ARCHITECTURE SPECIFICATIONS

Roof replacement

Public Work and Government Services Canada – CANMET
Laboratory in energy diversification research
1615 boul Lionel-Boulet, Varennes (Québec)

Approved for bid
August 26th 2014

Folder no :R.068119.001
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BISSON FORTIN ARCHITECTURE + DESIGN
PAGEAUMOREL

SPECFICATIONS
Approved for bid

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FIN DE SECTION

NUMBER OF PAGES

NUMBER OF PAGES

DIVISION 23 – HEATING, VENTILATION AND AIR CONDITIONNING (HVAC)

DIVISION 26 – ELECTRICAL

END OF SECTION

ARCHITECTURE

SPECIFICATIONS :

Specifications prepared by BISSON FORTIN ARCHITECTURE + DESIGN approved for bid, August 26th 2014.

DRAWINGS :

A00 Site and phasing plan – List of drawings
A01 Roof – Overall plan view – Demolition
A02 Roofing details – Demolition
A03 Roofing details – Demolition
A04 Roof – Overall plan view – Construction
A05 Roofing details – Construction
A06 Roofing details – Construction

MECHANICAL AND ELECTRICAL

SPECIFICATIONS :

Mechanical and electrical specifications prepared by PAGEAU MOREL approved for bid, August 26th 2014.

MECHANICAL DRAWINGS :

M01 Roof plan – Overall plan view – Demolition
M02 Roof plan – Overall plan view – Modified
M03 Details plan

ELECTRICAL DRAWINGS :

E01 Roof plan – Overall plan view – Demolition
E02 Roof plan – Overall plan view – Modified

STRUCTURE

DRAWINGS :

S01 Existing plan view
S02 Existing plan view

END OF SECTION

PART 1 – GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises replacement of the roof, located at 1615 Boul. Lionel-Boulet, Varennes, Quebec.

1.2 CONTRACT METHOD

.1 Construct Work under single build, stipulated price contract.

1.3 WORK BY OTHERS

.1 Work of Project executed during Work of this Contract, and which is specifically excluded from this Contract:
  .1 Replacement of the cooling unit and its structure.
  .2 Work of this Contract will need to be coordinated with the replacement of the cooling unit and its structure and achieve in line with the project schedule to ensure the sealing of the roof at all time.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner usage of the laboratory equipment during construction and specify the possible stop service of the equipment.

.3 Maintain access for fire protection; also provide the means to fight against fire.

1.5 CONTRACTOR USE OF PREMISES

.1 Coordinate the use of the premises as directed by Departmental Representative and according to the location and phasing plan.

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

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

.4 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.7 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 the Departemental Representative to facilitate execution of work.

1.8 EXISTING SERVICES

.1 Notify the Client representative and utility companies of intended interruption of services at least 72h in advance and obtain required permission.

.2 Submit schedule in accordance with the instruction in electromecanical specifications to and obtain approval from the Departemental 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.

.3 Provide temporary services when directed by the Departemental Representative to maintain critical building and tenant systems.

1.09 DOCUMENTS REQUIRED

.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.

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 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.

.2 Existing exits on the roof should, in no circumstance, be used by Contractor.

1.2 USE OF SITE AND FACILITIES

.1 Execute work in compliance with site and phasing plan with least possible interference or disturbance to normal use of premises. Make arrangements with Departemental Representative to facilitate work as stated.

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

.3 The Contractor will provide sanitary facilities for use by his personnel. Keep facilities clean.

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

1.3 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 Departemental Representative to facilitate execution of work.

1.4 EXISTING SERVICES

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

.2 Provide safe way for personnel and vehicular traffic.

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

1.5 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work Monday to Friday from 18:00 to 06:00 hours and on Saturdays, Sundays.

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

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

.4 Keep within limits of work as shown on site and phasing plan.

.5 Provide extinguisher, refer to Sections 01 52 00 – Work restrictions and 07 52 00 – Modified bituminous membrane roofing.

1.6 SECURITY

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

.2 Contractor's personnel will require satisfactory Departemental Representative initiated security screening in order to complete Work in premises and on site.

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted inside and outside the building.

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 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 PWGSC Representative to enable monitoring of project work in relation to established milestones.

1.2 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 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

.1	Contract award	2014-10-01	2014-10-01	1 day
.2	Kick-off meeting	2014-10-06	2014-10-06	1 day
.3	Phase 1A Work	2014-10-14	2014-10-15	2 days
.4	Structure Work	2014-10-16	2014-10-29	10 days
.5	Phase 1 Work	2014-10-30	2014-11-15	10 days
.6	Phase 2 Work	2015-04-15	2015-06-15	43 days
.7	Final acceptance	2015-06-16	2015-06-16	1 day

.2 No Work is allowed between November 15th 2014 and April 15th 2015.

1.5 MASTER PLAN

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

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

.3 Revise impractical schedule and resubmit within two (2) working days.

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

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

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

.3 The Work calendar is subject to Departemental Representative approval.

.4 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Siding and Roofing.
- .6 Lighting.
- .7 Electrical.
- .8 Piping.
- .9 Controls.
- .10 Heating, Ventilating, and Air Conditioning.
- .11 Millwork.
- .12 Fire Systems.
- .13 Testing and Commissioning.
- .14 Supplied equipment long delivery items.
- .15 Engineer supplied equipment required dates.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule once every two (2) weeks 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.

1.8 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.

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 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 and mock-ups 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.

1.2 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 Canada.

.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 work 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 shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 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.

.12 Submit one (1) electronic copie 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 3 years of date of contract award for project.

.13 Submit one (1) electronic copies 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.

.14 Submit one (1) electronic copies of manufacturer’s 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.

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

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

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

.18 Delete information not applicable to project.

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

.20 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.

1.3 SAMPLES

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

.2 Deliver samples prepaid to Work site 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 Representative 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.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 CERTIFICATES AND TRANSCRIPTS

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

.2 Submit transcription of insurance immediately after award of 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 GENERAL

1 Contractor shall manage its activities so that health and safety for the public and site personnel and environment protection has always precedence over issues related to cost and Work schedule.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 99 - Demolition for minor works.

1.3 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Province of Quebec
- .1 An Act Respecting Occupational Health and Safety, R.S.Q., c.S-2.1 (current edition) - Updated 2005.

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Data sheet

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within seven (7) days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit the copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within five (5) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five (5) days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

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

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

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

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

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

1.9 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.

.3 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 Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.

.2 Comply with Health and safety code taken by virtue of the Canadian Labour Code.

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 POSTING OF DOCUMENTS

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

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

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 11 01 – General work information

.2 Section 01 33 00 – Submittal procedures

.3 Section 01 61 00 – Common product requirements

.4 Section 02 41 99 - . Demolition for minor work

1.2 INSPECTION

.1 Allow Departmental Representative and Consultant 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 or Consultant 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 or Consultant 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.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or testing portions of Work. [Cost of such services will be borne by Consultant.

.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 Consultant at no cost to Consultant. Pay costs for retesting and reinspection.

1.4 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.

1.5 PROCEDURES

.1 Notify appropriate agency and Consultant 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.

1.6 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 Consultant 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 Consultant 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 Consultant.

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Consultant.

.2 Provide copies to subcontractor of work being inspected or tested and/or manufacturer or fabricator of material being inspected or tested.

1.8 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 Consultant and may be authorized as recoverable.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Consultant as specified in specific Section.

.3 Prepare mock-ups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups 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.

.5 Mock-ups may remain as part of Work.

1.10 MILL TESTS

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

1.11 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical [and building equipment] systems.

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 REFERENCES

.1 U.S. Environmental Protection Agency (EPA) / Office of Water
  .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 WATER SUPPLY

.1 Departmental Representative will provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

.3 The Contractor will have to pay for utility charges at prevailing rates.

1.5 TEMPORARY HEATING AND VENTILATION

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

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

.3 Ventilating:
  .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

1.6 TEMPORARY POWER AND LIGHT

.1 Departmental Representative will provide for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.

.2 Contractor will arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

1.7 FIRE PROTECTION

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

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

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 35 29-06 – Health and safety requirements.

1.2 REFERENCES

.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 (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 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 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

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

.2 Provide and maintain ladders and/or temporary stairs.

1.6 HOISTING

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

.2 Hoists and cranes to be operated by qualified operator.

1.7 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.

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site, where indicated in the contract documents.

.2 Provide and maintain adequate access to project site.

1.9 SECURITY

.1 The means of protection must comply with the Safety Code of the RBQ and of the C.S.S.T.

.2 The Contractor is responsible for compliance with requirements about fire protection specific of Work.

.3 At all time, keep on the extinguishers in accordance with applicable regulations on the roof site and on the premise.

.4 All flammable materials, gasoline, fuel, oil, grease and solvents, as well as oxygen, acetylene, butane and other similar products should be given special attention for their conservation and use. As such, the Contractor is required to comply with professional guidelines and is subject to regulation relating the deposit of these materials or products.

.5 The Contractor will store petroleum, chemical and other harmful products for health and environment in accordance with regulations. In a case of accidental spills, all necessary measures to stop the spill should be taken and the site should be decontaminate.

.6 Provide a complete and identified first aid kit and store it in an easily accessible location

1.10 OFFICES

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

.2 Provide marked and fully stocked first-aid case in a readily available location.

1.11 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.

.3 Provide lockable sheds to allow a waterproof environment to keep equipment, materials and tools and keep them clean and in good order. The contractor is responsible for handling the heavy materials and its heavy equipment on site. Avoid storage and any accumulation of materials and equipment on site that could put the completion in danger.

.4 Ensure environmental protection when handling materials and equipment.

.5 Deliver, store and keep packaged materials in their original condition, taking care not to alter their labels and seals.

.6 Store materials within the limits of the work in accordance with the provided instructions.

.7 Taking care not to damage or get materials dirty when they arrive on site or during handling and storage.

.8 Leave materials and equipment on site that haven't been kept away from the elements, but make sure they interfere as little as possible with the workflow.

1.12 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.

1.13 CONSTRUCTION SIGNAGE

.1 No construction signage indicating the Contractor or Consultant's name is permitted on Work site.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

1.15 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.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 – EXECUTION

3.1 NOT USED

.2 Not Used

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal

1.2 REFERENCES

.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 (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 HOARDING

.1 Erect temporary site enclosures using a metallic fence. Equip gates with locks and keys.

1.5 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of roofs.

.2 The barricades must support the calculated weather and wind pressure.

.3 Build a perfectly sealed temporary shelter for Phase 1a and maintain its waterproof attributes at all times.

1.6 Access routes for emergency vehicules

.1 Ensure an access for emergency vehicles and provide sufficient clearance.

1.7 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 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

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

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 – EXECUTION

3.1 NOT USED

.1 Refer to section 01 32 16.07 – Construction progress schedule – Bar chart (GANT)

.2 Refer to plan A00 – Site and phasing plan – List of drawings

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 45 00 – Quality control

.2 Section 06 20 00 – Finish carpentry

.3 Section 07 52 00 – Modified bituminous membrane roofing

.4 Section 07 62 00 – Sheet metal flashing and trim

.5 Section 07 92 00 – Joint sealant

1.2 REFERENCES

.1 The products must comply to the AMCQ standards.

.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, Consultant reserves right to refuse all product.

1.3 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 Consultant 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.

1.4 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 Consultant 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 Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

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

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.6 TRANSPORTATION

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

1.7 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 Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.

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

1.8 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 Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

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

1.9 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.

1.10 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.

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 52 00 – Construction facilities.

.2 Section 01 56 00 – Temporary barriers and enclosures.

1.2 REFERENCES

.1 Public Works and Government Services Canada (PWGSC), Standard Acquisition Clauses and Conditions (SACC) Manuel - ID : R0202D, Title : General Conditions « C ».

1.3 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.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.

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

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

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.6 Dispose of waste materials and debris off site.

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

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

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

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

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 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 including 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.

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

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

.8 Remove dirt and other disfiguration from exterior surfaces.

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

.10 Sweep and wash clean paved areas.

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

.12 Clean roofs, downspouts, and drainage systems.

.13 Remove snow and ice from access to building.

.14 Remove all trash on paved and grass areas used during Work.

.15 At the end of Work, install new grass on areas that were damaged by trucks, materials and other equipment during Work.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

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 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.

.2 PWGSC's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.3 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.4 Protect environment and prevent environmental pollution damage.

1.2 RELATED REQUIREMENTS

.1 Section 01 74 11 - Cleaning

1.3 REFERENCES

.1 Reference Standards: Canada Green Building Council (CaGBC)
LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).

1.4 DEFINITION

.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Consultant.

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

.3 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.

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

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

.6 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.

.7 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.

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

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

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:

.1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.

.2 Updated Waste Materials Tracking form (Schedule D).

.3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.

.2 Submit prior to final payment the following:

.1 Waste Diversion Report, indicating final quantities [in tones] by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials (See Schedule C).

.2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative or Consultant.

.2 Unless specified otherwise, materials for removal [do not become] [become] Contractor's property.

.3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.4 Protect structural components not removed and salvaged materials from movement or damage.

.5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative or Consultant.

.6 Protect surface drainage, mechanical and electrical from damage and blockage.

.7 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.8 Separate and store materials produced during project in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off site processing facility for separation.

.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

.4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.7 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 Tonnage reused or recycled.
- .5 Reused or recycled waste destination.

.4 Remove materials on-site as Work progresses.

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

1.8 INSTALLATION USAGE

.1 Execute work in minimal disruption of the normal use of site.

.2 Maintain the current securities measures for existing building. The temporary security measures must be approved by the Departmental Representative or Consultant.

1.9 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 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.

.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.

1.2 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 of commissioning are to demonstrate that equipments that have been removed, relocated and put back in place are perfectly operational after completion of works:

.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.

1.3 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.

1.4 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

1.5 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.

1.6 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.

1.7 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

1.8 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 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.3 Document require tests on approved PV forms.

1.9 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 Pre-start-up inspection reports.

.2 Signed installation/start-up check lists.

.3 Start-up reports,

1.10 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.

1.11 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.

1.12 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under actual or accepted simulated operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

1.13 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.14 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative, DCC Representative and Consultant for third and subsequent verifications where:

.1 Verification of reported results fail to receive Departmental Representative's approval.

.2 Repetition of second verification again fails to receive approval.

.3 Departmental Representative deems Contractor's request for second verification was premature.

1.15 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

1.16 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. Proceed with written approval from Departmental Representative.

1.17 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.

1.18 OCCUPANCY

.1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.19 OWNER'S PERFORMANCE TESTING

.1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

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 SUMMARY

.1 Section Includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.3 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

.3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.4 SAMPLES OF COMMISSIONING FORMS

.1 Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.

.2 Revise items on Commissioning forms to suit project requirements.

1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

.1 When additional forms are required, but are not available from develop appropriate verification forms and submit to Departmental Representative for approval prior to use.

.1 Additional commissioning forms to be in same format as provided by Departmental Representative.

1.6 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

- .1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.
- .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
- .3 Confirm operation as per design criteria and intent.
- .4 Identify variances between design and operation and reasons for variances.
- .5 Verify operation in specified normal and emergency modes and under specified load conditions.
- .6 Record analytical and substantiating data.
- .7 Verify reported results.
- .8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.
- .9 Submit immediately after tests are performed.
- .10 Reported results in true measured SI unit values.
- .11 Provide Departmental Representative with originals of completed forms.
- .12 Maintain copy on site during start-up, testing and commissioning period.
- .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual.

1.7 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.

Part 4 Individual system performance verification forms

4.1 Supply, evacuation or transfert fan

N° on plan :	**Service :**	**Location :**
Manufacturer :	Model :	Serial No :
Specifications		
Static pressure:	Flow :	Rotation frequency: _____RPM □ Constant / □ Variable
Motor (power) :	Électricity : ____ V/___ Φ/___ Hz	
Service factor :	Motor efficiency :	Filter type :
Paired damper : □ Motorised / □ Gravity / □ None	□ Damper spec sheet attached (if applicable)	

Prerequisites (check to confirm that prerequisite has been documented)

□ Shop drawings received	□ Installation complete	□ Network balanced	□ Connected to BAS
□ Sequence completed	□ Interlocks	State of filters at test :	
Comments :			

Measured element	**Instrument (Portable / BAS / Local)**	**Required**	**Measured 1**	**Measured 2**
Air flow (l/s – gpm)				
Operating pressure setpoint (Pa - "H_2O)				
Differential pressure (Pa - "H_2O)				
Pressure loss at filter (Pa - "H_2O)				
Voltage (if three-phase T_1, T_2, T_3)				
Amperage (I_1 /I_2 /I_3)				
O/L protection – Adjustment				
Comments				
Is test conclusive or not, add description				

Participants of realisation (R), validation (V) and approbation (A) tests :

Authority / company	**Name**	**Activity**	**Signature**	**Date**
Plumbing				
Ventilation				
Controls				
TAB				
Witness (General contractor)		V		
Commissionning agent				

4.2 Pipe tests

Drive N^{O} :	**System :**	**Location :**
Manufacturer :	Model :	Serial No :
Motor or associated equipment N^{O} :		

Prerequisites (check to confirm that prerequisite has been documented)

□ Shop drawings received	□ Installation complete	□ Network balanced	□ Connected to BAS
□ Associated motor performance verified (attached)		□ Control sequence completed	
□ Adequate full load amperage (FLA)			
Comments:			

Measurements at various speeds								
Percentage of full speed (%) as indicated on control panel		**min**	**30**	**50**	**65**	**80**	**100**	**100 bypass**
Motor and associated equipment properties (measurement instrument: Portable / BAS / Local)								
Flow (l/s – ft³/min)	Required							
	Measured 1							
	Measured 2							
Static pressure (Pa - "H2O)	Prescrit							
	Measured 1							
	Measured 2							
Speed (Hz)	Measured							
Current (A)	Phase I_1 Phase I_2 Phase I_3							
Voltage (V)	T_1 -T_2 T_2 - T_3 T_3 -T_1							
Acceleration from 0 to X% (sec)								
Comments :								
Is test conclusive or not, add description								

Participants of realisation (R), validation (V) and approbation (A) tests :

Authority / company	**Name**	**Activity**	**Signature**	**Date**
Plumbing				
Ventilation				
Controls				
TAB				
Witness (General contractor)		V		
Commissionning agent				

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 – Finis carpentry

.2 Section 07 52 00 – Modified bituminous membrane roofing

.3 Section 07 62 00 – Sheet metal flashing and trim

.4 Section 07 92 00 – Joint sealants.

1.2 REFERENCES

.1 CSA International
- .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 21 - Construction/Demolition Waste Management Disposal.

.2 Submit demolition drawings:
- .1 Submit for review and approval shoring and underpinning drawings stamped and signed by professional engineer registered or licensed in the Province Canada, showing proposed method.
- .2 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating the percentage of construction wastes that were recycled or

1.4 SITE CONDITIONS

.1 Review "Designated Substance Report" and take precautions to protect environment.

.2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
- .1 Proceed only after receipt of written instructions have been received from Departmental Representative.

.3 Notify Departmental Representative before disrupting building access or services.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Inspect building site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

3.2 PREPARATION

.1 Protection of In-Place Conditions:
- .1 Prevent movement, settlement, or damage to adjacent structures, landscaping features and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants 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.

.2 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.

3.3 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 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 52 00 – Modified bituminous membrane roofing

.2 Section 07 62 00 – Sheet metal flashing.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI/HPVA HP-1-10, American National Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards, 1st edition, [2009].

.3 ASTM International
- .1 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 CSA International
- .1 CSA B111-74(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 CSA O153-M1980(R2008), Poplar Plywood.
- .6 CAN/CSA-Z809-08, Sustainable Forest Management.

.5 Sustainable Forestry Initiative (SFI)
- .1 SFI-2010-2014 Standard.

1.3 SUPPLEMENTARY INFORMATIONS ABOUT WORK

.1 All items shown on the plans and necessary for the demolition and roofing works including membrane and sheet metal work (flashings and others). The items include, without limitation:
- .1 Demolition.
- .2 Parapets and fascia
- .3 Bases or curbs required for the passage and support of mechanical and electrical roof equipment, whereas the partial replacement of the frames and plywood of about 20%.
- .4 All the flashing and other roofing accessories.
- .5 Resettlement roof hatches.
- .6 All items prepared under coverage support coating, including the supply and installation of brackets, mounting, insulation, gypsum board, vapor barrier under parapets, walls and roof bases.

1.4 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 plywood and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit one electronic copy of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
- .3 Indicate materials, thicknesses, finishes and hardware.

.4 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.2 Plywood panels to CSA and ANSI standards.

1.6 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood products from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
- .1 CSA O141.
- .2 CAN/CSA-Z809 or FSC or SFI certified.
- .3 NLGA Standard Grading Rules for Canadian Lumber.
- .4 Machine stress-rated lumber is acceptable.
- .5 Hardwood lumber: moisture in accordance:

.1 National Hardwood Lumber Association (NHLA).
.2 CAN/CSA-Z809 or FSC or SFI certified.

.2 Panel Material: urea-formaldehyde free.

.3 Panel:
.1 Canadien softwood plywood: CAS O151 conform standard “construction” classification, “standard” category.

.4 Wood preservative
.1 Impregnation under vacuum and pressure wood complies with CSA C80 to retention level of 3.84 kg/m.cu.
.2 Use pressure treated wood (pieces of wood and plywood) for all roof elements.
.3 Retouch cuts using a product on site in accordance with CSA O80.

2.2 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to ASTM A 123/A 123M for exterior work, interior humid areas and for treated lumber; as existing finish elsewhere.

.2 Wood screws: plain, type and size to suit application.

.3 Adhesive and Sealants: in accordance with Section [07 92 00 - Joint Sealants].

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of the laboratory hired by Consultant.
.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 Unless otherwise stated, execute finish carpentry work to Quality Standards of (AWMAC).

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:
.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Interior and exterior frames:

.1 Set frames with plumb sides and level heads and sills and secure.

.3 Panelling:

.1 Secure panelling and perimeter trim using adhesive recommended for purpose by manufacturer. Fill nail holes caused by temporary fixing with filler matching wood in colour.

.2 Secure panelling and perimeter trim using concealed fasteners.

.3 Secure panelling and perimeter trim using counter sunk screws plugged with matching wood plugs.

3.4 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 and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by finish carpentry installation.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 – Finish carpentry

.2 Section 07 62 00 – Sheet metal flashing and trim.

1.2 SUPPLEMENTARY INFORMATION FOR WORK

.1 Provide materials, scaffolding, equipment, tooling and necessary manpower to complete the sealing roof work and their complements, as indicated on plans or described in this section, but without limitation.
- .1 Partial or complete demolition of existing roofing elements as indicated on plans.
- .2 Temporary supports for equipments, bases and other constructions where required for the execution of the current work.
- .3 Insulation and sloped insulation.
- .4 Parapet construction.
- .5 Insulation of parapets.
- .6 Drip edge flashing.
- .7 Gypsum board panels where indicated on plans.
- .8 Roof drains and vent sleeve.
- .9 Elastomeric bitumen roofing.
- .10 Membrane flashing.
- .11 Waterproofing at perforations in roof.
- .12 Expansion and control joints.
- .13 Metal flashing.
- .14 Pitch boxes.
- .15 Sealant joints where required.
- .16 All work necessary to obtain perfect waterproofing and finished work.

1.3 REFERENCES

.1 ASTM International Inc.
- .1 ASTM C 726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
- .2 ASTM C 1396/C 1396M-06a, Standard Specification for Gypsum Board.
- .3 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing,
- .4 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- .5 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
- .6 ASTM D 3617-83e1, Standard Practice for Sampling and Analysis of New Built-Up Roof Membranes.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 37-GP-9Ma-83 Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 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.
.7 CSA-B111-1974, Wire Nails, Spikes and Staples.
.8 CSA-A247-M86, Panneaux de fibres isolants.

.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.

.8 Manual “Work covers” the Master Roofing Association of Canada(CRCA).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with [roofing contractor's representative, Departmental Representative and Consultant in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review [manufacturer's]installation instructions and warranty requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Provide one copy of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide one copy of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and indicate VOC content for:
- .1 Primers.
- .2 Asphalt.
- .3 Sealers.

.3 Provide shop drawings:
- .1 Indicate flashing, control joints, insulation and tapered insulation details.
- .2 Provide layout for tapered insulation.

.4 Samples: submit one sample of each specified product in the present section.

.5 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.6 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens, roofing felt and membrane with specification requirements.

.7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.8 Manufacturer's field report: in accordance with Section [01 45 00 - Quality Control].

.9 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.6 QUALITY ASSURANCE

.1 The contractor shall, at the time of tenders and during the work, be officially recognized as an approved Contractor by the Manufacturer sealants roofer and be a member of the Association of Master Roofers in Quebec (AMCQ and CRCA).

.2 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 10 years documented experience and approved by manufacturer.

.3 Inspection of the work described in this section and relevant tests will be carried out by an independent inspection firm (control firm), specialized in roofing, accredited by the Association of Master Roofers of Quebec, mandated and paid by the owner.

.4 The supervising office will conduct a preliminary inspection to verify the carrier to receive the roofing materials, slopes, durability cleanliness, preparation and approval of related structures such as walls, parapets, downspouts plumbing vent, and other required work.

.5 In addition, the supervising office shall, before beginning of work, check the conformity between the specification and minimum requirements of the Master Roofers Association of Quebec, in order to ensure the insurance of its guaranteed.

.6 During installation of roofing materials, the presence of the control inspector will be continuous and no interruption will be allowed.

.7 The inspector’s presence, however, is not required with performing cleaning work supports, whether rid of surplus materials, accumulation of snow and/or ice on the surface. If the roofing contractor summoned the inspector by mistake for periods where his presence is not required, the contractor must bear the cost of such a presence.

.8 After installing the metal, the inspector supervising the Work shall ensure that the Work of sheet metal is consistent with the plans and specification and meet the installation requirements. The continued presence of the inspector is not required during the metal installation.

.9 The Contractor shall ensure perfect continuality the execution of Work that the incorporated materials are not damaged by any cause whatsoever.

.10 Work inspection ensure compliance with plans and specifications and will include following verifications:
- .1 Nature, thickness, weight and number of waterproofing membranes.
- .2 Overlap and sealing joints of membranes.
- .3 The construction of membranes and metal flashing or control joints or expension.
- .4 Sealing the base of mechanical, electrical or other equipment on the rooftop.
- .5 Stormwater runoff to the various drains.

.11 After Work acceptance by the inspector, he will provide a certificate of quality and compliance of the required installations to the Contractor.

1.7 FIRE PROTECTION

.1 Fire Extinguishers:
- .1 Maintain stored pressure rechargeable type with hose and shut-off nozzle,
- .2 ULC labelled for A, B and C class protection.
- .3 Size as indicated on roof per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

.3 Do dot solder directly on old dry wood.

.4 Carefully ensure cleanliness on site and always have a fire extinguisher UL listed Class, A, B, and C on hand near each torch. It must be loaded and in perfect condition throughout the Work. Observer the safety instructions accompanying sealant specifications. Ensure that the location where the torch is placed is not located near flammable or combustible materials.

.5 At the end of each working day, ensure that there is no smoldering fire. The site organization must allow the presence of worker at least one jour after the completion of welding.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

.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 Store insulation protected from daylight and weather and deleterious materials.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.2 Fold up metal banding, flatten and place in designated area for recycling.

1.9 SITE CONDITIONS

.1 Ambient Conditions

.1 Do not install roofing when temperature remains below -5 degrees celcius for torch application, or -5 degrees celcius for mop application.

.2 Minimum temperature for solvent-based adhesive is -5 degrees celcius.

.3 If temperature limits recommended by fabricant differ from limits indicated in the specifications, the more restrictive will prevail.

.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.

1.10 WARRANTY

.1 The bilayer Elastomeric membranes manufacturer must provide a written and signed document issued to the Department Representative certifying that products meet Canadian standards and guaranteed for a period of ten (10) years from the date of final certification of completion.

.2 The roofing contractor must submit the guarantying certificate of the Master Roofers Association of Quebec supported by AMCQ to the owner. The Contractor must support the first five years plus an additional five-year period by AMCQ.

.3 The total duration of the warranty period shall be ten (10) years, during which tree inspections are to be provided by AMCQ. Those reports will be forwarded to the Department Representative. Theses inspections will be managed by the AMCQ and executed in the presence of the Consultant and/or Department Representative.

.4 All deficiencies found during these inspections will be corrected without charge to the Department Representative. Maintenance however will be at the expense of the Department Representative. The AMCQ provide a report of these inspections to Department Representative.

1.11 MATERIALS

.1 Work and materials shall must comply with the applicable requirements contain in the work manuals of Master Roofer Association of Quebec (AMCQ).

.2 All sealants will be provided by the same manufacturer.

1.12 LABORATORY

.1 Upon request of the Consultant, manufacturer of membrane products will present the result of mechanical tests and chemical analyzes of the membranes provided. These tests must be performed by an independent laboratory accredited by the National Research Council of Canada or by a laboratory accredited ISO 9002.

.2 Besides establishing that the product meets the requirement of ONGC 37-GP-56M, testing should also demonstrate that they meet the performance of the products specified in this section. Refer to the manufacturer's technical data specified to establish performance level to meet.

.3 The manufacturer will provide more test results for each of the features described below, these tests will be performed according to the specified requirements:
- .1 Accelerated aging: according to UEACT norm (softening point and cold bending)
- .2 Dimensional stability: according to UEACT norm (transversely and longitudinally)
- .3 Creep resistance: according to UEATC standards.

1.13 SITE PROTECTION

.1 When transporting materials on roofs and during work, protect exposed surfaces of finished work with protective coverings to avoid damage. Install walkways made of rigid boards on the roofs, over the materials used to allow the passage of people and equipment. Assume full responsibility for any damage.

1.14 MANUFACTURER'S REPRESENTATIVE

.1 At the beginning and during the waterproofing Work, a manufacturer representative of the sealants company must be present on site.

.2 The Contractor will permit and facilitate access on site and on the roof at any time to all manufacturer's representative mentioned above.

1.15 CLEANING

.1 Regularly clean Work site of waste or other materials that may affect the execution and performance of the Work.

PART 2 – PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

.3 Materials and roofing systems must comply with NBC, AMCE and ACEC requirements.

.4 Specified membrane systems represent a minimum quality standard to be achieved, the Contractor may propose equivalent materials for approval and reviewed by the AMSC. For example, membrane system IKO, SOPREMA or TREMCO are accepted.

2.2 DECK COVERING

.1 Gypsum board sheathing Type X 9,3 mm (3/8'') or 12,7 mm (1/2''),same as existing thickness, conform the following norms:
- .1 CAN/ULC-S102;
- .2 CAN/ULC-S107;
- .3 Classe A.

.2 Provide for the replacement of existing gypsum board sheating that is in poor condition on 20% of the surface of the roof.

2.3 DECK PRIMER

.1 Primary (bitumen base layer) Compliant with CGSB 37-GP-9m.
- .1 Appropriated and consistent primer to the surface and material, according to the manufacturer's recommendations.

2.4 VAPOUR RETARDER

.1 On the existing vapor barrier or surface plasterboard, apply a universal primer according to manufacturer's recommendations.

.2 Membrane composed of SBS modified bitumen and a composite frame. The upper surface is sanded and the lower face is cover with a removable protective film. The upper surface will be marked with three (3) lines to facilitate alignment of the rollers. Must also comply to the following specifications:

.1	Thickness	3,5 mm	
.2	Vapour resistance (ng/Pa*s*m²)	0,2	
.3	Traction resistance (kN/m)	17	12,5
.4	Elongation at break (%)	60	65
.5	Cold flexibility at -30^{0}C	No fissure	
6	Tear resistance (N)	105	
.7	Dimensional stability	0,3	0,3
.8	Resistance to static loading (N)	400	
.9	Tear resistance (N)	60	
.10	ASTM D5147		
.11	CAN/CGSB-37.56-M		
.12	ASTM D5601		

2.5 MEMBRANE

.1 Underlayment membranes:
- .1 Current area: to CGSB 37-GP-56M.
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer. Both sides are covered by a heat-sealable plastic film. The surface to be marked with three (3) lines to facilitate alignment of the rollers.
  - .2 Minimum requirements

.1	Deformation resistance (kN/m)	7,8	7,2
.2	Traction resistance (kN/m)	15	13,5
.3	Elongation at break (%)	60	65
.4	Tear resistance (N)	125	
.5	Resistance to static loading (N)	560	
.6	Dimensional stability	0,2	0
.7	Résistance au fluage (^{0}C)	≥ 110	
.8	Cold flexibility at -30^{0}C	No fissure	
.9	Resistance of the oberlay covering (kN/m)	Succeed > 4 kN/m	
.10	Thickness:	2,5 mm	

.2 For parapets

.1 Description: Styrene-Butadiene-Styrene (SBS) elastomeric polymer. Both sides are covered by a heat-sealable plastic film. The surface to be marked with three (3) lines to facilitate alignment of the rollers.

.2 Compliant to ONGC 37.56-M (9e ébauche).

.3 Compliant to ASTM D6162.

.4 Minimum requirements

.1	Deformation resistance (kN/m)	7,8	7,2
.2	Traction resistance (kN/m)	15	13,5
.3	Elongation at break (%)	60	65
.4	Tear resistance (N)	125	
.5	Resistance to static loading (N)	560	
.7	Cold flexibility at -30^{0}C	No fissure	
.8	Thickness	3 mm	

.2 Finish membrane

.1 Curent area

.2 Description: Membrane composed of Styrene-Butadiene-Styrene (SBS) elastomeric polymer with flame retardant. Surface protected with colored granules and the underside is covered by a heat-sealable plastic film.

.3 Compliant to ONGC 37.56-M(9^e draft)

.4 Minimum requirements

.1	Deformation resistance (kN/m)	7,8	7,2
.2	Traction resistance (kN/m)	15	13,5
.3	Elongation at break (%)	60	65
.4	Tear resistance (N)	125	
.5	Resistance to static loading (N)	560	
.6	Dimensional stability	0,2	0
.7	Résistance au fluage (^{0}C)	≥ 110	
.8	Cold flexibility at -30^{0}C	No fissure	
.9	Resistance of the oberlay covering (kN/m)	Succeed > 4 kN/m	
.10	Thickness	3,7 mm	

.2 For parapets:

.1 Description: Membrane composed of Styrene-Butadiene-Styrene (SBS) elastomeric polymer with flame retardant. Surface protected with colored granules and the underside is covered by a heat-sealable plastic film.

.2 Compliant to ONGC 37.56-M(9e draft)

.3 Minimum requirements

.1	Deformation resistance (kN/m)	7,8	7,2
.2	Traction resistance (kN/m)	15	13,5
.3	Elongation at break (%)	60	65
.4	Tear resistance (N)	125	
.5	Resistance to static loading (N)	560	
.6	Dimensional stability	0,2	0
.7	Résistance au fluage (^{0}C)	≥ 110	
.8	Cold flexibility at -30^{0}C	No fissure	
.9	Resistance of the oberlay covering (kN/m)	Succeed > 4 kN/m	
.10	Thickness		

.3 Color choice:
- .1 Current areas: gray.
- .2 Sidewalks traffic: color approved by the architect depending on the manufacturer's availability.

.4 Starter membrane:
- .1 Description: Membrane composed of Styrene-Butadiene-Styrene (SBS) elastomeric polymer with a surface protected with colored granules, has a strip of 100mm (4") on each side. The underside is covered by a heat-sealable plastic film.
- .2 Compliant to ONGC 37.56-M(9e draft)
- .3 Minimum requirements

.1	Strain energy (kN/m)	13	10
.2	Breaking strenght (kN/m)	25	21
.3	Ultimate elongation (%)	66	93
.4	Tear resistance (N)	118	
.5	Static poncture (N)	432	
.6	Dimensional stability	0,2	0,2
.7	Plastic flow(^{0}C)	105	110
.8	Cold bending at -30^{0}C	No fissure	
.9	Lap adhesion	Initial	27,0
		5 days at 50^{o}C	27,0
		14 days at 70^{o}C	27,0
.10	Thickness	4 mm	

2.6 ADHESIVE

.1 Adhesive for insulation.
- .1 Two-component urethane adhesive with low expansion, fast-curing and without temperature limit.

.2 Primer for heat-sealable membrane
- .1 Primer composed of bitumen, known for their adherence to volatile solvents and resins. Used as a primer to improve adhesion of waterproofing membranes sealable.

.3 Primer for adhesive membrane
- .1 Primer composed of SBS synthetic rubbers resins known for their ability to grip and for their solvent without VOC. Used as a primer to improve adhesion of waterproofing membranes.

2.7 ROCK FIBER INSULATION

.1 Insulation complies with ASTM C 726 standards, type 1 and CAN/ULC-S702.2, thickness indicated, straight edges.
- .1 Fiber insulation panel with a hard surface and made from basalt rock and steel slag. ITS surface is saturated with a bitumen layer for the implementation of the membranes installed by using a torch, hot bitumen or adhesive.

.2 Insulation panel for drain cup;
- .1 Cup insulation panel made of mineral wool designed to facilitate the flow of water around the drain.

2.8 POLYISOCYANURATE INSULATION

.1 To CAN/ULC-S704, facing, thickness as indicated.
  .1 Flat 1 200 x 1200mm panels, thickness as indicated. Compliant to CAN/ULC 5704-01 norm and with a minimum RSI of 1,25 for 25mm thickness. The insulation must also have the ULC and FM approval. Index propagation of flame ≤ 25mm as ASTME-84.

2.9 SLOPED INSULATION

.1 Expanded polystyrene insulation panel, adapted to provide a roof slope system of minimum 2%. The insulation slope must have a minimum of 12mm thickness at the base. The panel must have the following characteristics:
  .1 Panel 1220 x 1220 mm, thickness to determine the time required to correct the slope.
  .2 Permeability to water vapor for a thickness of 1 '(ASTM C518, C117): 2.66 perm
  .3 Dimensional stability for a thickness of 1 '(ASTM D2126): 0.32%
  .4 Compressive strength for a thickness of 1 ½ '' (ASTM D1621): 93.00 kPa minimum.
  .5 Flexural strength for a thickness of 1 ½ '' (ASTM C 203) 209 kPa
  .6 Flame Spread:
    .1 ASTM E 84: 15
    .2 CAN.4-S102.2M: 115

2.10 REVERSE SLOPE BEHIND EQUIPMENTS

.1 Rock fiber insulation panel, with the same characteristics as flat insulation, designed to provide the roofing system of an index of sufficient slope to let the water flow (minimum 4%). The insulation shall have a minimum of 0mm thickness at the base of the slope.

2.11 SEALERS

.1 Description: Multi-use mastic based SBS with modified bitumen, fiber, minerals and solvents.

.2 Sealant for filling mastic boxes:
  .1 Description: Mastic boxes system made of prefabricated modules of various sizes, polyurethane, interlocking with each other as well as a sealing compound solvent, base made of two-component polyurethane and a single component elastomeric sealant.

2.12 WALKWAYS

.1 Waterproofing membrane composed of SBS modified bitumen and reinforced with a non-woven polyester to protect the membranes of the pedestrian traffic. The surface is covered with black pellets and the underside is covered by a heat-sealable film.

.2 Compliant to ONGC 37.56-M(9e draft)

2.13 CARPENTRY

.1 Refer to Section 06 20 00 – Finish carpentry.

2.14 FASTENERS

.1 Covering to steel deck: No. 10 flat head, self-tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and 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.

2.15 COPPER DRAINS

.1 Copper apron measuring 6000 mm x 600 mm, 0.55mm (16oz).

.2 Downpipe copper 0.55mm thick (16oz) x diameter.

.3 Connect apron to the downpipe with a watertight seal.

.4 Coper and welding comply with following standards:
- .1 Comply to ASTM B32-87, Specification for Solder Metal.
- .2 Comply to ASTM B370-88, Specification for Copper Sheet and Strip for Building Construction.

.5 Stainless steel or cast aluminium strainers mechanically adjustable by means or screws to a thight contact to the downpipe.

.6 Flexible sleeve or donut seal according to site conditions

2.16 ACCESSORIES

.1 Two-component polymethyl methacrylate-based (PMMA) liquid membrane combined to fleece fabric to form a monolithic, self-flashing and self-adhering reinforced membrane.
- .1 Comply to ASTM D5147
- .2 Comply to ASTM D412
- .3 Comply to ASTM D412
- .4 Comply to ASTM D570

.2 Vent prefabricated cone, model and dimensions adapted to existing conditions.

.3 Precast aluminium sleeve as MURPHCO, model 1500 or approved equivalent.

.4 Mounting for ducts with following specifications
- .1 Mounting of ±135mm high
- .2 One piece support shell with extruded polystyrene type 3 base.
- .3 UV resistant.
- .4 Comply with CAN/ULC-S701-97.

.5 Flexible waterproof expansion join covers made with a rubber membrane supported by closed-cell foam.
- .1 Comes with its galvanized or prepainted metal flashing;
- .2 Size to fit existing conditions;
- .3 Refer to plans for appropriate shape.

.6 Interlocking prefabricated pitch pocket system, polyurethane based filled with quick dry waterproofing mastic.
- .1 Mastic sealant shall be solvent free, polyurethane bi-composite base with fast-curing after application.
- .2 Use suitable size for different equipment
- .3 Complies to ASTM D412

PART 3 – EXECUTION

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual, particularly for fire safety precautions.

.2 Do priming in accordance with manufacturers written recommendations.

.3 Make the connection of the assembly of components and materials taking onto account the loads of the considered elements.

.4 Realize entirely all the Work of a basin prior to starting a new basin.

.5 Roofing must run on a continuous basis as when the surfaces are ready and weather the conditions permit. Mot to undertake demolition if the weather forecast during working hours or other conditions prevent from completing Work.

.6 Seal all joints of the sub-layers that are not covered with a coat membrane the same day. In no event shall there be any moisture trapped in the joints before laying a second membrane.

3.2 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Consultant.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.3 IMPLEMENTATION’S CONDITION

.1 Do not install roofing materials when the temperature is below -5^{o}C considering the wind factor.

3.4 EXAMINATION OF ROOF DECKS

.1 The examination and preparation of surfaces must be made according to the instructions included in the technical documentation of the roof membrane manufacturer.

.2 Prior to the beginning of the work, the owner's representative and the roofing superintendant will be responsible to inspect and approve the condition of support (slopes and wood blocking, where applicable) as well as vertical surfaces at parapets, roof drains, plumbing vents and others, ventilation exhausts and others and construction joints. When applicable, a non conformity notice will be given to the contractor in order for him to proceed to the corrections. The beginning of the work will be considered as an acceptance of the conditions related to the achievement of the work.

.3 Do not start any of the work until surfaces are clean, smooth, dry and free of ice, snow and waste materials. The use of calcium salts and is forbidden to remove ice or snow.

.4 Ensure that plumbing, carpentry and others have been duly completed.

.5 Do not install roofing materials during rain or snowfall.

3.5 DEMOLITION

.1 Perform demolition as indicated on plans.

3.6 REPAIRS

.1 Provide for the replacement of plasterboard panels and unsound vapour barrier where required. Corrections may reach about 20% of the total roof surface. This work will be carried out and paid according to the price schedule defined and measured quantities.

3.7 INTERMEDIATE COATING INSTALLATION

.1 Mechanically attach the gypsum board to the steel deck with steel embedded screws in the upper face of the support ribs, 400mm center line in both direction. According to the requirements of the manufacturer and FM (Factory Mutual).

.2 Place the coating in the longitudinal direction, perpendicularly to the ribs of the support, so that the end joints are offset and completely supported on the ribs.

3.8 PRIMER APPLICATION

.1 Apply primer to gypsum board support, respecting the manufacturer's recommended dosage.

3.9 VAPOUR RETARDER (ON GYPSUM BOARD/EXISTING VAPOUR BARRIER)

.1 The installation of the vapour barrier is required on the new gypsum board support panels only and on all damaged or not watertight areas of the existing membrane areas. The addition of vapour barrier on existing membrane surfaces resulting in damages made by the contractor during the demolition work will not be paid for, nor considered in the calculation of quantities for the construction work.

.2 Unroll and welding torch on the primed surface

.3 Overlap membrane sheets of at least 75mm and 150mm, the sides and ends respectively.

.4 Perform installation following the manufacturer's recommendations.

3.10 PROTECTED MEMBRANE ROOFING (PMR) APPLICATION

.1 Installation of insulation fully adhered by adhesive bonding
- .1 Before installing boar insulation, ensure that the vapor barrier is in perfect condition to ensure full continuity of the air barrier and vapor protection under the insulation. Do not cover with insulation until the support and the vapor barrier has been inspected and approved.
- .2 No wet or degraded insulation will be accepted
- .3 Do not let the insulation without protection at the end of workday. Cover tightly insulated panels. Remove temporary protection
- .4 All insulation boards with damaged, badly cut or ill-fitting edges or surfaces will be refused.
- .5 Paste the insulation vapor barrier laminated with a urethane adhesive bi-component low expansion, fast-curing and without temperature limit.
- .6 Paste with a cold adhesive the slope expended insulation panels to redo the basin 4B and 5A or other basin that needs correction on the vapor barrier membrane, with paste recommended by manufacturer. So that it is farthest form heat, install the two next rows of insulation (polyisocyanurate and rock fiber) in the order specified on plans over the slopped insulation.
- .7 Flat and tapered modules slopes panels once installed and
- .8 All vertical joints between the modules and flat panel slopes including the supports of the sealing membranes, will be shifted in the vertical and the horizontal plane.
- .9 Secure insulation board. Seal the spacing more that 3mm between the panels with rock fiber insulation. If the joints exceed 6mm, fill them with a triangular piece of the same insulating board to obtain a smooth and uniform surface.
- .10 Place boards in parallel rows staggered; panels should be joined in tight contact.
- .11 At the end of row, cut the panels to the required length.
- .12 Apply adhesive webs placed 300 mm oc.
- .13 Ask one (1) thickness of draining sheets or sheets of independence for detaching the membrane and the insulation.

.2 Insulation panel for drain cup installation
- .1 The drain cup panel must be installed according to manufacturer’s recommendations.

.3 Base sheet application:
- .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
- .2 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
- .3 Lap sheets 75 mm for side and 150 mm for end laps.
- .4 Application to be free of blisters, wrinkles and fishmouths.
- .5 Perform the installation of the membrane according to the manufacturer's recommendations.

.4 Cap sheet application:
- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
- .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
- .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm from those in base sheet.
- .4 Application to be free of blisters, fishmouths and wrinkles.

.5 Proceed with membrane application in accordance with manufacturer's recommendations.

.5 Flashings:
- .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
- .2 Torch sheet onto substrate in 1 metre wide strips.
- .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
- .4 Lap flashing cap sheet to membrane cap sheet 200 mm and torch weld.
- .5 Provide 75 mm side lap and seal.
- .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
- .7 Do Work in accordance with manufacturer's recommendations and Section 07 62 00 - Sheet Metal Flashing and Trim.

.6 Roof penetration:
- .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with the manufacturer's recommendations and details.

3.11 WALKWAYS

.1 Install walkway membrane in accordance with manufacturer's instructions and as indicated.
- .1 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

.2 Install pavers, level on insulation pads, as indicated.

3.12 FIELD QUALITY CONTROL

.1 Refer to section 01 45 00 – Quality control.

3.13 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 instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

.4 Waste Management: separate waste materials for reuse and recycling.
- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
- .3 Ensure emptied containers are sealed and stored safely.
- .4 Divert unused aggregate materials from landfill to local facility for reuse as reviewed by Departmental Representative.
- .5 Unused coating material must be disposed of at official hazardous material collections site as reviewed by Departmental Representative.
- .6 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .7 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

.8 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.

.9 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.

.10 Divert unused gypsum materials from landfill to recycling facility as reviewed by Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 – Finish carpentry.

.2 Section 07 52 00 – Modified bituminous membrane roofing.

1.2 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 AAI DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
- .1 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.
- .2 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.
- .3 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .4 ASTM B 32-04, Standard Specification for Solder Metal.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 Roofing Specifications Manual 1997.

.4 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.

.5 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.

1.3 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 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.4 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
.2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARANTY

.1 Provide a written warranty, issued and signed on behalf of the owner, by the installer and the manufacturer certifying that the work specified in this section shall be free from defects in materials and workmanship including against cracking, flaking, discoloration and crumbling for a period of five (5) years from the final acceptance date.

.2 The warranty shall cover the cost of all the cost of any expense incurred by the repair of such defects or any other damage to the building resulting from defect of Work.

.3 The form of the warranty shall be approved by the architect and the owner.

PART 2 – PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Galvanized steel sheet:
.1 Zinc based-coating steel sheet: to ASTM A 653/A 653M, commercial quality, gauge 24 with Z275 coating.
.2 Stainless steel sheet: to ASTM A 167 and ASTM A 240/A 240M], with existing finish.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied polyvinylidene fluoride.
- .1 Class F1S.
- .2 Colour as existing.
- .3 Specular gloss: 30 units +/- in accordance with ASTM D 523.
- .4 Coating thickness: caliber 24.
- .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 2500 hours.
  - .2 Humidity resistance exposure period 5000 hours.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.
- .1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.

.4 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness 50 mm same as sheet metal being secured.

.5 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.

.6 Hardware exposed to the elements: hardware and fasteners in stainless steel for new equipment or same material that existing elements.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.9 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work 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.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 0.61mm thick galvanized or prefinished, as existing.

2.6 REGLETS AND CAP FLASHINGS

.1 Form metal cap flashing of 0.48mm thick sheet metal to be built for base flashings as detailed.
- .1 Provide slotted fixing holes and steel/plastic washer fasteners.
- .2 Cover face and ends with plastic tape.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.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 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.7 Insert metal flashing under cap flashing to form weather tight junction.

.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.9 Caulk flashing at reglet and cap flashing with sealant.

.10 Install pans, where shown around items projecting through roof membrane.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 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

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 62 00 – Sheet metal flashing and trim.

1.2 REFERENCES

.1 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.

.2 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.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

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 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 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:
- .1 Submit 2 samples of each type of material and colour.
- .2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:
- .1 Submit instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 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 off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect joint sealants from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.6 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.

1.7 QUALITY CONTROL

.1 The introduction of different sealants will be conducted by a specialized firm with a good reputation, approved by the product manufacturer which has at least five (5) years experience in the field, the necessary equipment and employing skilled workers to perform Work satisfactorily.

1.8 WARANTY

.1 Provide a written warranty, issued and signed on behalf of the owner, by the installer and the manufacturer certifying that the work specified in this section shall be free from defects in materials and workmanship including against losses, sealing, cracking, sapling, loss of consistency, shrinkage, sagging, loss of adhesion and tarnishing of adjacent surfaces for a period of five (5) years from the final acceptance date.

.2 The warranty shall cover the cost of any expense incurred by the repair of such defects or any other damage to the building resulting from defect of Work.

.3 The warranty form shall be approved by the architect and the owner.

PART 2 – PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odors, contains toxic chemicals or is not certified as mold 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.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Primer: recommended by the sealant manufacturer type.
- .1 Sealant 1: one component silicone sealant with a high yield and medium modulus, with the following characteristics:
  - .1 Comply to ASTM-C920, type S, nuance NS, class 25, usage NT, M,A and 0.
  - .2 SWRI: validation of product nº: 604-CWS609.
  - .3 Additional movement capability of ± 25 relative to the original size of the joint.
  - .4 Colour choice from the architect from all the colours in the manufacturer's palette.

.2 Sealants and caulking should not contain the following components or be manufactured with these aromatic solvents, talc fibers or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, and barium derivatives, except barium sulfate.

.3 In order to minimize health risks and maximize product performance, it is important that they are accompanied by detailed information on the application methods for disposal instruction.

.4 Caulking that has strong odors, which contain toxic chemical that are not certified as a mold resistant type should not be used in processing air equipment.

.5 If we cannot do otherwise that using toxic product, restrict its use in areas where fumes may be vented to the outside or in places where they will be confined behind fences air barrier , or apply several months before the place is occupied to allow the evacuation of fumes on the longest possible period.

2.3 SUPPORT MATERIALS

.1 Compressible backer foam, closed cell circular.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

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 joint sealants 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 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.

3.3 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.

3.4 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.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 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.

3.7 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.

3.8 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

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.2 Drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 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.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

.1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.5 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 Make changes as required and re-submit as directed by Departmental Representative.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 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 weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-Built drawings:

.1 Identify each drawing in 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).

.2 Submit to Departmental Representative for approval and make corrections as directed.

.3 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect from [nicks, scratches, and blemishes].

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 NOT APPLICABLE.

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 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.

.2 Identify and number equipments according to nomenclature on plans.

3.2 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

3.3 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.4 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 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.

.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Departmental Representative will record these demonstrations on video tape for future reference.

3.6 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.

3.7 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

3.8 SHUT DOWN OF SERVICES AND SYSTEMS

.1 CANMET/PWC have to be advised 48 hours in advance before any shut down in odrer to obtain permission.

.2 Indicate possible down time. Do not exceed the time specified in the table on the following pages of this section.

.3 Make sure to have responsible personal available at all times during evenings, nights, week-ends and holidays or on demand from CANMET/PWC

3.9 SCOPE OF WORKS

.1 Refer to notes on plans in order to understand scope of works, along with specifications.

3.10 PHASING OF WORKS

.1 Works will be done in phases.

.2 Refer to architectural documents in order to understand different phases and their contents

Items aux plans/ Items on plans	Description Mécanique/Électrique	Démolition	Mise à l'arrêt possible	**Maximum shut down time**
		Oui / Non	Oui / Non	
1	SYSTÈME M21-E1, ÉVACUATION	Non		2 days, out of occupation time
2	REFROIDISSEUR DE MARQUE REF-PLUS	Non	Oui	10 days
3	SORTIE DE TUYAUTERIE DE RÉFRIGÉRANT	Non	Oui	10 days
4	SORTIE DE TUYAUTERIE DE RÉFRIGÉRANT	Non	Oui	10 days
5	REFROIDISSEUR / Sectionneur 208,V 3P, 60A F40A	Non	Oui	10 days
6	SYSTÈME M20-E1, ÉVACUATION / Moteur 575V, 1/2HP 3P	Non	Oui	10 days
7	PRISE D'AIR	Non	Oui	2 days, out of occupation time
8	SORTIE DE TUYAUTERIE - ÉVENT	Non	Oui	10 days
9	SORTIE D'AIR	Non	Oui	2 days, out of occupation time
10	CHEMINÉE 250	Non	Oui	2 days, out of occupation time
11	CHEMINÉES (375 ET 300) ET ÉVENT	Non	oui	10 days
12	CHEMINÉE 400	Non	oui	10 days
13	CHEMINÉE OBTURÉE	**Oui**		
14	SORTIE DE TUYAUTERIE - ÉVENT	Non	oui	10 days
15	VENTILATEUR D'ÉVACUATION	**Oui**		
16	SYSTÈME M1-E1, ÉVACUATION HOTTE /Sec tionneur 600V, 3P, 30A, type 3	**Oui**		
17	ÉVACUATION 250	Non	Oui	2 days, out of occupation time
18	SYSTÈME M1-R1, ÉVACUATION USINE PILOT	Non	Oui	2 days, out of occupation time
19	CHEMINÉE 550	**Oui**		
20	SYSTÈME M2-E9, ÉVACUATION DES LABORATOIRES / Sectionneur 600V, 30A, 3P , type 3	Non	Non	
21	SYSTÈME M4-E1, ÉVACUATION PIÈCES # 1103, 1104, 1107, 1108 / Moteur de hotte DIRECT DRIVE	Non	Oui	2 days, out of occupation time
22	SORTIE DE TUYAUTERIE - ÉVENT DE VAPEUR?	Non	Non	
23	SORTIE DE TUYAUTERIE	Non	Oui	10 days
24	ÉVACUATION D'AIR	Non	Oui	2 days, out of occupation time
25	OUVERTURE AU TOIT DE 965 x 965	Non	Oui	10 days
26	OUVERTURE AU TOIT OBTURÉE DE 572 x 572	**Oui**		
27	REFROIDISSEUR / Sectionneur 600V, 200A, 3P, type 3	Non	Oui	up to april 15 th, 2015
28	CHEMINÉE 400	Non	Oui	5 days
29	SORTIE DE TUYAUTERIE - ÉVENT DE GAZ NATUREL	Non	Non	
30	CHEMINÉE 250	Non	Oui	2 days, out of occupation time
31	PRISE D'AIR	Non	Oui	2 days, out of occupation time
32	SORTIE DE TUYAUTERIE	Non	Oui	
33	ÉVACUATION D'AIR	Non	Oui	2 days, out of occupation time
34	CHEMINÉE 350	Non	Oui	10 days
35	OUVERTURE DE 2286 x 1016	Non	Oui	10 days
36	CHEMINÉE 350	**Oui**		
37	CHEMINÉE 350	**Oui**		
38	CHEMINÉE 350	**Oui**		
39	OUVERTURE AU TOIT - CONDUITS ÉLECTRIQUES	Non	Oui	10 days
40	CHEMINÉE 200	**Oui**		
41	CHEMINÉE 350	Non	Oui	10 days
42	SYSTÈME M31-E2, ÉVACUATION / Moteur de hotte DIRECT DRIVE	**Oui**		
43	CHEMINÉE 350	**Oui**		
44	SORTIE D'AIR	Non	Oui	10 days
45	OUVERTURE DE 1041 x 1626	**Oui**		

Items aux plans/ Items on plans	Description Mécanique/Électrique	Démolition	Mise à l'arrêt possible	**Maximum shut down time**
		Oui / Non	Oui / Non	
46	OUVERTURE DE 660 x 660 AVEC BASE DE 1003 x 1524	**Oui**		
47	OUVERTURE DE 660 x 660 AVEC BASE DE 1003 x 1524	**Oui**		
48	OUVERTURE AU TOIT - CONDUITS ÉLECTRIQUES	Non	Oui	10 days
49	SYSTÈME M2-E3, ÉVACUATION / Sectionneur 600V, 30A ,3P type 3	Non	Oui	10 days
50	OUVERTURE DE 660 x 660 AVEC BASE DE 1003 x 1524	**Oui**		
51	SYSTÈME M2-E5, ÉVACUATION / Sectionneur 600V, 30A ,3P type 3	**Oui**		
52	SYSTÈME M2-E6, ÉVACUATION HOTTE / Sectionneur 600V, 30A ,3P type 3	Non	Oui	10 days
53	OUVERTURE DE 660 x 660 AVEC BASE DE 1003 x 1524	**Oui**		
54	SYSTÈME M3-E2, ÉVACUATION CUISINE / Moteur de hotte	Non	Oui	2 days, out of occupation time
55	SYSTÈME M3-E1, ÉVACUATION PIÈCES # 1232, 1233, 1234, 1235, 1236, 1242, 1243. / Moteur de hotte	Non	Oui	2 days, out of occupation time
56	SYSTÈME M30-E1, ÉVACUATION TOILETTE BUREAU PHASE II / Moteur de hotte	Non	Oui	2 days, out of occupation time
57	OUVERTURE AU TOIT	**Oui**		
58	ÉVACUATION de salle de toilette DIRECT DRIVE	Non	Oui	2 days, out of occupation time
59	Pyranomètre (Station de mesure d'Albedo)	**Oui**		
60	Lumière extérieur type "wall pack" HID	Non	Oui	10 days
61	Station météo	Non	Oui	2 days
62	Station météo	Non	Oui	2 days
63	Station météo	Non	Oui	2 days
64	Conduit d'acier rigide (-27 mm) pour dérivation de panneau solaire	Oui		
65	Quatre (4) conduit d'acier rigide (-103 mm) pour dérivation de panneau solaire	Oui		
66	Conduit d'acier rigide (-27 mm) pour dérivation de panneau solaire	Oui		
67	Panneau solaire, (Source sous tension)	Non	Oui	10 days
68	Panneau solaire, (Source sous tension)	Non	Oui	10 days
69	Conduit flexible de refroidisseur (-27 mm)	Non	Oui	10 days
70	Conduit flexible de station météo (-53 mm)	Non	Oui	2 days
71	Deux (2) conduits rigides rigide de (-21mm)	Non	Oui	from october to april
72	Conduit rigide (-27mm)	Non	Oui	10 days
73	Deux (2) conduits rigides rigide de (-27mm)	Oui		
74	Cheminée banc d'essais hybride	Oui		
75	Panneaux solaires thermique	Non	Oui	10 days
Note	Protection contre la foudre			

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 23 31 13.01 – Metal Ducts – Low Pressure to 500 PA.

1.2 REFERENCES

.1 Definitions:

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previouslydefined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

.2 Reference Standards:

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1-04, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.

.1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411-05, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553-02e1, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

.6 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.7 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Description of equipment giving manufacturer's name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

.2 Shop Drawings:

.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.3 Manufacturers' Instructions:

.1 Provide manufacture's written duct insulation jointing recommendations. and special handling criteria, installation sequence, cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, member of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address [and ULC markings].

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

.1 Canvas:

.1 220 gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168 and GSES GS-36.

.3 Aluminum:

.1 To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Stucco embossed.

.4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

.1 Stainless steel:

.5 Type: 304.

.6 Thickness: 0.25 mm sheet.

.7 Finish: Stucco embossed.

.8 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168 and GSES GS-36.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 ULC Listed Canvas Jacket:

.1 220 gm/m^2 cotton, plain weave, [treated with dilute fire retardant lagging adhesive to ASTM C921] [untreated].

.5 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m^2.

.6 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.7 Contact adhesive: quick-setting

.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168 and GSES GS-36.

.8 Canvas adhesive: washable.

.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168 and GSES GS-36.

.9 Tie wire: 1.5 mm stainless steel.

.10 Banding: 12 mm wide, 0.5 mm thick stainless steel.

.11 Fasteners: 2 mm diameter pins with 35 mm diameter clips, length to suit thickness of insulation.

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 PRE-INSTALLATION REQUIREMENTS

.1 Pressure test ductwork systems complete, witness and certify.

.2 Ensure surfaces are clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and as indicated.

.3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.5 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

.6 Insulate, if necessairy, ductwork which could have been elongated or modified because of the works.

3.4 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thicknesses: conform to following table:

TIAC Code		Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Round cold and dual temperature supply air ducts	C-2	yes	50

.2 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.1 Finishes: conform to following table:

TIAC Code	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3
Outdoor, exposed to precipitation	CRF/3	CRD/4
Outdoor, elsewhere	CRF/4	CRD/5

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 13 17 – Drainage Waste and Vent Piping – Cast Iron and Copper.

.2 Section 23 21 13.02 – Hydronic Systems Steel.

.3 Section 23 23 00 – Refrigerant Piping..

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1-01, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.

.2 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.3 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.

.6 ASTM C547-2003, Mineral Fiber Pipe Insulation.

.7 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.8 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as specified.

.2 TIAC ss:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

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

.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.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards member of TIAC.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

.5 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

.6 TIAC Code A-6: flexible unicellular tubular elastomer.

.1 Insulation: with vapour retarder jacket.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Certified by manufacturer: free of potential stress corrosion cracking corrodants.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: fibrous glass, untreated 305 g/m^2.

2.8 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: to match adjacent finish paint.

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.7 Special requirements:

.1 Outdoor: UV rated material at least 0.5 mm thick.

.2 Canvas:

.1 120 gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.3 Aluminum:

.1 To ASTM B209.

.2 Thickness: 0.50 mm sheet.

.3 Finish: stucco embossed.

.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

.4 Stainless steel:

.1 Type: 304.

.2 Thickness: 0.25 mm.

.3 Finish: stucco embossed.

.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

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 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Securements: Tape at 300 mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: [A-3].

.1 Securements: Tape at 300 mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp. degree Celsius	TIAC Code	Pipe sizes (NPS) and insulation thickness (mm)					
			Up to 1	from 1¼ to 2	from 2½ to 4	from 5 to 6	6 and over	Up to 175
Hot Water Heating	60 - 94	A-1	25	38	38	38	38	38
Hot Water Heating	Jusqu'à 59	A-1	25	25	25	25	38	38
Glycol Heating	60 - 94	A-1	25	38	38	38	38	38
Glycol Heating	Jusqu'à 59	A-1	25	25	25	25	38	38
Refrigeranthot gas suction	4 - 13	A-6	25	25	25	25	25	25
Refrigerant liquid	Moins de 4	A-6	25	25	38	38	38	38
RWL and RWP	C-2	25	25	25	25	25	25	

.5 Finishes:

.1 Exposed indoors: canvas jacket.

.2 Exposed in mechanical rooms: canvas jacket.

.3 Concealed, indoors: canvas on valves, fittings. No further finish.

.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.5 Outdoors: water-proof aluminum jacket.

.6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

.7 Insulate all new piping, if necessary, because of piping modifications.

3.6 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

Partie 1 Général

1.1 RÉFÉRENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

.1 ANSI/AWWA C111/A21.11-06, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 American Society of Mechanical Engineers (ASME)

.1 ASME B16.1-10,Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

.2 ASME B16.3-06, Malleable Iron Threaded Fittings: Classes 150 and 300.

.3 ASME B16.5-09, Pipe Flanges and Flanged Fittings: NPS through NPS 24 Metric/Inch Standard.

.4 ASME B16.9-07, Factory-Made Wrought Buttwelding Fittings.

.5 ASME B18.2.1-10, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).

.6 ASME B18.2.2-10, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.3 ASTM International

.1 ASTM A47/A47M-99(2009), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.

.3 ASTM A536-84(2009), Standard Specification for Ductile Iron Castings.

.4 ASTM B61-08, Standard Specification for Steam or Valve Bronze Castings.

.5 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.6 ASTM E202-10, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.4 CSA International

.1 CSA B242-05(R2011), Groove and Shoulder Type Mechanical Pipe Couplings.

.2 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

1.2 DOCUMENTS/ÉCHANTILLONS À SOUMETTRE POUR APPROBATION/INFORMATION

.1 Fiches techniques

.1 Soumettre les fiches techniques requises ainsi que les instructions et la documentation du fabricant concernant réseaux hydroniques. Les fiches techniques doivent indiquer les caractéristiques des produits, les critères de performance, les dimensions, les limites et la finition.

.2 Dessins d'atelier

.1 Les dessins d'atelier soumis doivent porter le sceau et la signature d'un ingénieur compétent reconnu ou habilité à exercer au Canada, dans la province de Québec.

.2 Indiquer sur les dessins ce qui suit.

.1 Composants et accessoires.

1.3 TRANSPORT, ENTREPOSAGE ET MANUTENTION

.1 Transporter, entreposer et manutentionner les matériaux et le matériel conformément à la section 01 61 00 - Exigences générales concernant les produits et aux instructions écrites du fabricant.

.2 Livraison et acceptation : livrer les matériaux et le matériel au chantier dans leur emballage d'origine, lequel doit porter une étiquette indiquant le nom et l'adresse du fabricant.

.3 Entreposage et manutention

.1 Entreposer les matériaux et le matériel de manière qu'ils ne reposent pas sur le sol, dans un endroit propre, sec et bien aéré, conformément aux recommandations du fabricant.

.2 Remplacer les matériaux et le matériel endommagés par des matériaux et du matériel neufs.

Partie 2 Produit

2.1 TUYAUTERIE

.1 Tuyaux en acier : conformes à la norme ASTM A53/A53M, catégorie B, ainsi qu'aux prescriptions suivantes.

.1 Jusqu'à NPS 6 : série 40.

2.2 JOINTS

.1 Tuyaux de diamètre nominal égal ou inférieur à NPS 2 : raccords à visser avec ruban en PTFE.

.2 Tuyaux de diamètre nominal égal ou supérieur à NPS 2 : raccords à souder, selon la norme CSA W48.

.3 Tuyaux à embouts rainurés par roulage : accouplements standard, selon la norme CSA B242.

.4 Garnitures pour accouplements de tuyaux à extrémités rainurées par roulage : type EPDM.

2.3 RACCORDS

.1 Raccords à visser : en fonte malléable, selon la norme ASME B16.3, classe 150.

.2 Raccords à souder bout à bout : en acier, selon la norme ASME B16.9.

.3 Raccords-unions : en fonte malléable, selon les normes ASTM A47/A47M ASME B16.3.

.4 Raccords pour tuyaux à embouts rainurés par roulage : en fonte malléable, selon la norme ASTM A47/A47M et en fonte ductile, selon la norme ASTM A536.

Partie 3 Exécution

3.1 EXAMEN

.1 Vérification des conditions : avant de procéder à l'installation des réseaux hydroniques, s'assurer que l'état des surfaces/supports préalablement mis en oeuvre aux termes d'autres sections ou contrats est acceptable et permet de réaliser les travaux conformément aux instructions écrites du fabricant.

.1 Faire une inspection visuelle des surfaces/supports en présence du Représentant du Ministère.

.2 Informer immédiatement le Représentant du Ministère de toute condition inacceptable décelée.

.3 Commencer les travaux d'installation seulement après avoir corrigé les conditions inacceptables et reçu l'approbation écrite du Représentant du Ministère.

3.2 CHARGE DU CIRCUIT D'EAU GLYCOLÉE

.1 Utiliser, pour le remplissage, un mélange d’eau distillée et de propylène glycol préparé en usine et non au chantier.

.2 Une fois le nettoyage du réseau terminé, vérifier de nouveau la concentration de la solution d'eau glycolée conformément à la norme ASTM E202.

.3 Utiliser du propylène glycol pour obtenir le mélange adéquat, 50/50.

3.3 NETTOYAGE

.1 Nettoyage en cours de travaux : effectuer les travaux de nettoyage conformément à la section 01 74 11 - Nettoyage.

.1 Laisser les lieux propres à la fin de chaque journée de travail.

.2 Nettoyage final : évacuer du chantier les matériaux/le matériel en surplus, les déchets, les outils et l'équipement, conformément à la section 01 74 11 - Nettoyage.

FIN DE LA SECTION

Part 1 General

1.1 REFERENCES

.1 ASME

.1 ASME B16.22-12, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.

.2 ASME B16.24-11, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 600, 900, 1500 and 2500.

.3 ASME B16.26-11, Cast Copper Alloy Fittings for Flared Copper Tubes.

.4 ASME B31.5-10, Refrigeration Piping and Heat Transfer Components.

.2 ASTM International

.1 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.2 ASTM B280-08, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.3 CSA Group

.1 CSA B52-05(R2009), B52 Package, Mechanical Refrigeration Code.

.4 Environment Canada (EC)

.1 EPS 1/RA/1-96, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for refrigerant piping, fittings and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect refrigerant piping, fittings and equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 TUBING

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

.1 Hard copper: to ASTM B280, type ACR B.

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

2.2 FITTINGS

.1 Service: design pressure 2070 kPa and temperature 121 degrees C.

.2 Brazed:

.1 Fittings: wrought copper to ASME B16.22.

.2 Joints: silver solder, copper-phosphorous, 95% Cu-5%P and non-corrosive flux.

.3 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 VALVES

.1 22 mm and under: Class 500, 3.5 Mpa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.

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

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 refrigerant piping 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 MANUFACTURER'S INSTRUCTIONS

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

3.3 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

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

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

3.4 PIPING INSTALLATION

.1 General:

.1 Hard drawn copper tubing: do not bend. Minimize use of fittings.

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.2 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.

.3 Provide inverted deep trap at top of risers.

.4 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified.

.2 Small riser: size for 5.1 m3/s at minimum load. Connect upstream of traps on large riser.

3.5 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

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

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

3.6 EXISTING REFRIGERANT

.1 Make sure to recuperate all existing refrigerant before working on piping.

.2 Re-use existing refrigerant, if possible, after works on piping.

.3 Use same type of refrigerant, if necessary, to obtain a complete installation.

3.7 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.

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

.4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa absolute and filled with dehydrated oil.

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

.6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14 Pa absolute and hold for 4 hours.

.2 Break vacuum with refrigerant to 14 kPa.

.3 Final to 5 Pa absolute and hold for at least 12 hours.

.4 Make sure not to discharge refrigerant to atmosphere

.5 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.

.6 Submit test results to Departmental Representative.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.

.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.

.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make checks and measurements as per manufacturer's operation and maintenance instructions.

.2 Record and report measurements to Departmental Representative.

3.8 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

Partie 1 Général

1.1 RÉFÉRENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

.1 ANSI/AWWA C111/A21.11-06, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 ASTM International

.1 ASTM A480/A480M-12, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-09b, 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 A653/A653M-11, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Green Seal Environmental Standards (GS)

.1 GS-36-11, Standard for Adhesives for Commercial Use.

.4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2005.

.2 SMACNA HVAC Air Duct Leakage Test Manual, 2012.

.3 IAQ Guideline for Occupied Buildings Under Construction 2007.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 DOCUMENTS/ÉCHANTILLONS À SOUMETTRE POUR APPROBATION/INFORMATION

.1 Fiches techniques

.1 Soumettre les fiches techniques requises ainsi que les instructions et la documentation du fabricant concernant les conduits d'air métalliques. Les fiches techniques doivent indiquer les caractéristiques des produits, les critères de performance, les dimensions, les limites et la finition.

.2 Dessins d'atelier

.1 Les dessins d'atelier soumis doivent porter le sceau et la signature d'un ingénieur compétent reconnu ou habilité à exercer au Canada, dans la province de Québec.

1.3 TRANSPORT, ENTREPOSAGE ET MANUTENTION

.1 Transporter, entreposer et manutentionner les matériaux et le matériel conformément à la section 01 61 00 - Exigences générales concernant les produits.

.2 Livraison et acceptation : livrer les matériaux et le matériel au chantier dans leur emballage d'origine, lequel doit porter une étiquette indiquant le nom et l'adresse du fabricant.

.3 Entreposage et manutention

.1 Entreposer les matériaux et le matériel de manière qu'ils ne reposent pas sur le sol, dans un endroit propre, sec et bien aéré, conformément aux recommandations du fabricant.

.2 Entreposer les conduits d'air métalliques de manière à les protéger contre les marques, les rayures et les éraflures.

.3 Remplacer les matériaux et le matériel endommagés par des matériaux et du matériel neufs.

Partie 2 Produit

2.1 CLASSES D'ÉTANCHÉITÉ À L'AIR

.1 La classe d'étanchéité à l'air des conduits doit être déterminée selon les données du tableau ci-après.

Pression maximale (Pa)	Classe d'étanchéité (SMACNA)
500	C
250	C
125	C

.2 Classes d'étanchéité

.1 Classe A : joints longitudinaux, joints transversaux, traversées murales et raccordements scellés au moyen d'un produit et d'un ruban d'étanchéité.

.2 Classe B : joints longitudinaux, joints transversaux et raccordements scellés au moyen d'un produit d'étanchéité, d'un ruban d'étanchéité ou d'une combinaison de ces éléments.

.3 Classe C : joints transversaux et raccordements scellés au moyen de garnitures, d'un produit ou d'un ruban d'étanchéité ou d'une combinaison de ces éléments. Joints longitudinaux non scellés.

.4 Joints non scellés.

2.2 PRODUIT D'ÉTANCHÉITÉ

.1 Caractéristiques liées au développement durable

.1 Adhésifs et produits d'étanchéité : teneur maximale en COV de 30 g/L, selon le règlement numéro 1168 du SCAQMD la norme GS-36.

.2 Produit d'étanchéité : pour conduits d'air, à base d'eau, à base de polymères, ignifuge, résistant à l'huile et pouvant supporter des températures allant de -30 degrés Celsius à 93 degrés Celsius.

2.3 RUBAN D'ÉTANCHÉITÉ

.1 Ruban d'étanchéité : membrane de fibres de verre, à armure lâche, traitée au polyvinyle, de 50 mm de largeur.

2.4 ÉTANCHÉITÉ DES CONDUITS D'AIR

.1 Selon les exigences formulées dans le HVAC Air Duct Leakage Test Manual de la SMACNA.

2.5 RACCORDS

.1 Fabrication : selon la SMACNA.

2.6 CONDUITS D'AIR EN ACIER GALVANISÉ

.1 Conduits en acier pliable permettant de former des agrafures : selon la norme ASTM A653/A653M, avec zingage Z90.

.2 Épaisseur, fabrication et renforcement : selon l'ASHRAE la SMACNA.

.3 Joints : conformes à l'ASHRAE à la SMACNA joints préfabriqués de marque déposée pour conduits d'air. Les joints à brides préfabriqués et de marque déposée, pour conduits d'air, doivent être considérés comme un type d'étanchéité de classe A.

2.7 CONDUITS D'AIR EN ACIER INOXYDABLE

.1 Acier inoxydable : de nuance 304, selon la norme ASTM A480/A480M.

.2 Fini : numéro 4.

.3 Épaisseur, fabrication et renforcement : selon l'ASHRAE la SMACNA les indications.

.4 Joints : selon l'ASHRAE la SMACNA soudés en continu en atmosphère inerte

Partie 3 Exécution

3.1 GÉNÉRALITÉS

.1 Assujettir les conduits verticaux conformément aux exigences des normes pertinentes de l'ASHRAE et des normes pertinentes de la SMACNA, selon les indications.

.2 Poser les joints à brides préfabriqués, de marque déposée, selon les instructions du fabricant.

3.2 CONDUITS ÉTANCHES À L'EAU

.1 Les conduits suivants doivent être étanches à l'eau.

.1 Les prises d'air neuf.

.2 Tous les conduits indiqués.

.2 Façonner le fond des conduits horizontaux sans y faire de joints longitudinaux.

.1 Souder les joints transversaux des tôles de fond et latérales.

.2 Sceller tous les autres joints au moyen d'un produit de d'étanchéité pour conduits d'air.

.3 Donner aux dérivations horizontales une pente descendante vers les hottes d'extraction des fumées et des gaz auxquelles elles sont reliées.

.1 Donner aux conduits collecteurs une pente descendante vers les conduits verticaux principaux auxquels ils sont reliés.

.4 Poser, au bas des conduits verticaux principaux, une cuvette d'égouttement de 150 mm de profondeur, avec tuyau d'évacuation de 32 mm de diamètre raccordé à un siphon à garde d'eau profonde muni d'un robinet.

.5 Les gaines exposées aux intempéries doivent être en acier inoxydable.

3.3 SCELLEMENT

.1 Appliquer le produit d'étanchéité selon les exigences de la SMACNA selon les recommandations du fabricant.

.2 Noyer le ruban dans le produit d'étanchéité, puis recouvrir le tout d'au moins une (1) couche du même produit, selon les recommandations du fabricant.

3.4 ESSAIS D'ÉTANCHÉITÉ DES CONDUITS D'AIR

.1 Exécuter les essais d'étanchéité conformément aux exigences formulées dans le HVAC Duct Leakage Test Manual de la SMACNA.

.2 Faire les essais en procédant par tronçon.

.3 Faire les essais préliminaires d'étanchéité (visant à déceler les fuites d'air) selon les instructions, pour vérifier la qualité d'exécution des travaux.

.4 Ne pas poser d'autres conduits tant que les résultats de ces essais préliminaires ne sont pas satisfaisants.

.5 Ne pas calorifuger ni dissimuler les conduits avant d'avoir terminé les essais exigés.

3.5 NETTOYAGE

.1 Nettoyage en cours de travaux : effectuer les travaux de nettoyage conformément à la section 01 74 11 - Nettoyage.

.1 Laisser les lieux propres à la fin de chaque journée de travail.

.2 Nettoyage final : évacuer du chantier les matériaux/le matériel en surplus, les déchets, les outils et l'équipement, conformément à la section 01 74 11 - Nettoyage.

FIN DE LA SECTION

Part 1 General

1.1 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 2005.

1.2 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect air duct accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m^2.

Part 3 Execution

3.1 INSTALLATION

.1 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

3.2 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

Part 1 General

1.1 REFERENCES

.1 Definitions:

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1-10, Canadian Electrical Code, Part 1 last edition, Safety Standard for Electrical Installations.

.2 CAN3-C235-F83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

1.2 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 outlets and lighting fixtures and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

.1 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.2 Submit one (1) number of copies product data to authority having jurisdiction.

.3 If changes are required, notify Departmental Representative.

.4 Certificates:

.1 Provide CSA certified material.

.2 Submit test results of installed electrical systems and equipment.

.3 Permits and fees: in accordance with General Conditions of contract.

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for lighting fixtures for incorporation into manual.

.1 Operating instructions to include following:

.1 Safety precautions.

.2 Procedures to be followed in event of equipment failure.

.3 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.2 Supply instructions as instructed by the Ministry’s representative.

1.4 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 and supplier’s name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect material 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.

.5 Packaging Waste Management: remove for recycling as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Language operating requirements: provide identification nameplates for control items in French and English.

.3 Use one nameplate for both languages.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material to be CSA certified.

.3 Factory assemble control panels and component assemblies.

2.3 Electrical motor and electrical apparatus

.1 Identify and number equipments according to nomenclature on plans.

.2 Before removing any equipment, record state of operation of all electrical equipment located in the work zone.

.1 Forward results to consultant and Departmental Representative.

.3 Note the direction of rotation of motors.

.4 After construction work is completed. Before re starting of equipment or motor make sure they are in working state condition and rotation is as per previous record.

.1 Forward results to consultant and Departmental Representative.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. XX" as directed by Departmental Representative.

.7 Disconnect: nameplate shall indicate equipment being controlled and voltage and power supply.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Outdoor electrical equipment to be painted as per architect requirements.

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 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 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 CONDUIT AND CABLE INSTALLATION

.1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

3.5 LOCATION OF OUTLETS

.1 Locate outlets.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

3.6 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Lighting.

.2 Motors.

.3 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 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 recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.3 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wire and box connectors 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.

.5 Packaging Waste Management: remove for return by manufacturer as specified in Construction Waste Management Plan.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

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 wire and box connectors 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.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors cables and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

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 in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Reference standard

.1 Conform to Thermoplastic insulated wires and cables STD CSA C22.2 n° 75.

.2 Conform to Thermoset-insulated wires and cables STD CSA C22.2 n° 38.

1.2 PRODUCT DATA

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for return by manufacturer in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE, Non Jacketted.

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 dielectric 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.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Conductor length for parallel feeders to be identical.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA Group

.1 CSA C22.1-10, Canadian Electrical Code, Part 1 last edition, Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.2 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 connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for recycling as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper short barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

.3 Joint boxes dry location type in accordance with Section 26 05 32 - Raceway and Boxes for Electrical Systems.

Part 3 Execution

3.1 INSTALLATION

.1 Install terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

3.2 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 and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.1-10 Canadian electrical code.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.3 CLOSEOUT SUBMITTALS

.1 Submit required documents.

1.4 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect grounding equipment 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.

.5 Packaging Waste Management: remove for reuse by manufacturer as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 EQUIPMENT

.1 Insulated grounding conductors: green, copper conductors, as per table 16 of the CSA C22.1 Canadian electrical code.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform ground continuity and resistance 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 Disconnect ground fault indicator during tests.

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 recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-10, Canadian Electrical Code, Part 1, last Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1-10.

2.2 CONDUIT BOXES

.1 Cast FS aluminum or CPV waterproof boxes with factory-threaded hubs surface mount devices.

2.3 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Conduit outlet bodies for conduit up to 21 mm.

.3 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 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.4 Vacuum clean interior of outlet boxes before installation of wiring devices.

.5 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA C22.2 No. 18.3-12, Conduit coupling.
- .2 CSA C22.2 No. 45-[M1981(R2003)], Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-[04], Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 211.2-06, Rigid PVC conduit.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

- .1 Submit cable manufacturing data.

.3 Quality assurance submittals:

- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.2 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal aluminum.

2.2 CONDUIT FASTENINGS

.1 One hole malleable iron straps to secure surface conduits 53 mm and smaller.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

2.4 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 INSTALLATION

.1 Conceal conduits when it possible.

.2 Use rigid galvanized steel threaded conduit except where specified otherwise.

.3 Use rigid pvc conduit in corrosive areas.

.4 Use always liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp.

.5 Minimum conduit size: 21 mm.

.6 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 21 mm diameter.

.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.9 Install fish cord in empty conduits.

.10 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.11 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not pass conduits through structural members except as indicated.

3.4 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.

3.5 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.

END OF SECTION

Partie 1 Général

1.1 RÉFÉRENCES

.1 CSA International

.2 Insulated Cable Engineers Association, Inc. (ICEA)

1.2 DOCUMENTS/ÉCHANTILLONS À SOUMETTRE POUR APPROBATION/INFORMATION

.1 Soumettre les documents requis conformément à la section 01 33 00 - Documents/Échantillons à soumettre.

.2 Fiches techniques

.1 Soumettre les fiches techniques requises ainsi que les instructions et la documentation du fabricant concernant les câbles. Les fiches techniques doivent indiquer les caractéristiques des produits, les critères de performance, les dimensions, les limites et la finition.

.3 Documents/Échantillons à soumettre relativement à la conception durable

.1 Gestion des déchets de construction

.1 Soumettre le plan de gestion des déchets de construction établi pour le projet, lequel doit préciser les exigences en matière de recyclage et de récupération.

.2 Soumettre les calculs relatifs aux taux de recyclage en fin de projet, aux taux de récupération et aux taux d'envoi aux sites d'enfouissement, lesquels doivent démontrer que 75 % des déchets de construction ont effectivement été détournés des sites d'enfouissement.

1.3 TRANSPORT, ENTREPOSAGE ET MANUTENTION

.1 Transporter, entreposer et manutentionner les matériaux et le matériel conformément aux instructions écrites du fabricant.

.2 Livraison et acceptation : livrer les matériaux et le matériel au chantier dans leur emballage d'origine, lequel doit porter une étiquette indiquant le nom et l'adresse du fabricant.

.3 Entreposage et manutention

.1 Entreposer les matériaux et le matériel dans un endroit propre, sec et bien aéré, conformément aux recommandations du fabricant.

.2 Entreposer les câbles de manière à les protéger contre les marques, les rayures et les éraflures.

.3 Remplacer les matériaux et le matériel endommagés par des matériaux et du matériel neufs.

.4 Gestion des déchets d'emballage : récupérer les déchets d'emballage aux fins de réutilisation/réemploi et de reprise par leur fabricant, selon les directives de plan de réduction des déchets, conformément à la section 01 74 21 - Gestion et élimination des déchets de construction/démolition

Partie 2 Produit

2.1 Sans objet.

Partie 3 Exécution

3.1 POSE DE CÂBLES EN CONDUITS

.1 Poser les câbles dans les conduits.

.2 Il est interdit de tirer des câbles épissés dans les conduits.

.3 Poser simultanément tous les câbles passant dans la même canalisation.

.4 Pour réduire la tension de tirage, utiliser des lubrifiants approuvés par la CSA et compatibles avec l'enveloppe extérieure du câble.

.5 Une fois la pose des câbles terminée, obturer les extrémités des conduits au moyen d'un produit conçu pour le scellement des conduits.

3.2 CONTRÔLE DE LA QUALITÉ SUR PLACE

.1 Faire les essais conformément à la section 26 05 00 - Électricité - Exigences générales concernant les résultats des travaux.

.2 Confier l'exécution des essais à un personnel compétent.

.1 Fournir les instruments et le matériel nécessaires.

.3 Vérifier l'ordre des phases et repérer individuellement les conducteurs de chaque phase de chaque artère d'alimentation.

.4 Vérifier la continuité de toutes les artères d'alimentation; s'assurer que ces dernières sont exemptes de courts-circuits et de fuites à la terre.

.1 S'assurer que la résistance entre la terre et chaque circuit n'est pas inférieure à 50 mégohms.

.5 Essais préalables à la réception.

.1 Après la pose des câbles, mais avant l'épissage et le raccordement, mesurer la résistance d'isolement de chaque conducteur de phase, à l'aide d'un mégohmmètre de 500 V.

.2 Après l'exécution de chaque épissure et/ou raccordement, vérifier la résistance de l'isolant afin de s'assurer que le réseau de câbles est prêt pour l'essai de réception.

.6 Essais de réception

.1 S'assurer que toutes les terminaisons et tout le matériel accessoire sont débranchés.

.2 Mettre à la terre les blindages, les fils de terre, les armures métalliques et les conducteurs non soumis aux essais.

.3 Essais de rigidité diélectrique

.1 Faire les essais de rigidité diélectrique conformément aux recommandations du fabricant.

.7 Fournir au Représentant du Ministère une liste des résultats d'essais indiquant l'emplacement de chaque point d'essai, le circuit mis à l'essai et le résultat de chaque essai.

.8 Enlever et remplacer intégralement toute longueur de câble qui ne satisfait pas aux critères des essais.

3.3 NETTOYAGE

.1 Nettoyage en cours de travaux : effectuer les travaux de nettoyage conformément à la section 01 74 11 - Nettoyage.

.1 Laisser les lieux propres à la fin de chaque journée de travail.

.2 Nettoyage final : évacuer du chantier les matériaux/le matériel en surplus, les déchets, les outils et l'équipement, conformément à la section 01 74 11 - Nettoyage.

.3 Gestion des déchets : trier les déchets en vue de leur recyclage, conformément à la section 01 74 21 - Gestion et élimination des déchets de construction/démolition.

.1 Retirer les bacs et les bennes de recyclage du chantier et éliminer les matériaux aux installations appropriées.

3.4 PROTECTION

.1 Réparer les dommages causés aux matériaux et au matériel adjacents par l'installation des câbles.

FIN DE LA SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-13, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.2 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 wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit receptacles shop drawings.

.4 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.5 Material and acceptable products:

.1 When material or products are specified by company product name, consult documents to know method for product approbation or for replacement product.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.4 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices 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.

.5 Packaging Waste Management: recycle waste as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 RECEPTACLES

.1 CSA 5-15R receptacle incorporating U malt and GFCI with following caracteristics :

.1 Commercial grade;

.2 Brown nylon molded case ;

.3 Back or lateral connecting arrangement for 10 gauge wire.

.4 GFCI interupting with 10 kA interupting capacity.

.5 Status red indicating LED

.6 Test and reset button

.7 Trip level of 4-6 mA with 0.025 second delay (class A)

.8 Hubbell, GFT R15 series or equivalent from Leviton or Pass and Seymour

2.2 COVER PLATES

.1 Metal plates lids resistant to corrosion, weather-resistant, with sealing gaskets double sockets, weatherproof whyle in use cover.

2.3 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

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 wiring devices 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 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Install GFCI receptacle outdoor.

.2 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

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 recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.4 **PROTECTION**

.1 Protect installed products and components from damage during construction.

.2 Protect cover plates finish durant construction.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA Group

.1 CAN/CSA-C22.2 No.4-04(R2009), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

1.2 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 disconnect switches - fused and non-fused] and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75 % of construction wastes were recycled or salvaged.

1.3 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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect disconnect switches - fused and non-fused 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.

.5 Packaging Waste Management: remove for reuse and return by manufacturer as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Non-fusible, disconnect switch in CSA enclosure type 3, size as indicated on drawing.

.2 Provision for padlocking in on switch position by 3 locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Quick-make, quick-break action.

.5 ON-OFF switch position indication on switch enclosure cover.

.6 Must resist to outside weather.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

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 disconnect switches - fused and non-fused installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable. Mecanically secur disconnect switch with adapted support for ourdoor conditions.

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 recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE).

.2 Canadian Standards Association (CSA International) C22.2 No. 250.

.3 ICES-005-[07], Radio Frequency Lighting Devices.

1.2 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 datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 No sample to submit.

.4 Quality assurance submittals: provide following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, cleaning procedures.

.5 Material and acceptable products:

.1 When material or products are specified by company product name, consult documents to know method for product approbation or for replacement product.

1.3 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 45 00 - Quality Control. No sample to submit.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's and supplier’s name, address.

.3 Packaging Waste Management: remove for recycable by manufacturer in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.4 Divert unused metal materials from landfill to metal recycling facility.

.5 Disposal and recycling of discharge lamps as per local regulations.

.6 Disposal of old ballasts as per local regulation.

Part 2 Products

2.1 LAMPS

.1 LED, 19 W.

2.2 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation. Outdoor installation.

2.3 LUMINAIRES

.1 Lithonia TWS LED Wallpack 120 V.

.2 or approved equivalent.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated on drawing.

.2 Provide adequate support.

3.2 WIRING

.1 Connect luminaires to existent lighting circuits:

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted individually parallel or perpendicular to building grid lines.

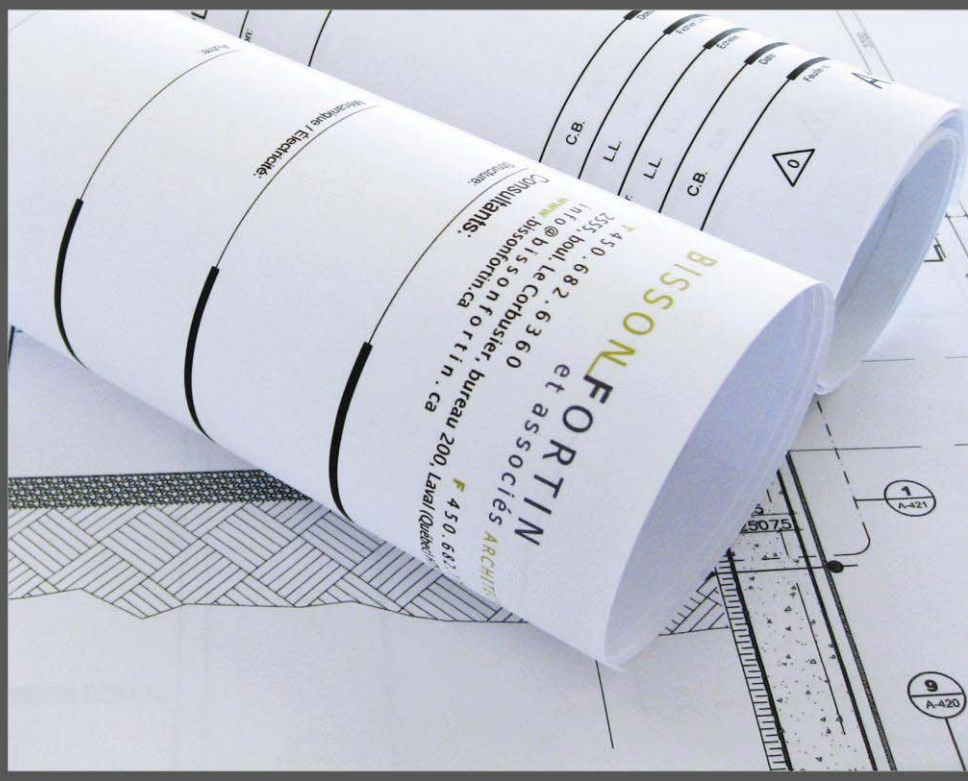
3.4 CLEANING

.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 recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION



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