Public Works and Government Services Canada

Roof and Chimneys Rehabilitation
Former Officers' Quarters (Bldgs. 18 and 28)
Quebec Citadel National Historic Site of Canada
O/Ref.: R.057742.001
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Technical Specifications

Electrical

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Prepared by:

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RECORD OF REVISIONS AND VERSIONS		
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PART 1 - GENERAL

1.1 GENERAL

.1 This section applies to electrical work.

.2 The provisions of this section complement all contract clauses, all general provisions of the Departmental Representative. Refer to these documents for relevant requirements applying to mechanical and electrical work.

.3 Relevant contractual document requirements apply to electrical work.

.4 In the event of a conflict between the provisions of the project's contractual documents, the most stringent provisions apply.

.5 Electrical plans and specifications are intended for both the General Contractor and electrical Contractor. The General Contractor assumes overall responsibility and is responsible for ensuring coordination of the work of Contractors with each other and with the entire project. The General Contractor is responsible for resolving any conflicts which arise between Subcontractors.

.6 Unless otherwise specified, costs relating to all work shown on plans and specifications must be borne by the General Contractor, whether or not "supply and install" is indicated.

.7 The Departmental Representative has priority for interpreting contractual documents with respect to the work.

1.2 DEFINITIONS

.1 Contractor or General Contractor:

A natural person doing business alone under his or her own name or under a different name, an incorporated business or a company that has entered into a contract with the Departmental Representative for performance of the work.

.2 Specialized Contractor or subcontractor:

A natural person doing business alone under his or her own name or under a different name, an incorporated business or company that has entered into a contract with the General Contractor for performance of the work.

.3 Departmental Representative:

See definition in General conditions GC1.1.2.

.4 Contractual documents:

See "Contract documents" section in invitation to tender.

.5 Supply:

Unless otherwise indicated, the term "supply" means: furnish, install, support, connect, test, commission, calibrate and any other work needed for the proper operation of the equipment and systems.

.6 Install or installation:

These terms have the same meaning as "supply" unless it is specifically stated that provision of the article is excluded from the contract.

1.3 COST OF WORK BREAKDOWN

.1 Before the start of work, and no later than ten (10) business days following award of the contract, provide an itemized cost breakdown for the different work stages: equipment, materials, permits, labour, etc. by specification section.

.2 When submitting a payment approval request for work that has been performed, prepare the progressive estimate on the basis of the itemized list. Requests for progress payments will be rejected if a detailed estimate of work performed has not been previously submitted to the Departmental Representative.

1.4 SCHEDULE

.1 Within fifteen (15) business days following award of the contract, submit the typical stages for completion of work, along with an activity chart and work schedule indicating the dates for the progress and completion stages to be completed within the time limits specified in the contract.

.2 Revisions to the progress of work, based on the completion schedule submitted, shall be at the Departmental Representative's discretion. The General Contractor shall update the schedule in collaboration with the Departmental Representative.

.3 For additional requirements, refer to Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT) Chart.

1.5 CODES AND STANDARDS

.1 Unless otherwise specified, carry out work in accordance with the Quebec Construction Code (QCC) and any other applicable federal, provincial or municipal code, latest version.

.2 Work must comply with or exceed requirements set out in standards, codes or other reference documents.

.3 Carry out work in accordance with public utility company standards.

.4 Applicable codes and standards are part of contractual documents.

1.6 PERMITS AND CERTIFICATES

.1 See General conditions GC1.8 for details.

.2 Refer to the description of each section for the additional permits and certificates requested. These permits and certificates must be delivered to the Departmental Representative and are a condition of acceptance of work.

1.7 LICENCE

.1 See General conditions GC1.8 for details.

1.8 DRAWINGS, SPECIFICATIONS AND SITE REVIEW

.1 By submitting its bid, the Contractor implicitly confirms that it has reviewed all documents in the call for proposals, has visited the project site, is familiar with local conditions and any factors likely to affect performance of the work and has taken these factors into account in its bid. Ignorance of the requirements in the call for proposals or of the conditions for performance of the work will, in no case, be a valid reason to claim a payment.

1.9 PLANS AND SPECIFICATIONS

.1 The plans and specifications constitute part of the contract and are complementary. The Contractor shall perform all work included in the plans and specifications and not described in the contract, or vice versa, as if the work were indicated in both the plans and specifications and in the contract. All work and materials not described or implicitly specified but required for the installation of a complete, operational and safe system shall be provided for in the bid submission and installed.

.2 The Contractor shall inform the Departmental Representative of any error or omission that it discovers in the plans or specifications when submitting its bid in order to obtain any clarification required for a complete bid. The Contractor may not invoke errors in the plans and specifications to perform defective work or to claim additional payment if, in the opinion of the Departmental Representative, the error or omission is evident.

.3 The Contractor shall inform the Departmental Representative of any contradiction or inconsistency that it discovers in the project documents in order to obtain any clarification required for a complete bid. If clarification cannot be issued, the Contractor shall prepare its bid based on the most expensive solution, and the Departmental Representative reserves the right to choose the appropriate solution even if it is the most expensive.

.4 All annotations in the plans are part of this contract.

.5 Any changes to the plans and specifications during the bid period must be in writing. The Departmental Representative shall not be responsible for information given verbally.

1.10 ADDENDA

.1 Prior to submission, the Contractor must verify, with the Departmental Representative, whether any addenda have been issued to ensure that its bid is complete.

.2 Any failure to include the addenda in the bid will automatically lead to rejection of the bid.

1.11 TAXES

.1 The Contractor must include in its bid all taxes applicable to materials, labour and services required for performance of the work.

.2 The Contractor may not benefit from tax credits to which the Departmental Representative is entitled.

1.12 AMENDMENTS TO WORK

.1 No change to the original plans and specifications may be made without a written request from the Departmental Representative and following approval by the Departmental Representative of an evaluation of such changes. If the Departmental Representative requests a change that does not affect the price, the Contractor shall perform the change without further notice.

.2 The Departmental Representative must be consulted concerning all changes, and only him may authorize changes to the plans and specifications. The Contractor must redo any work that does not comply with the plans and specifications at no additional cost to the Departmental Representative.

.3 During construction, the Departmental Representative is entitled to request changes to the plans and specifications which it deems appropriate. Such changes shall not affect or invalidate the terms and conditions of this contract. If these changes result in an increase or decrease in the cost of the work, the contract will be adjusted following an assessment of the cost.

.4 Additional work is subject to the terms and conditions of the contract.

1.13 QUALITY ASSURANCE

.1 Quality assurance: In accordance with Section 01 45 00 – Quality Assurance.

.2 Preliminary project meetings:

.1 At least one week before start of work, hold a meeting to review the following:

.1 Work requirements;

.2 Installation and substrate conditions;

.3 Work performed with other building subtrades;

.4 Manufacturer's installation instructions and warranty requirements.

.3 Certificates:

.1 Technical data taken from catalogues and manufacturers' documentation shall be reliable, based on the results of tests carried out by the manufacturers themselves or on their behalf by independent laboratories, and shall enable to certify the compliance of the elements with current codes and standards.

1.14 HEALTH AND SAFETY

.1 Perform construction occupational health and safety in accordance with architectural specifications, Section 01 35 29.06 – Health and Safety Requirements.

1.15 MAINTENANCE

.1 Supply a kit containing special tools required to maintain equipment, according to manufacturers' recommendations and Section 01 78 00 – Closeout Submittals.

.2 Refer to the various sections of the specifications for additional maintenance requirements.

1.16 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver and store materials in accordance with manufacturer's written instructions.

1.17 SPECIFIED EQUIPMENT AND MATERIALS AND EQUIVALENTS

Important note: The clauses of the item "Specified Equipment and Materials and Equivalents" have priority over corresponding clauses in the architectural specifications.

.1 Where equipment is specified by a single brand name and model number, base the bid on that brand and model number.

Example of this type of specification: Equipment brand "A", model "X".

.2 Where equipment is specified by a number of brand names and model numbers, base the bid on one of these brands and its model number.

Example of this type of specification: Equipment brand "A", model "X"; brand "B", model "Y"; brand "C", model "Z".

.3 See General instructions GI15 for details.

.4 Where equipment or material is specified solely with reference to a standard, choose the equipment or material which meets or exceeds the requirements of the standard.

.5 The Departmental Representative is the sole judge of a product's equivalency. Should the Departmental Representative reject a submitted product, the Contractor must supply the equipment according to the specification at no additional cost to the Departmental Representative.

.6 The Contractor is responsible for any changes to the design, drawings or work of any discipline resulting from an equivalent product and shall pay any costs arising from such changes.

.7 It is understood that acceptance of equivalent equipment in no way alters the Contractor's responsibility.

.8 Unless otherwise indicated, use the products of the same manufacturer where materials or equipment is of the same type or class.

.9 Required quality or acceptable product:

.1 Means that the equipment or material specified and identified by catalogue number is an integral part of the specifications and is used as a performance and quality criterion for the material and for execution.

.10 By submitting its bid, the Contractor implicitly states that it is able to procure the equipment, in accordance with the rules set out above, within the time limits of the schedule of work.

1.18 SUBMITTAL PROCEDURES

.1 Administrative documents and samples to be submitted:

.1 Submit promptly and in orderly sequence, so as to avoid delays in the execution of the work, the submittals required by the Departmental Representative for approval. Failure to submit in ample time is not considered sufficient reason for an extension of execution time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with work for which submittals are required until a review of all submittals is completed.

.3 Present shop drawings, technical sheets, samples and mock-ups in the units used in the plans and specifications.

.4 Identify equipment using symbols appearing in plans and specifications.

.5 Where items or information is not produced in SI metric units, converted values are accepted.

.6 Review submittals prior to submission to the Departmental Representative. With this review, the Contractor ensures that the requirements applicable to the work have been determined and verified and that each submittal has been checked and found compliant with the work requirements and the contractual documents.

.7 Shop drawings must bear the Contractor's seal along with the signature of its authorized representative stating that the documents submitted have been approved, that the measures taken on site have been verified and that everything is in compliance with the contractual documents.

.8 Submittals not stamped, signed, dated and identified in respect of the specific project will be returned without being examined and considered rejected.

.9 Clearly notify the Departmental Representative in writing, at the time of submission, of any deviations from the requirements of the contractual documents, giving reasons for such deviations.

.10 Ensure that field measurements and affected adjacent work are coordinated.

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

.12 The Contractor's responsibility for deviations in submissions from requirements of the contractual documents is not relieved by the Departmental Representative's review of submittals.

.13 Adjustments made to the shop drawings by the Departmental Representative are not intended to change the contract price. If adjustments affect the value of the work, state such in writing to the Departmental Representative prior to proceeding with the work.

.14 For each document submitted, keep a verified copy on site.

.15 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.

.2 Shop drawings and technical sheets:

.1 Submit shop drawings and technical sheets according to instructions. Submit shop drawings and technical sheets in electronic format (.pdf); these will be annotated and returned by the Departmental Representative in .pdf format. Exception: shop drawings and technical sheets exceeding 28 cm (11 in.) x 43 cm (17 in.); ten copies of all formats of plans must be submitted; the Departmental Representative retains one copy.

.2 Submit shop drawings and technical sheets for all project equipment and devices and for all automatic control systems.

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

.4 Shop drawings must include the following information:

.1 Preparation and revision dates;

.2 Project name and number;

.3 Specification section number;

.4 Name and address:

.1 Of the General Contractor;

.2 Of the subcontractor;

.3 Of the supplier;

.4 Of the manufacturer.

.5 Shop drawings and technical sheets must indicate the following:

.1 Materials and manufacturing details;

.2 Layout showing dimensions, including identified field dimensions;

.3 Clearances required to operate and maintain equipment, such as the space required to operate access doors;

.4 Assembly or adjustment details;

.5 Power, speed and capacity details;

.6 Mechanical connection details;

.7 Tables and performance curves showing points of operation;

.8 Acoustical power data of systems and equipment;

.9 Power requirements and details;

.10 Standard specifications;

.11 Operating weight;

.12 Wire maps;

.13 Single line and schematic diagrams;

.14 Technical details for judging equipment performance;

.15 Hazardous materials data sheets;

.16 Relationship to adjacent work.

.6 Submit the following documents with shop drawings and product data:

.1 Document issued by the manufacturer certifying current model production;

.2 Certification of compliance to applicable codes;

.7 Shop drawings must be reviewed and sealed by the Departmental Representative. The Contractor must comply with the following:

.1 Supply equipment as shown on shop drawing ("Supply as submitted" stamp);

.2 Supply equipment as corrected and commented ("Supply as corrected" stamp);

.3 Correct and resubmit shop drawing ("Correct and resubmit" stamp);

.4 Submit drawings using specified equipment, when equipment is refused ("Refused" stamp).

.8 The Departmental Representative's comments may state that the drawings are general and serve only to indicate to the Contractor that the equipment and layout comply with the general quality and appearance desired and in no way relieve the Contractor of its obligation to supply a product that complies with accepted standards, with the plans and specifications and with prevailing regulations and standards. These comments may relate to sizes and interferences with other aspects of the project. However, the Contractor remains solely and entirely responsible for sizes and interferences.

.9 The Departmental Representative reserves the right to remove, at the Contractor's expense, any material or product that has not been formally submitted in the shop drawings or installation drawings and which have not been approved by the Departmental Representative.

.10 Keep a copy of shop drawings and product data on site for reference purposes.

.11 Shop drawings and product data must be in French.

.12 The Contractor shall allocate, in its work plan, a minimum of ten (10) business days for the Departmental Representative to review shop drawings.

.3 Erection plans:

.1 General:

.1 Prepare and submit erection plans to coordinate the work of other construction specialties. Erection plans to be submitted for the following work:

.1 All ventilation and air conditioning work;

.2 All sprinkler and fire prevention work;

.3 Mechanical and electrical work in mechanical and electrical rooms, tunnels, shafts, parking areas, etc.;

.4 Mechanical and electrical work in areas obstructed with equipment such as corridor ceilings and raised floors;

.5 Sleeves, openings and perforations in wall, roofs, floors, beams and columns;

.6 Anchors;

.7 Supports in technical shafts;

.8 In locations indicated in mechanical and electrical specifications;

.9 This clause is not limitative. Erection plans may be required for other locations, as deemed by the Departmental Representative.

.2 Erection plans must clearly and precisely indicate the work of the discipline involved and work performed by other disciplines.

.3 All erection plans must be prepared with the latest version of AutoCAD, submitted in a .DWG file, on paper and sepia according the quantity required. The AutoCAD layers for each subcontractor must meet Quebec Association of Consulting Engineers (AICQ) standards.

.4 Description:

.1 Erection plans consist of scale plans, showing the position of equipment, ducts, pipes, valves and other accessories with sections and details, including piping and duct dimensions, locations of sleeves, openings, anchors and supports; positions relative to the structure, architectural work and mechanical and electrical work.

.2 Prepare plans to appropriate scale but no smaller than 1:50 (¼ in. = 1 ft.).

.5 Preparation:

.1 Each specialty must prepare their erection plans in coordination with other specialties.

.2 The General Contractor is responsible for coordinating the erection plans of all mechanical and electrical trades. These disciplines must provide all the data, drawings, schematics and diagrams required for coordinating the work.

.3 The HVAC Contractor must prepare a drawing of its own work with all required data and dimensions and incorporate any information provided by other trades.

.4 All erection plans for a given sector must be submitted for review at the same time.

.5 At the request of the Departmental Representative, submit erection plans printed in different colours to differentiate the work of the various trades.

.6 Cooperation:

.1 There must be close collaboration among the companies responsible for mechanical and electrical work when choosing equipment locations to avoid incompatibilities.

.7 Distribution of erection plans:

.1 Submit for verification two copies approved by the General Contractor and signed by all project participants to the Departmental Representative.

.2 Once reviewed, drawings must be corrected by relevant specialties and, when required, resubmitted.

.8 Responsibility:

.1 Each subcontractor is directly responsible for the correct placement and size of openings, bases, perforations and sleeves, for the location of equipment, piping and ducts whether or not the structural, architectural and electrical drawings are graded.

.2 No compensation is paid for changes imposed on the work for the purposes of coordinating and integrating mechanical and electrical systems.

.3 Verification of erection plans by the Departmental Representative is limited to ensuring that technical requirements have been met (VCF valves, grilles, insulation, etc.). The Departmental Representative does not verify the quality of contractors' coordination.

.9 Existing work:

.1 Erection plans must take into account existing mechanical, electrical, structural and architectural installations in addition to the work to be performed.

.10 Original erection plans:

.1 At the end of work, each mechanical and electrical contractor must submit CD-ROMs of AutoCAD drawings and one copy of as-built drawings to the Departmental Representative.

.11 Verification of erection plans:

.1 In its work plan, the Contractor shall allocate a minimum of ten (10) business days for the Departmental Representative to review the erection plans.

.4 Product samples:

.1 Submit for review three (3) samples of products in accordance with the provisions of the technical sections of the specifications. Label samples with origin and intended use.

.2 Mark and identify samples according to the schedule in the plans and specifications.

.3 Deliver samples prepaid to the Departmental Representative's business address.

.4 Notify the Departmental Representative in writing, at time of submission, of deviations in samples from requirements of contractual documents.

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

.6 Adjustments made to samples by the Departmental Representative are not intended to change the contract price. If adjustments affect the value of work, state such in writing to the Departmental Representative prior to proceeding with work.

.7 Make changes in samples, which the Departmental Representative may require, consistent with contractual documents.

.8 Samples will be delivered to the Contractor, who shall store them on site in an appropriate location and keep them until the end of work. At the end of work, the Contractor may dispose of samples as it sees fit.

.9 Reviewed and accepted samples will become the standard against which the quality of the materials will be evaluated.

.10 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.

.5 Work samples:

.1 For repetitive work, perform on site, for approval, an installation and connection prototype to serve as a model for the work.

.2 Construct work samples at locations requested by the Departmental Representative or indicated in the section concerned.

.3 Prepare work samples for approval by the Departmental Representative promptly and in orderly sequence so as to avoid delays in the execution of the work.

.4 Failure to submit work samples in ample time is not considered sufficient reason for an extension of execution time and no claim for extension by reason of such default will be allowed.

.5 Remove work samples at the end of work or at a time determined by the Departmental Representative.

.6 Work samples may be incorporated into the finished work.

.7 Each section of the specifications dealing with work samples specifies whether these may be incorporated into the finished work or when they must be removed.

.8 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.

1.19 EQUIPMENT AND MATERIALS

.1 Quality:

.1 Unless otherwise indicated, equipment and materials used for execution of the work must be new, in perfect condition, manufactured, assembled and tested at the factory in accordance with the contractual documents. Equipment and materials must be ready to be installed for the purposes for which they are intended. If necessary, provide proof establishing the nature, origin and quality of the products provided.

.2 No used equipment or material may be used in the execution of the work unless specifically requested in the plans and specifications. This clause takes precedence over all other clauses in the contractual documents.

.3 Equipment and materials must be approved by the relevant organizations such as the CSA, ULC, ASME, FM, CGA, etc.

.4 Information included on equipment and materials must be bilingual.

.5 Equipment or materials found to be defective before the end of work will be rejected regardless of the conclusions of previous inspections. The Contractor shall ensure removal and replacement of defective products at its own expense. The Contractor is responsible for any delays and resulting costs.

.6 In the event of a dispute over the quality or suitability of a product, the Departmental Representative alone may decide the issue based on the requirements in the contractual documents.

.7 Equipment or materials must have characteristics and dimensions suitable to the locations where they are to be installed. Inform the Departmental Representative prior to proceeding with installation if equipment or material does not meet these conditions.

.2 Delivery:

.1 Pay transportation costs for equipment and materials required for the work.

.2 Transportation costs for equipment and materials supplied by the Departmental Representative shall be paid by him. Unload, handle and store equipment and materials. Costs of lifting equipment required for handling equipment and materials from the delivery point to installation shall be borne by the Contractor.

.3 Ensure deliveries are coordinated of and pay demurrage charges.

.3 Storage, handling and protection of equipment or materials:

.1 The Contractor is responsible for inspecting, storing, installing and connecting equipment and materials that arrive at the site.

.2 Without damaging, marring or soiling equipment and materials, move and store in a secure location and follow manufacturer's instructions, where applicable.

.3 Store equipment and materials in their original packaging, taking care to leave intact the manufacturer's label and seal.

.4 Replace, at no additional cost, damaged equipment and materials to the Departmental Representative's satisfaction.

.4 Unless otherwise indicated, install equipment or materials according to manufacturer's instructions.

.5 For additional requirements, refer to architectural specifications, Section 01 61 00 – Common Product Requirements.

1.20 USE OF THE SITE

.1 If necessary, determine with the Departmental Representative, site access roads, storage areas, suitable locations for stacking materials and location of facilities.

.2 Move stored materials that hinder the Departmental Representative or users' operations or those of another Contractor.

.3 After obtaining the required authorizations, pay the costs associated with the use of additional storage or work areas required for the work.

.4 The Contractor is responsible for any damage caused to the building, the site or existing facilities during the period of project-related work, which ends with final acceptance by the Departmental Representative. Consequently, the Contractor must restore any damaged part to its original state.

1.21 EXECUTION

.1 General:

.1 Ensure quality of work is of the highest standard and performed in accordance with industry standards, prevailing codes and standards and manufacturer's recommendations, and executed by teams of workers experienced and skilled in the respective duties for which they are employed. Immediately inform the Departmental Representative if the work is such as to make it impractical to achieve the required results.

.2 The Departmental Representative reserves the right to require the dismissal of any person deemed incompetent, careless, insubordinate or whose presence cannot be tolerated on the site.

.3 For additional requirements, refer to architectural specifications, Section 01 73 00 – Execution Requirements.

.2 Cooperation:

.1 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision.

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

.3 Ensure openings are large enough for equipment to pass.

.3 Concealment:

.1 Unless otherwise indicated, in finished areas conceal pipes, ducts and electrical wiring in walls and ceilings.

.2 Prior to concealing raceways, inform the Departmental Representative of any unusual situation. Install according to the Departmental Representative's instructions.

.3 No work, such as pipes, ducts, etc., is to be concealed before inspection and approval.

.4 Cutting and patching:

.1 Perform cutting and patching work for those parts of the work which form a coherent whole. Coordinate works consequently.

.2 Structural elements may not be perforated or cut without the written approval of the Departmental Representative and the structural Engineer.

.3 Specialists familiar with the materials affected shall perform cutting and patching. Perform in a manner to neither damage nor put at risk any portion of the work.

.4 All openings shown on the structural plans must be made by the General Contractor; however, the specialized Contractor concerned must verify placement and sizes before construction or concreting. The specialized Contractor shall provide the General Contractor with any size changes resulting from the final choice of equipment.

.5 If additional openings are required after concreting, the Contractor concerned must use a diamond drill, with the approval of the General Contractor and the permission of the structural Engineer. In addition, the Contractor concerned must repair any resulting damage.

.6 If openings are required after concreting or in an existing slab, the subcontractor responsible for drilling must locate any concealed services using infrared or other devices to avoid cutting existing services or utilities.

.7 Additional work resulting from poor coordination cannot be charged to the Departmental Representative.

.5 Location of equipment and materials:

.1 The plans and specifications indicate the approximate locations of ducts, piping, pull boxes, junction boxes, etc.

Before the start of work, check the size and the exact layout of equipment on the site and not to scale in the plans.

.2 The exact location of equipment and materials, which is approximate in the plans, will be determined jointly with the Departmental Representative on site.

.3 Install equipment, materials and raceways so as to limit congestion and preserve as much useful space as possible, in accordance with manufacturer's recommendations on safety, access and maintenance.

.4 Inform the Departmental Representative of any problem which placement of equipment or material may cause and proceed with installation following his instructions.

.5 If access doors need to be installed for maintenance or access to equipment or materials, obtain the Departmental Representative's approval before proceeding with installation. Supply and installation of access doors is without additional cost to the Departmental Representative.

.6 The location of devices and equipment may be changed at the Departmental Representative's request without additional cost or credit, on condition that relocation does not exceed 5 metres and the request is made prior to performance of the work.

.6 Protection of work in progress:

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

.2 Ensure finished work or work in progress is adequately protected. Work that has been damaged or marred due to a lack of protection must be replaced or repaired free of charge in accordance with the Departmental Representative's requirements.

.3 All open ends of ducts and pipes laid by the Contractor must be hermetically sealed so as to prevent dust or other waste from entering during the work. All machinery must be protected against dust and weather with a polyethylene tarpaulin.

.7 Temporary services:

.1 No permanent equipment is to be used for temporary services without the Departmental Representative's written authorization.

.2 If the Contractor disregards this warning, the Departmental Representative's reserves the right to reject such material and replace it with new material at the Contractor's expense.

1.22 WORK COORDINATION

.1 Each specialized Contractor must review all construction plans and any other document issued following award of the contract prior to proceeding with installation of its equipment, and ensure, based on the equipment and shop drawings, that the equipment can be installed in the location specified in the plans without hindering installation of equipment of other specialties.

.2 Special attention must be paid to the installation of equipment on or suspended from ceilings, on duct risers in shafts, and on or in walls. Equipment that must remain accessible must be installed so that other equipment, ventilation ducts or inaccessible ceilings do not obstruct access. Check the depth of equipment recessed in walls and ceilings to coordinate installation.

.3 Location of lighting fixtures in mechanical rooms is determined after installation of other equipment.

.4 When the work of one specialty may damage the work of another specialty, inform the affected Contractor with the General Contractor, and come to an agreement on the most effective way to protect the equipment.

1.23 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.

1.24 FIELD QUALITY CONTROL

.1 Field tests: Field tests to be carried out in accordance with Section 01 45 00 – Quality Control and provide reports.

.1 Fire alarm system;

.2 Heating cable system.

.2 Manufacturer's field services:

.1 Obtain and submit a written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.

.2 Manufacturer to provide product use recommendations and perform periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Provide for site visits.

1.25 DEMONSTRATION

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

.2 Supply tools, equipment and qualified instructors to train operations and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of equipment and systems 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 Provide number of hours of training requested.

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

1.26 FOREMAN

.1 Each specialty must be represented on site by a foreman.

.2 The foreman must have sufficient expertise in the trade to enable effective collaboration with the other subcontractors and ensure that orders issued by those in authority are properly executed.

.3 The foreman must attend all regularly schedule site meetings, unless otherwise authorized by the Departmental Representative.

.4 The foreman must be fluent in French.

1.27 CORROSION PROTECTION

.1 All unprotected metal parts such as pipe brackets, anchors, machinery, etc. must be given, on site, a coat of anti-corrosion paint once metal surfaces have been cleaned.

.2 All caps, screws and other devices outside the building must be bronze or cadmium plated.

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

.4 Restore surface finishes that have been too severely marred for primer or touch ups.

.5 Cut or perforated parts of devices, equipment or accessories made from galvanized steel must be protected with paint to ASTM-A780-09 standard.

1.28 ANCHORS

.1 Anchorage using fastening tools is not permitted. Expansion bolts must be used to secure ducts to walls or ceilings. The Departmental Representative reserves the right to require any type of anchoring they deem suited to site conditions.

.2 Anchoring used to support equipment, apart from air ducts, must be appropriate according to equipment to be secured and surface. Authorized manufacturers: HILTI, Ramset / Red head, UCAN, SIKA, or equivalent.

1.29 ERRORS AND OMISSIONS

.1 No additional charge will be allowed when work needs to be redone due to error, omission or lack of coordination on the part of the Contractor.

1.30 CLEANING

.1 Clean the site on a regular basis and remove waste.

.2 Clean and restore to good condition all locations used as service areas.

.3 Upon the Departmental Representative taking possession of the building, all equipment must be clean inside and out.

.4 For additional requirements, refer to architectural specifications, Section 01 74 11 – Cleaning.

1.31 DEPARTMENTAL REPRESENTATIVE'S RIGHTS

.1 The Departmental Representative reserves the right to have others, at its own expense, perform work involving the project but not included in the plans and specifications. The Contractor is not, however, released from its responsibility with respect to the work included in its contract.

1.32 PROGRESSIVE ESTIMATES

.1 Prior to the first request for monthly payment, the Contractor shall submit for the Departmental Representative's approval, a detailed breakdown of the contract price. This list, once approved by the Departmental Representative, will serve as the basis for issuing monthly payment certificates.

.2 Progressive estimates prepared by the Contractor must be submitted to the Departmental Representative for approval. The latter will make no payment without such approval.

.3 The Contractor must charge only for materials installed and not for materials available on site. The Departmental Representative may, exceptionally, accept materials or equipment for specific contract use. The Departmental Representative approval of progressive estimates does not constitute partial acceptance of work.

1.33 SITE INSPECTION

.1 Unless otherwise indicated, the Contractor shall inform the Departmental Representative forty-eight (48) hours prior to concealing installed materials so that the latter may conduct an inspection. Omission of this procedure will require the Contractor, if the Departmental Representative so demands, to uncover said materials in order that an inspection may be conducted.

.2 The Departmental Representative will regularly visit the site to observe the progress of the work. If a defect is brought to the attention of the Contractor, the Contractor must promptly correct the anomaly. Refusal by the Contractor to comply with such an order may result in work stoppage until an understanding has been reached between the Departmental Representative and the Contractor.

1.34 TESTS AND CERTIFICATION

.1 At the end of work, start up electro-mechanical equipment and systems, check that they function properly, test, adjust, balance and ensure that they meet all requirements in the plans and specifications; submit reports on these activities.

.2 Subsequently, demonstrate systematically, in the presence of the Departmental Representative, that all equipment and systems function as specified in the plans and specifications. A second series of tests will be run, if necessary, within two (2) weeks of the first series. Following these tests, deliver a report to the Departmental Representative. Commissioning must be carried out during the relevant season. Start up of the heat transport systems must be done during their respective operating period, assuming a time lag between heating and air conditioning periods.

.3 Conduct tests and supply all required material. Inform the Departmental Representative twenty-four (24) hours in advance so that it can delegate operations and maintenance personnel to attend the tests, if so desired.

.4 Refer to the descriptions of each section for specifically requested tests.

.5 Test reports are a condition for the acceptance of work by the Departmental Representative. Provide all certificates required by the regulations, laws and the contract.

1.35 CLOSEOUT SUBMITTALS

.1 Operating and Maintenance Manual:

.1 Submit closeout submittals incorporated into the "Operating and Maintenance Manual ".

.2 Supply the operating, maintenance and performance technical sheets and incorporate them into the "Operating and Maintenance Manual".

.3 Operating, maintenance and performance technical sheets must be verified prior to final inspection by the Departmental Representative, who will keep final copies.

.4 Operating sheets to include:

.1 Control schematics for each system including environmental controls;

.2 Description of each system or installation, and their controls;

.3 Description of the operation of each system or installation at various loads together with reset schedules and seasonal variances;

.4 Operating instructions for each system, installation and component;

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

.6 Colour coding chart.

.5 Maintenance data to include:

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

.2 Information concerning the frequency of tasks as well as the tools, parts and time required for these tasks.

.6 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation once commissioning is complete;

.2 Equipment performance verification test results;

.3 Any other special performance data as specified in contractual documents;

.4 System testing, adjustment and balancing test reports.

.7 Operating and maintenance manuals must also include:

.1 Any reviewed and corrected shop drawings;

.2 Layout of all equipment as installed in the project;

.3 Exact description of operating stages for each system;

.4 Step-by-step description of start and stop procedures for reliable and safe operation;

.5 List of equipment parts likely to need replacement on a regular basis with replacement intervals;

.6 List of spare parts with names, addresses and telephone numbers of suppliers for all equipment, motors and accessories provided and installed, with a reference to the relevant sections in the specifications.

.8 Approval:

.1 Submit a draft "Operating and Maintenance Manual" to the Departmental Representative for approval. Unless otherwise indicated by the Departmental Representative, do not submit individual data sheets.

.2 Make changes to the “Operating and Maintenance Manual” as required and re-submit as directed by the Departmental Representative.

.3 Provide three final copies of the "Operating and Maintenance Manual".

.9 Additional data:

.1 Prepare and insert into the “Operating and Maintenance Manual” additional data when the need for it becomes apparent during specified demonstrations and instructions.

.10 The “Operating and Maintenance Manual” must be in French, inserted into a binder and organized according to the order of specification sections.

.11 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals.

.2 Personnel Safety Guidelines:

.1 Provide three (3) copies of the Personnel Safety Guidelines.

.2 Document content - the manual must contain information on:

.1 Potential emergency situations, including: fire and smoke, power failures, water supply interruptions and loss of water pressure, chemical spills and refrigerant leaks;

.2 Elevator, service elevator and escalator failures;

.3 HVAC and fuel supply failures;

.4 Intrusions and security breaches;

.5 Natural disasters, bomb threats and other disruptive situations;

.6 Emergency power supply for high security and medical facilities and computer systems;

.7 Emergency procedures in case of fire, power failures and major equipment failures;

.8 Names and addresses persons to contact in an emergency;

.9 This document must be easy to obtain and understand even for users with no technical knowledge;

.3 As-built drawings:

.1 Site records:

.1 Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information to printed copies, revising reproductibles to show mechanical systems and equipment as actually installed.

.3 Make available for reference purposes and inspection.

.2 As-built drawings:

.1 Before starting tests, system balancing and adjustments, update as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm (1/2 in.) high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW SYSTEMS AND EQUIPMENT AS INSTALLED", "Signature of Contractor" and "Date".

.3 Submit drawings to the Departmental Representative for approval and make corrections as directed.

.4 Test, balance and adjust systems, equipment and networks based on as-built drawings.

.5 Submit completed as-built drawings with "Operating and Maintenance Manuals".

.3 Submit a copy of as-built drawings and include them in the final report on testing, balancing and adjustment of systems and facilities.

.4 As-built drawings must be provided prior to requesting acceptance of work.

.5 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals.

.4 Warranty:

.1 Guarantee the work and its proper operation under this contract.

.2 Provide guarantees demonstrating that the work supplied under this contract has been done with care using high-quality materials, tested in accordance with these specifications and that the results of these tests comply with the requirements of the approved specifications and drawings.

.3 No payment certificate issued or paid, nor any partial or total occupation of the project, relieves the Contractor of its responsibility for defective materials or poor workmanship that becomes apparent during the warranty period.

.4 Correct any fault detected in the work during the warranty period, whether due to defective material, workmanship or to any other cause that is the responsibility of the Contractor.

.5 Defective work must be corrected promptly and at the Contractor's expense, by replacing, repairing or redoing the work according to the nature of the problem, to the Departmental Representative's satisfaction. Damage and work arising from corrective work, such as cutting, resurfacing, painting, equipment removal, etc., shall be at the Contractor's expense.

.6 If the Contractor fails to remedy a defect within three (3) days following notice given by the Departmental Representative, or if the work does not progress at a

suitable pace, the Departmental Representative may perform repairs or corrections itself or through another designated person. The cost of this work shall be borne by the Contractor.

.7 The Contractor guarantees that corrective work meets the performance, resistance and operating characteristics set out in the plans and specifications.

.8 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals.

1.36 TRAINING OF OPERATING AND MAINTENANCE PERSONNEL

.1 Supply tools, equipment and qualified instructors to provide training to operating and maintenance personnel in the operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance and delivery of systems and equipment.

.2 Where specified in other provisions or at the request of the Departmental Representative, manufacturers shall conduct demonstrations and staff training.

.3 Training must be based on the contents of the "Operating and Maintenance Manual" and as-built drawings.

1.37 REQUIREMENTS FOR INTERIM INSPECTION

.1 Before requesting final work inspection, the Contractor shall:

.1 Complete the work as far as possible; otherwise, the Departmental Representative may refuse to draw up an overlong list of deficiencies. In addition, the Contractor may be charged for any unnecessary travel undertaken by the Departmental Representative due to lack of coordination or negligence;

.2 Clean the exterior and interior of all project devices and touch up paint on equipment, where necessary;

.3 Submit as-built drawings;

.4 Display all certificates;

.5 Provide instruction manuals;

.6 Deliver balancing reports;

.7 Supply required replacement parts.

.2 During the inspection, the Contractor must:

.1 Systematically demonstrate that all systems and equipment operate in compliance with the requirements of the plans and specifications;

.2 Provide the Departmental Representative with the resources to conduct inspections, such as availability of a person to place stools and ladders where required, removing ceiling tiles, opening access doors, starting and stopping systems, etc.

.3 For additional requirements, refer to architectural specifications, Section 01 77 00 – Closeout Procedures and Section 01 78 00 – Closeout Submittals.

1.38 ACCEPTANCE OF THE WORK

.1 See General conditions 2, 3, 5 and 6 for details.

.2 The Contractor shall pay all costs subsequent to the first general inspection if this inspection is insufficient for the Departmental Representative to issue the final acceptance of work.

.3 Consequently, subsequent lists of deficiencies (second, third, etc.), required for final acceptance of work, will be charged on an hourly basis to the Departmental Representative by the consulting engineer. The Departmental Representative will then deduct this amount from the amount in the Contractor's contract.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

1.2 REFERENCES

.1 Except where otherwise indicated, carry out entire installation in accordance with the *Code de construction du Québec* [Quebec Construction Code], Chapter I (Buildings - 2005) and Chapter V – Electricity, in effect in the province of Quebec (2010).

.2 Comply with CSA certification standards and bulletins pertaining to electricity in effect at the time of bid submission.

.3 Perform work on live equipment to CSA Z462 (-F12).

1.3 RATED VOLTAGES

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.4 RIGHTS, PERMITS AND INSPECTION

.1 Submit the required number of copies of drawings and specifications to the Régie du bâtiment du Québec and the electricity supplier (Hydro-Québec) for review and approval prior to the start of work.

.2 Pay all related fees.

.3 Inform the Departmental Representative of modifications required by the Régie du bâtiment du Québec, prior to making any change to the drawings or specifications. Submit a copy of the comments issued by the Régie du bâtiment to the Departmental Representative.

.4 Upon completion of the work, obtain certificate of acceptance from the Régie du bâtiment du Québec and/or the electricity supplier (Hydro-Québec) and forward to the Departmental Representative.

1.5 MATERIALS AND EQUIPMENT

.1 Material and equipment to be CSA certified. Where CSA certified equipment is not available, obtain special approval from the Régie du bâtiment du Québec.

.2 Factory assemble control panels and component assemblies.

1.6 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Control wiring and conduit: in accordance with Section 26 except for conduit, wiring and connections below 50 V which are related to control systems indicated by mechanical equipment supplier and as shown on drawings.

1.7 FINISHES

.1 Shop finish metal enclosure surfaces by application of appropriate rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint indoor switchgear and distribution enclosures light gray to ASA61.

.2 Clean and touch up surfaces of shop-painted equipment scratched or damaged during shipping or installation, to match original paint.

.3 Clean and prime exposed, non-galvanized hangers, racks and fastenings to prevent rusting.

1.8 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates:

.1 Lamicoid 3 mm thick plastic engraving sheet, white finish face, black core, mechanically attached with self tapping screws. For emergency equipment, nameplates must be red with white letters.

NAMEPLATE SIZES

Size	Dimensions	Number of Lines	Letter Height
1	10 x 50 mm	1	3 mm
2	12 x 70 mm	1	5 mm
3	12 x 70 mm	2	3 mm
4	20 x 90 mm	1	8 mm
5	20 x 90 mm	2	5 mm
6	25 x 100 mm	1	12 mm
7	25 x 100 mm	2	6 mm

.2 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

.3 Allow for minimum of twenty-five (25) letters per nameplate.

.4 Provide identification nameplates in English and French.

.5 Nameplates for disconnects, starters and contactors to indicate equipment being controlled and voltage characteristics.

.6 Nameplates for terminal cabinets and pull boxes to indicate system and voltage characteristics.

.7 Nameplates for transformers to indicate capacity, primary and secondary voltages.

1.9 WIRING IDENTIFICATION

.1 Identify wiring with numbered plastic tape or heat-shrink tubing on both ends of phase conductors of feeders and branch circuit wiring, including neutral.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.10.

.4 Use colour coded wires in communication cables, matched throughout system.

1.10 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes (not only covers) and metallic sheathed cables.

.1 Provide every conduit and metallic cable with a guide strip (>= 20 mm wide) in colours shown in the table below, except for "Fire Alarm" conduit, which must be completely "RED" and "Communication" cables, which must be completely "BLUE" with guide strips as follows:

.1 At each end of the conduit;

.2 At 15 m intervals;

.3 At each direction change;

.4 Where conduit or cable enters and exits wall or floor:

.1 For wall and floor penetrations, also enter where it comes from (panel)

.2 Box covers:

.1 Completely painted, inside and outside, in prime colour as shown below;

.2 Also show use of cable (see table below) and where it comes from (panel, circuit, etc.).

Note:
- "Normal": power supplied directly from Hydro-Québec network.

White: Normal / Blue: Communication+Misc. Yellow: Emergency (2 min.) / Purple: UPS Orange: Essential (10 s) / Red: Fire / Green: Ground			None "—": Misc. or < 250 V Black: Misc. or 250 - 600 V Brown: Other
USE OF CABLE IN CONDUIT	IDENTIFICATION	PRIME COLOUR	AUXILIARY COLOUR
Ground	"—"	GREEN	"—"
Electricity - Normal / 0 - 250 V	Panel+Circuit	YELLOW	"—"
Electricity - Normal / 251 - 600 V	Panel+Circuit	YELLOW	GREEN
Electricity - Normal / 601 V ++	Panel+Circuit	YELLOW	BLUE <5 kV; RED <15kV Write VOLTAGE
Electricity – Time-delay / 0 - 250 V	Panel+Circuit	YELLOW	"—"
Electricity - Time-delay / 251 - 600 V	Panel+Circuit	YELLOW	BLACK
Electricity - Time-delay / 601 V ++	Panel+Circuit	YELLOW	Write VOLTAGE
Electricity - Vital / 0 - 250 V	Panel+Circuit	ORANGE	"—"
Telephone		GREEN	"—"
Emergency voice	Panel+Circuit	RED	BLUE
Fire alarm	Panel+Circuit	RED	"—"
Other security systems	Panel+Circuit	RED	YELLOW
Other communication systems	Panel+Circuit	GREEN	BLUE

1.11 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

.2 Use compression lugs for the appropriate gauge.

1.12 CSA NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

1.13 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of inspection authorities.

1.14 UNIFORMITY

.1 Contractor shall provide complete uniformity in the various parts of the systems for each specialty.

.2 Departmental Representative may, if deemed necessary, at any time prior to installation have auxiliary equipment, such as fans, lighting, switches, outlets, circuit breakers or light transformers, moved within a 5-metre radius at no extra cost if a change notice is issued prior to installation. Contractor is responsible for coordinating the work with other trades and contractors and obtaining the necessary approval from the Departmental Representative.

.3 No light fixture may be place over pipes, conduits or other obstacle.

.4 Pull boxes and junction boxes must be selected in accordance with *Code de construction du Québec* [Quebec Construction Code] – Chapter V – Electricity (CCQ), taking into account the number and section of conductors and conduits used.

.5 Pull boxes and junction boxes must be located in protected and easily accessible locations. They must remain accessible after installation of equipment and application of finishes.

.6 The Contactor must take note that plans are provided as a guide and are sometimes reduced in scale and do not always indicate dimensions. Contractor must therefore use judgment and ensure that accessories for the systems integrate properly into the building structure and architecture.

1.15 LOCATION OF OUTLETS

.1 Confirm location of all outlets on site. Make necessary adjustments where interior finish remains to be completed. Departmental Representative will not pay extra cost of such adjustments.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Locate light switches on latch side of doors.

.4 Change location of outlets at no extra cost or credit, providing distance does not exceed 5000 mm, and information is given before installation.

1.16 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

- .1 Local switches: 1200 mm.
- .2 Wall receptacles:
  - .1 General: 300 mm.
  - .2 Above top of continuous baseboard heater: 200 mm.
  - .3 Above top of counters or counter splash backs: 175 mm.
  - .4 In mechanical rooms: 1200 mm.
  - .5 Outdoors : 900 mm.
  - .6 Fire alarm stations: 1200 mm.
  - .7 Fire alarm bells: 2100 mm or 300 mm from floor.

1.17 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

1.18 FIELD QUALITY CONTROL

.1 The Contractor must ensure that skilled personnel are on site and that measuring and testing equipment is available to perform the tests requested to Departmental Representative's complete satisfaction. In addition, any test requested by the local representative of the authority with jurisdiction must be performed at no extra cost. Notify Departmental Representative verbally and in writing two weeks in advance of the proposed tests, so that the Departmental Representative can inspect the installation and attend the testing if desired.

.2 All tests must be carried out with the authorization of the Departmental Representative and the other contractors involved. Any imperfections or defects found during testing must be corrected to the Departmental Representative's complete satisfaction.

.3 Conduct following tests and pay associated costs:

.1 Verification of cable insulation resistance;

.2 Verification of grounding continuity;

.3 Adjustment of transformer sockets;

.4 Balancing of phases;

.5 Operation of all lighting, ventilation, heating and electrical outlets;

.6 Operation of all control devices, control panels and protection;

.7 Simulation and manual operations required for the verification of various automatic alarm and control systems;

.8 Required testing of fire alarm system. Obtain certificate of compliance from recognized authority.

.4 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.

.5 Carry out tests in presence of the Departmental Representative.

.6 Provide instruments, meters, equipment and personnel required to conduct tests during installation and at conclusion of project.

.7 Submit test results to Departmental Representative.

1.19 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

1.20 DRILLING, OPENINGS AND SLEEVES

.1 The Contractor is responsible for making all required openings in floors, ceilings and walls as well as providing and installing all required sleeves in concrete slabs. All existing walls, floors, ceilings or other, damaged by the passage of wiring or installation of equipment, must be repaired to match existing finishes.

1.21 LIST OF APPROVED MANUFACTURERS

.1 All equipment must be equivalent to those specified in every detail and is limited to the list of manufacturers provided below:

.1 600 V cable: PIRELLI, PHILIPS, ALCATEL, or equivalent.

.2 Conduits: LCR, SCEPTER, COLUMBIA/MBF, or equivalent.

.3 Fittings: CROUSE-HINDS, APPLETON, or equivalent.

.4 Cable fittings: BURNDY, T & B, or equivalent.

.5 Outlet boxes: HUBBELL, COMMANDER, or equivalent.

.6 Wall switches: HUBBELL, LEVITON, LEGRAND, or equivalent.

.7 Outlets: HUBBELL, LEVITON, LEGRAND, or equivalent.

.8 Plates: HUBBELL, LEVITON, LEGRAND, or equivalent.

.9 Pull boxes: BEL PRODUCTS, COMMANDER, EUROBEC, or equivalent.

.10 Rails, racks and gutters: ELECTROVERT, B-LINE, THOMAS & BETTS, or equivalent.

.11 Fire alarm: SIMPLEX, NOTIFIER (as required).

.12 Fire alarm wiring: BELDEN, SECUREX, or equivalent.

.13 Communication and equipment wiring: BELDEN, ALCATEL, or equivalent.

.14 Lighting equipment: See drawing.

.15 Heating cable: RAYCHEM, NELSON HEAT TRACE, CHROMALOX, or equivalent.

1.22 FIREPROOFING

.1 Where conduits or cables pass through fire walls and floors, make sure to seal from fire and smoke using 3M products, CP25, 303, FS195 and CS95 and seal kit series 7902 and 7904 (or equivalent). Installation to CAN/CGSB 19.13-M87 and manufacturer's recommendations.

1.23 DANGER OF ARC FLASH

.1 Live work:

.1 All work performed on live equipment must be carried out in accordance with CSA Z462 "Workplace Electrical Safety". Refer to tables 1 and 4 of CSA Z462.

.2 The Contractor must obtain approval of foreman prior to starting any live work.

.2 Identification of Arc Flash Danger:

.1 Supply and install labels on all electrical equipment (except those falling under section 4.3.3.1 of CSA Z462), as requested in CCQ-E and Figure Q.1, as indicated in Schedule Q of CSA Z462.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 The work includes, but is not limited to, the supply, manufacture, design, where applicable, assembly, internal wiring, installation, connections, inspection, painting, factory testing, labour, handling, storage, anchoring, levelling, transportation, delivery, assembly, disassembly, dismantling and on-site testing, as well as guaranteeing of all equipment and components supplied.

.2 Plans and specifications are complementary. Any installation or equipment shown on the drawings, even if not specifically indicated on the specifications, and vice versa, is part of the tender documents, as though it were indicated and shown on the specifications.

.3 Supply all materials, labour, tools, lifting equipment, scaffolding, temporary structural supports, cranes and services required for performance of the work.

.4 The work shall be complete, operational and safe.

1.2 SCOPE OF WORK

.1 The work includes but is not limited to the supply, installation and connection of the following systems and equipment:

.1 Distribution systems, including:

.1 Circuit breakers;

.2 Conduits and wiring;

.2 Lighting system;

.3 Fire alarm network;

.4 Outlets;

.5 Connection of all electrical equipment supplied by other disciplines;

.6 Grounding system and associated hardware;

.7 Dismantling, disassembly and relocation of equipment, as shown or indicated on the drawings. Also see Section 26 05 03 – Work on Existing Facilities – Electrical;

.8 Supply and installation of manholes;

.9 Temporary work to maintain operation of existing facilities;

.10 Load transfer equipment;

.11 Access control system;

.12 Heating cables and controls.

.2 The Contractor must be aware that there are two fire alarm systems for the project and that both manufacturers must be engaged for verification, programming, start-up and training. Section 28 31 00 – Fire Alarm System applies to both systems.

.3 Prior to performing the work, the Contractor and specialist subcontractor responsible for installation must hold a meeting, with the Departmental Representative in attendance, to agree on the exact locations for the various system components and the manner in which they will be attached to the existing wood framing. Installation of the new system must be done in manner to respect the heritage value of the former officers' quarters.

1.3 WORK PROGRAM AND WORK PERIODS

.1 Refer to the Departmental Representative's general conditions and the architecture documents for information about the work execution program in order to take it into account in the bid documents. No supplement will be granted by the Departmental Representative owing to failure to be aware of the execution program.

END OF SECTION

PART 1 - GENERAL

1.1 DEMOLITION

.1 Remove all existing electrical equipment indicated on the plans. The equipment must be removed at the appropriate time.

1.2 EXISTING EQUIPMENT

.1 Existing equipment includes all existing materials or components related to the existing electrical facilities at the time of signature of the contract related to these specifications and the related plans.

.2 Existing equipment to be removed:

.1 Must be completely removed, from its power supply to its point of use;

.2 Becomes the property of the Contractor, which must promptly dispose of it, unless otherwise indicated.

.3 Any existing equipment to be removed and relocated:

.1 Must be relocated to the location shown on the redeveloped plans;

.2 Where indicated on the plans, the wiring for an existing piece of equipment to be removed and relocated may be reused either in whole or in part, if the wiring is in excellent condition. However, the wiring must be used for the same purpose;

.3 With the exception of light fixtures, check that the equipment is functioning properly prior to disconnecting it and immediately report any malfunction to the Departmental Representative; once disconnected, the equipment is considered to be in good working order and the Contractor must assume all costs to repair or replace parts and return the equipment to working order, unless a malfunction was reported prior to disconnection.

.4 When existing light fixtures are relocated, they must be equipped with new bulbs; any light fixture with defective ballasts, broken lenses or any other damage must be returned to perfect condition with like-new appearance.

1.3 CONTINUITY OF POWER SUPPLY

.1 Ensure that the power supply is uninterrupted for building occupants during and after the work.

.2 Where modifications to the existing electrical facilities affect sectors adjacent to the work, supply and install conduits, conductors and fittings required for permanent redistribution of service.

.3 Demolition of existing fire alarm devices must take place following start-up of new fire alarm devices.

1.4 POWER OUTAGES

.1 Power outages must be kept to a minimum and carried out in close coordination with the Departmental Representative, who must be notified at least 15 business days in advance and reminded 48 hours in advance of the start of work.

.2 Power outages must be planned and documented. The Contractor must present a detailed description of the work and procedures at each stage for approval. The length of time required for each procedure must be established suitably to enable the Departmental Representative to decide when to proceed with the work.

.3 Should the Departmental Representative issue a counter-order, the Contractor must be able to turn the power back on within 20 minutes.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International

.1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings.

.2 CSA C22.2 No.41, Grounding and Bonding Equipment.

.3 CAN/CSA-C22.2 No.65, Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

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, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors to consist of:

.1 Connector body and stud clamp for round copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors 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. Replace insulating cap.

.4 Install bushing stud connectors in accordance with relevant NEMA standards.

.5 Install stress cones, terminations and splices in accordance with manufacturer's instructions.

.6 Bond and ground as required to CSA C22.2 No.41.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

.3 Section 26 05 20 – Wire and Box Connectors (0 - 1000 V).

.4 Section 26 05 43.01 – Installation of Cables in Trenches and in Ducts.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International.

.1 CSA C22.2 No.0.3, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No.131, Type TECK 90 Cable.

.2 Underwriters Laboratories of Canada (ULC).

.1 ULC-S139-00, Method of Fire Test for Evaluation of Integrity of Electrical Cables.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Submit product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.3 Samples:

.1 N/A.

1.4 DRAWINGS

.1 Indicate number and size of conductors on plans. If no size is indicated, the Contractor must not use a gauge smaller than allowed by the *Code de construction du Québec* [Quebec Construction Code], Chapter V – Electricity and the smallest conductor must not be below No. 12 AWG.

.2 Not all cables appear on plans. Cables that appear are in the form of diagrams and serve as a guide for circuit number to use. The Contractor must provide all cables required.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger.

.2 Copper conductors: size as indicated, with 600 V or 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90.

.3 Conductors: 12 AWG minimum.

.4 For electrical outlet networks, use No. 10 AWG minimum conductors.

.5 Each circuit to have bonding wire (green). EMT conduit cannot be used as a bonding wire.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors: as appropriate.

2.3 TECK CABLE

.1 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.2 Insulation:

.1 Thermosetting polyethylene, chemically cross-linked, type RW90, rated 1000 V.

.3 Inner jacket: polyvinyl chloride material.

.4 Armour: interlocking galvanized steel.

.5 Overall covering: thermoplastic polyvinyl chloride.

.6 Fastenings:

.1 One hole straps to secure surface cables 53 mm and smaller. Two hole steel straps for cables larger than 53 mm.

.2 Channel type supports for two or more cables.

.3 Threaded rods: 6 mm diameter to support suspended channels.

.7 Connectors:

.1 As approved for TECK cable.

2.4 FIRE ALARM CABLES

.1 See Section 28 31 00 – Fire Alarm Systems.

2.5 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated, insulation: thermoplastic, sheath: thermoplastic jacket and armour of closely wound aluminum wire.

.2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated, insulation: PVC, TW-40 degrees C, covered with an outer shell of PVC polyethylene type FT-4 or overall covering of interlocked armour of flat galvanized steel.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 43.01.

3.2 INSTALLATION OF ARMOURED CABLES

.1 In general, all electrical installation in conduit. However, the following options are allowable in the following cases:

.1 Type AC-90 armoured cable may be used to supply electrical outlets and heating equipment in partitions covered with gypsum board. Maximum length of cables 5 m.

.2 Group cables wherever possible on channels.

.3 Except where otherwise indicated, all cables are concealed within architectural units. Except where otherwise indicated, no surface installation is permitted without the prior approval of the Departmental Representative.

.4 Where installed in trays, group cables according to level of insulation.

3.3 INSTALLATION OF TECK CABLE

.1 Group cables wherever possible on channels.

.2 Where installed in trays, group cables according to level of insulation.

3.4 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduits.

.2 Ground control cable shield.

3.5 INSTALLATION OF CABLES SUPPLIED WITH EQUIPMENT

.1 Install cables supplied with equipment, instruments or components in flexible or rigid conduit, metal or other depending on application.

.2 Use appropriate connectors.

.3 Packing gland type connectors are not acceptable for connecting cables directly to equipment, instruments or components.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 – Specific Conditions – Electrical.

.2 Section 26 05 00 – Common Work Results for Electrical.

.3 Section 26 05 21 – Wires and Cables (0 - 1000 V).

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International

.1 CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

.2 CSA Z32.I, Safety in Anesthetizing Locations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 – Specific Conditions – Electrical.

.2 Product Data:

.1 N/A.

.3 Samples:

.1 N/A.

Part 2 Products

2.1 EQUIPMENT

.1 Insulated grounding conductors: green, calibre as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories as indicated, to approval of local authority.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Use mechanical connectors for grounding connections to equipment provided with lugs.

.4 Soldered joints not permitted.

.5 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.6 Ground secondary service pedestals.

.7 Make all fittings and joints "fused" type, such as Thermoweld by Burndy or Cadweld by C.L.M., or approved equivalent.

3.2 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, alternators, elevators and escalators, distribution panels, natural gas inlet and outdoor lighting network, raised floors in computer rooms and variable frequency drives.

3.4 COMMUNICATION SYSTEMS

.1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:

.1 Sound, fire alarm, intercommunication systems: according to manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

.1 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of local authority having jurisdiction over installation.

.2 Perform tests before energizing electrical system.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 – Specific Conditions – Electrical.

.2 Product Data:

.1 Provide product data in accordance with Section 26 00 00 – Specific Conditions – Electrical.

.3 Samples:

.1 N/A.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.6 mm thick, surface mounted, suspended or set in poured concrete walls and ceilings.

.2 Fabricate supports for equipment of galvanized steel.

.3 Supply all required equipment supports for complete installation. Supports for junction boxes, outlets, conduit, etc., are examples of supports not shown on the drawings that must be supplied and installed. For every panel to be wall-mounted, hot dipped galvanized steel channels must be installed vertically between the wall and panel. For prefabricated supports, installation must be in accordance with manufacturer's requirements.

.4 Use metal fasteners. Plastic fasteners are not acceptable.

.5 Stainless steel hardware.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole stainless steel straps to secure surface conduits and cables 53 mm and smaller.
- .2 Two-hole stainless steel straps for conduits and cables larger than 53 mm.

.7 Beam clamps to secure conduit to exposed steel work.

.8 Suspended support systems:

- .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.9 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.

.10 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.11 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.12 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.13 Do not use supports or equipment installed for other trades for conduit or cable support.

.14 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.15 Install mesh supports for conductors dropped vertically in raceways, separately from terminal connections and at intervals not in excess of those indicated in Table 21 of the *Code de construction du Québec* [Quebec Construction Code], Chapter V – Electricity. Supports must maintain continuity of the raceway without damage to conductors or sheath. Secure supports inside boxes.

.16 Install mesh supports for cables dropped vertically, separately from connections and at intervals not in excess of those indicated in Table 21 of the *Code de construction du Québec* [Quebec Construction Code], Chapter V – Electricity. Supports must hold the weight of the cables without damage to cable sheath. Secure the supports.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 Canadian Standards Association (CSA International):

.1 CSA C22.10, Canadian Electrical Code, Part 1, with Quebec amendments (2010 edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product Data:

.1 Provide product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Provide documents and samples in accordance with Section 26 00 00 - Specific Conditions – Electrical.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Make boxes of galvanized steel, welded and screwed lids for flat surface mounting.

.2 Lids with rim at least 25 mm, adapted to flush-mounted pull boxes and junction boxes.

.3 Stainless steel hardware.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install sufficient pull boxes to ensure conduit between each box is maximum 30 metres long and maximum three rectangular or similar elbows between distribution boxes and maximum two rectangular or similar elbows for other networks and empty conduit.

.3 All junction and pull boxes to be appropriate size for number of conductors and diameter of conduit connected to them.

3.2 IDENTIFICATION LABELS

.1 Identification Labels: size 2 indicating system name, power source, capacity, voltage and phase.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45, Rigid Metal Conduit.

.3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83, Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Submit manufacturer's printed product literature, specifications and datasheets in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.1 Submit cable manufacturing data.

.3 Samples:

.1 Provide documents and samples in accordance with Section 26 00 00 - Specific Conditions – Electrical.

1.4 QUALITY ASSURANCE

.1 Test reports: submit test reports certified by recognized independent laboratories.

.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.

1.5 GENERAL

.1 Not all conduits, tubing and pathways are shown on drawings. Those shown are in the form of diagrams.

.2 Conduit to be minimum diameter 21 mm.

.3 For the fire alarm and telephone/voice communication systems, conduit must be factory-painted along full length in the colour shown on the table in Section 26 05 00.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: galvanized steel threaded.

.2 Electrical metallic tubing (EMT): with couplings and green ground wire.

.3 Conduit and tubing to be minimum diameter 21 mm, except where otherwise indicated.

2.2 CONDUIT FASTENINGS

.1 One hole stainless steel straps to secure surface conduits 53 mm and smaller. Two hole stainless steel straps for conduits larger than 53 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports, galvanized steel, for two or more conduits.

.4 Threaded rods, galvanized steel, 6 mm diameter, to support suspended channels.

.5 Use metal fasteners. Plastic fasteners are not acceptable.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Fittings and sleeves with set screws for electrical metallic tubing, except where otherwise indicated.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for linear expansion and ensuring ground integrity.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 21 mm deflection, and ensuring ground integrity.

2.5 FISH CORD

.1 Polypropylene, single length in each empty conduit, extending 3 m beyond each end.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in unfinished areas.

.3 Use rigid galvanized steel threaded conduit for conduits in the roof space, exposed to weather, in an explosion proof enclosure and/or exposed to damage.

.4 Use epoxy coated conduit in corrosive areas.

.5 Use electrical metallic tubing (EMT) when conduits are not in danger of being damaged, except when used in the roof space.

.6 Cables with metal sheaths can be used instead of electrical metal tubing between the accessible connection box in suspended ceilings and light fixtures, maximum length 1.5 m. Use EMT conduits in gypsum board walls to connect wiring devices and/or all other outlets.

.7 Do not use electrical metal tubing (EMT) in hazardous areas or where there are corrosive vapours.

.8 Cables with metal sheaths can be used instead of electrical metal tubing between the accessible connection box in suspended ceilings and light fixtures or cable devices in gypsum board walls, when circuits have 2, 3 or 4 No. 12 AWG conductors, to a maximum length of 3 m.

.9 Use rigid PVC conduit for underground facilities, outside the boundaries of the building foundation.

.10 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without prewired outlet box, connection to surface or recessed fluorescent fixtures and work in movable metal partitions.

.11 Use flexible metal conduit for connection to motors or vibrating equipment in dry areas. Except where otherwise indicated, maximum run length beneath this type of conduit is 1,000 mm.

.12 Use explosion proof flexible connection for connection to explosion proof motors.

.13 Use conduit sealing fittings on rigid conduit installed in explosion proof areas. Fill with sealing compound.

.14 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.15 Mechanically bend steel conduit over 21 mm diameter.

.16 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.17 Install fish cord in empty conduits.

.18 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.19 Dry conduits out before installing wire.

.20 Install metal supports on ceiling T-bars for installation of exit signs and fire detectors.

.21 Install expansion fitting for all conduit that crosses an expansion joint in the building.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind intense heat source with 1.5 m clearance.

.3 Group conduits wherever possible on suspended or surface channels.

.4 Do not pass conduits through structural members except as indicated.

.5 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls or gypsum panels.

.2 Run parallel or perpendicular to building lines.

.3 Anchor all concealed conduit and tubing solidly, including those above suspended ceilings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International

.2 Insulated Cable Engineers Association, Inc. (ICEA)

Part 2 Products

N/A.

Part 3 Execution

3.1 CABLE INSTALLATION IN CONDUITS

.1 Install cables as indicated in conduits.

.2 Do not pull spliced cables inside conduits.

.3 Install multiple cables in conduit simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into conduits and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal conduit ends with conduit sealing compound.

.8 Install cables in ducts without exceeding fill rate, as indicated in Table 8 of the Quebec Construction Code, Chapter V – Electricity (latest edition, 2010).

.9 All cables to have same diameter, installed without exceeding the maximum amount, as indicated in Table 6 of the Quebec Construction Code, Chapter V – Electricity (latest, 2010).

3.2 FIELD QUALITY CONTROL

.1 Perform tests using qualified personnel and include necessary instruments and equipment.

.2 Check phase rotation and identify each phase conductor of each feeder.

.3 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.4 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

.5 Check insulation resistance after each splice and/or termination.

.6 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International

.1 CSA C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55, Special Use Switches.

.4 CSA C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20 twelfth edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Provide product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.3 Samples:

.1 N/A.

Part 2 Products

2.1 SWITCHES

.1 20 A, 120 V, single pole switches to: Specification Grade.

.2 Switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Toggle.

.6 Colour: white for normal network, red for emergency network.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 120% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

.5 Acceptable products:

	Pass & Seymour	Hubbell	Leviton
120 V - 20 A - 1 P	CS20AC1-W	CS120-W	CS120-2W

2.2 RECEPTACLES

.1 Commercial Grade duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:

.1 Tamper and weather resistant.

.2 Colour: white for normal network, red for emergency network and orange for receptacle with isolated ground.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

.4 Acceptable products:

	Pass & Seymour	Hubbell	Leviton
15 A - 125 V (5-15R)	WR15TRW	BR15WHIWRTR	TWR15-W

.5 Receptacles for maintenance designed for 15 A and 20 A plugs must be 5-20R configuration.

2.3 COVER PLATES

.1 Cover plates for wiring devices.

.2 Cover plates from one manufacturer throughout project.

.3 Stainless steel, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.4 Switches: Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Receptacles: Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location. Provide for necessary accessories and supports.

.3 Mount toggle switches at height in accordance with Section 26 05 00 or as indicated.

.4 Install switches on latch side of doors.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height as indicated or in accordance with Section 26 05 00.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Connect wires using clamping screws only.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is complete.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.4 Identification:

.1 On each cover plate, identify outlets and switches using self-adhesive plastic labels (e.g.: P-Touch, Dymo or 3M), size 1 or in accordance with Departmental Representative instructions, indicating the panel and power circuit number. Label holder to be transparent matt finish with white lettering on a black background for the normal system and white lettering on a red background for the emergency system.

.5 Perform tests in accordance with standards in effect and submit test report.

.6 Do not install outlets back-to-back in wall. Allow minimum 150 mm horizontal clearance between boxes.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

.3 Section 26 28 20 – Ground Fault Circuit Interrupters - Class "A".

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International

.1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Submit product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.3 Samples:

.1 N/A.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, compatible with existing panel: quick- make, quick-break type, for manual and automatic operation.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.4 Circuit breakers must have at least the same breaking capacity as the panel in which they are installed.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 CSA International

.1 CAN/CSA C22.2 No.144, Ground Fault Circuit Interrupters.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA PG 2.2, Application Guide for Ground Fault Protection Devices for Equipment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Provide product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.3 Samples:

.1 Provide documents and samples in accordance with Section 26 00 00 - Specific Conditions – Electrical.

1.4 QUALITY ASSURANCE

.1 Submit test reports for field testing of ground fault equipment to Departmental Representative and certificate that system as installed meets criteria specified.

.2 Testing of ground fault equipment to be paid by the Contractor, in accordance with Section 26 00 00 - Specific Conditions – Electrical.

1.5 DESCRIPTION

.1 System No. 1, ground fault circuit interrupter, one or two circuits, 120 V (or 208 V as appropriate), solely for ground networks.

.2 System No. 2, self-contained with duplex receptacle, solely for ground networks.

Part 2 Products

2.1 MATERIALS

.1 Components comprising ground fault protective system to be of same manufacturer.

2.2 SYSTEM NO. 1

.1 Ground fault circuit interrupter for 15 A, 120 V (or 208 V) as indicated, with following features:

.1 Automatic A breaker with shunt trip.

.2 Zero sequence transformer.

.3 Facility for testing and reset.

2.3 SYSTEM NO. 2

.1 Ground fault protector unit, self-contained with 15 A, 120 V circuit interrupter and duplex receptacle complete with:

.1 Solid state class A ground sensing device.

.2 Facility for testing and reset.

Part 3 Execution

3.1 INSTALLATION

.1 Do not ground neutral on load side of ground fault relay.

.2 Pass phase conductors, including neutral, through zero sequence transformers.

.3 Each system to be installed as indicated.

.4 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations and as indicated.

.5 Self-contained ground fault protector units cannot be used to provide ground fault protection for standard outlets.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Arrange for field testing of ground fault equipment.

.3 Demonstrate simulated ground fault tests.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.3 CSA International

.1 CSA C22.2 No.14, Industrial Control Equipment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Product data:

.1 Submit product data in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.3 Samples:

.1 N/A.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Operation and Maintenance Data: submit operation and maintenance data for contactors for incorporation into manual as indicated in 26 00 00 - Specific Conditions – Electrical.

.3 Attach operation and maintenance data for each type and model of contactor.

Part 2 Products

2.1 CONTACTORS

.1 Contactors: general use.

.2 Electrically held controlled by pilot devices as indicated and rated for type of load controlled.

.3 Mount in NEMA 1 Enclosure unless otherwise indicated.

2.2 EQUIPMENT IDENTIFICATION

.1 Size 4 nameplate indicating name of load controlled in accordance with Section 26 05 00.

2.3 MANUFACTURERS

.1 Acceptable products: Eaton, Schneider Electric, Allen-Bradley or approved equivalent.

Part 3 Execution

3.1 INSTALLATION

.1 Install contactors and connect power wires and auxiliary control devices.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 ASTM International Inc.

.1 ASTM F1137, Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.74, Equipment for Use with Electric Discharge Lamps.

.5 United States of America, Federal Communications Commission (FCC).

.1 FCC (CFR47), EM and RF Interference Suppression

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Provide shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Departmental Representative.

.2 Product Data:

.1 N/A.

1.4 GENERAL

.1 Supply and install all fluorescent tubes and light bulbs in luminaires.

Part 2 Products

2.1 DEVICES

.1 Refer to list of lighting devices on drawing.

2.2 LAMPS

.1 Compact fluorescent lamps:

- .1 Compact;
- .2 Watts indicated;
- .3 10,000 hour lamp life;
- .4 CRI 82;
- .5 3500 K.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Electrical Contractor to install suspended luminaires. Secure luminaire using wood screws of appropriate length.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 00 00 - Specific Conditions – Electrical.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Unless otherwise indicated, perform all work in accordance with latest *Code de construction du Québec* [Quebec Construction Code] (2005).

.2 Furthermore, perform work in accordance with any other code or standard having jurisdiction, latest edition, including but not limited to the following:

.1 Government of Canada

.1 Standard for Fire protection, Treasury Board of Canada, http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316

.2 Government of Quebec

.1 *Code de construction du Québec* [Quebec Construction Code] – Chapter I, Buildings and National Building Code – Canada 2005 (modified).

.2 *Code de construction du Québec* [Quebec Construction Code] – Chapter V, Electricity, National Building Code– Canada 2010 (modified).

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-06, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S530-M91 (1999), Heat Actuated Fire Detectors for Fire Alarm Systems.

.3 CAN/ULC-S536-04, Inspection and Testing of Fire Alarm Systems.

.4 CAN/ULC-S537-04, Verification and Testing of Fire Alarm Systems.

.4 National Fire Protection Agency

.1 NFPA 72-2013, National Fire Alarm Code.

.5 Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

.1 Submit shop drawings in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Include:

.1 Detail assembly and internal wiring diagrams for control units;

.2 Overall system riser wiring diagram, identifying control equipment, initiating zones and signalling circuits, conductors, terminations and terminal numbers;

.3 Details for devices;

.4 Details and performance specifications for control, annunciation and peripherals, with item by item cross reference to specifications for compliance;

.5 Written certificate from manufacturer indicating that equipment supplied specifically for these specifications will be available for a 10-year period.

.2 Product Data:

.1 N/A.

.3 Samples:

.1 N/A.

1.4 CLOSEOUT SUBMITTALS

.1 Provide all closeout submittals in accordance with Section 26 00 00 - Specific Conditions – Electrical.

.2 Submit maintenance and engineering data for incorporation into manual specified in Section 26 00 00 - Specific Conditions – Electrical.

.3 Operations and maintenance data to include:

.1 Instructions for fire alarm system components to permit effective operation and maintenance;

.2 Technical data and illustrated parts list with catalogue numbers;

.3 Copy of approved shop drawings with corrections completed and marks and comments removed, except review stamps.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in fire alarm system installations approved by manufacturer with 5 years' experience.

.2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.

.3 System:

.1 Conform to CAN/ULC-S524.

.2 Subject to Departmental Representative approval.

.3 To Canadian Forces Fire Marshal approval.

.4 Maintenance Service:

.1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative.

.5 Training:

.1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system and added elements.

1.6 SYSTEM DESCRIPTION

.1 Two independent systems are currently installed:

.1 One Simplex 4010-9101CF system for the northern part of the building, belonging to PWGSC (public side of governor general's residence and governor general's private apartments);

.2 One Notifier NFS-320 system for the southern part of the building, belonging to DND (commander's residence and officers' mess).

.2 Supply, install and connect all items necessary to perform the following functions (see plan details):

.1 Heat detection in the roof space of the governor general's private apartments and commander's residence and officers' mess;

.2 Transmission of fire alarm from Notifier panel (DND side) to Simplex panel (PWGSC side);

.3 Transmission of fire alarm from Simplex panel (PWGSC side) to Notifier panel (DND side).

Part 2 Products

2.1 LINEAR HEAT DETECTORS

.1 Conventional linear heat detectors for connection to an addressable monitoring interface (see Section 2.2).

.2 Maximum length of cable connecting to an addressable monitoring interface must be at least 1,000' (300 m).

.3 Alarm temperature 155 °F (68 °C), compatible with a maximum ambient temperature of 40 °C.

.4 Detectors must be ULC and FM labelled.

.5 Make and model as recommended by respective manufacturers (Notifier and Simplex), with technicians certified to perform inspections.

2.2 ADDRESSABLE INTERFACES

.1 Contact trip devices, for monitoring sprinkler locations and controlling electrical devices.

.2 Single point monitoring interface.

.1 Required products: Notifier (DND side) and Simplex (PWGSC side).

.3 Command interface with control relays (1 A).

.1 Required products: Notifier (DND side) and Simplex (PWGSC side).

2.3 END-OF-LINE DEVICES

.1 End-of-line devices to control supervisory current in alarm and signalling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel.

2.4 WIRING AND CONDUIT

.1 Twisted and shielded copper conductors, FAS105, rated 300 V, installed in conduit.

.2 Detection circuits: copper conductors, FAS105, 16 AWG minimum, twisted and shielded.

.3 Signal circuits: copper conductors, FAS105, 14 AWG minimum, twisted.

.4 Control circuits: conductors, type FAS105, 14 AWG minimum, twisted.

.5 Each wire clearly identified. Identification embedded in insulation and in uniform colour, numbered or other approved method.

.6 Conductors to be in electrical metal tubing (EMT). Diameter of conduit in accordance with Electrical Code.

.7 Contractor to take special care to properly ground all metal elements.

2.5 MANUFACTURERS

.1 Required products: Notifier (DND side) and Simplex (PWGSC side).

Part 3 Execution

3.1 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524, NBC and Quebec Construction Code, Chapter V, Electrical, 2010 edition, and according to manufacturer's recommendations.

.2 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.3 Install end-of-line devices at end of alarm and signalling circuits.

.4 Ensure that wiring is free of opens, shorts or grounds before system testing and handover to Departmental Representative.

3.2 FIELD QUALITY CONTROL

.1 PWGSC (Simplex) and DND (Notifier) suppliers must jointly perform tests in accordance with Section 26 05 00 and CAN/ULC-S537.

.2 Once installation is complete, equipment must be started up by a qualified manufacturer's representative.

.3 System programming and programming verification using COMPARE software as recommended by ULC and NFPA.

.4 Fire alarm system manufacturers must perform a complete system check. Manufacturer must be a member of the C.F.A.A. and have ISO 9002 certification.

.5 The manufacturers must check connections of all new equipment (including previous and following devices on the same circuit).

.6 Fire alarm system manufacturers must ensure that system is installed to ULC requirements and in accordance with plans and specifications.

.7 Fire alarm system manufacturers must ensure that system is installed in accordance with manufacturers' recommendations.

.8 Fire alarm system manufacturers must ensure that the rules for supervisory current are followed. To that end, each wire connected to the various non-addressable equipment is checked by disconnecting it to ensure continuity of supervision and correct polarity and ensure connections are to separate terminals at the entry and outlet of a device.

.9 Fire alarm system manufacturers must ensure that the power applied to each component is within recommendations and that circuits are protected by fuses or circuit breakers.

.10 Fire alarm system manufacturers must ensure that equipment is checked for operation in accordance with Chapter 6 of ULC-S537.

.11 Manufacturers to provide a detailed report from a printer connected to the control panel and providing:

.1 Identification number and type of all addressable devices connected to the system;

.2 Analog voltage of addressable devices;

.3 Voltage to calibrate smoke detectors;

.4 Voltage to identify addressable devices.

.12 Once check is complete, manufacturers to provide the Departmental Representative with a certificate stating that the work was completed in accordance with the directives and standards in effect. Include in submittal all expenses necessary for the inspection and issuance of certificate.

.13 A certificate specific to the project pertaining to the fire alarm system must be supplied by the manufacturer. Certificate covering property damage and personal injury for $5,000,000.

.14 Upon completion of the work, the manufacturer must provide the Departmental Representative with a complete list indicating exact location (part number) of all equipment for the project, as well as various changes or modifications made as a result of the inspection.

.15 Correct any defect in operation reported by the Departmental Representative or other defect, notification of which this Division is responsible, to Departmental Representative's satisfaction for a period of one year from completion of system verification.

END OF SECTION