Project Title

Gravenhurst, Ontario
Correctional Service Canada
2000 Beaver Creek Drive
Beaver Creek Institution
Various AM&E Works
For BC-62

Project Number R.045086.002

Project Date 2016-10-27

Issued for Tender

Architect

Mechanical Engineer

Electrical Engineer

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Part 1 General

1.1 SUMMARY OF WORK

.1 Work of this Contract consists of various architectural, mechanical and electrical work scopes located throughout the existing building, as indicated on drawings and specified herein, including but not necessarily limited to the following items:

.1 Modifications to existing doors and frames to accommodate new security access control requirements, removal of existing flooring and preparing flooring substrate for new floor finishes, as well new resilient flooring, and painting of plywood floors and gypsum board.

.2 Modifications to existing roof dormers including supply and installation of galvanized steel ladders and platforms to provide service access to attic spaces as shown on drawings.

.3 Supply and installation of new sprinkler test drain, sanitary sump pumps and replacement of combustion air intake piping as well as a control connection for sump pumps level indication at main security panel.

.4 Supply and installation of new fire alarm smoke detectors in elevator lobbies including connections to existing FA system and testing for correct function are also required as is power for the door operators and tie-in to the fire alarm panel. Public address system is to be connected to existing campus public address system.

1.2 MINIMUM STANDARDS

.1 Execute work to meet or exceed:

.1 National Building Code of Canada 2015, National Fire Code of Canada 2015, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply as directed by the Departmental Representative.

.2 Rules and regulations of authorities having jurisdiction.

.3 Treasury Board of Canada Secretariat, Fire Protection Standard, April 1, 2010.

.4 Observe and enforce construction safety measures required by National Building Code 2015, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 278/05 (Asbestos), Workplace Safety and Insurance Board and municipal statutes and authorities.

.5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

.6 Comply with CSA B651-12, Accessible Design for the Built Environment, unless specified otherwise. In any case of conflict or discrepancy between the building codes and CSA B651, the requirements of CSA B651 shall apply.

1.3 AUTHORITIES HAVING JURISDICTION

.1 Fire Testing requirements are for ULC or WHI listed and labelled products.

.2 Substitution of ULI or other Fire testing reports for required ULC and WHI testing is acceptable to the Departmental Representative only if the issuing organization is accredited and listed in the "Directory of Accredited Certification Organizations (CAN-P-1505C), 1993" published by the Standards Council of Canada, 1-800-267-8220. Testing shall be to the Canadian standards and the tested products shall bear the appropriate label.

.3 Submit 3 copies of test reports under the letterhead of the accredited organization to the Departmental Representative.

1.4 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.5 FEES, PERMITS, CERTIFICATES AND LETTERS

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates, permits and letters required.

.3 Obtain PWGSC Fire Protection Engineer Inspection Letter of Deficiencies from Departmental Representative. Submit a copy of the letter with a list of remedial measures taken to correct deficiencies.

.4 Furnish certificates, permits and letters when requested.

1.6 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

.2 Conduct concrete floor moisture testing using Calcium Chloride moisture tests.

.1 Submit test results to Departmental Representative for approval prior to installing any flooring. Conduct one test per 100 sq. metres of area being covered.

1.7 DOCUMENTS

.1 Keep one copy of contract documents and shop drawings on the site.

1.8 ELECTRONIC SUBMITTALS

.1 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, MS Word, MS Excel, MS Project and Autocad dwg files; on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as Oproma, as directed by Departmental Representative.

1.9 CONTRACTOR'S AS-BUILT DRAWINGS AND SPECIFICATIONS

.1 As work progresses, neatly record significant deviations from the Contract drawings and specifications using fine, red marker on full size white prints and specifications. Make the same changes on the electronic files.

.2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT". Also circle on List of Drawings each title and number of drawing marked with "AS-BUILT" information. Circle on Table of Contents each specification section number and title of specification sections marked with "AS-BUILT" information.

.3 Departmental Representative will provide one electronic set of drawings, schedules and specifications for as-built drawing and specification purposes.

.1 Drawings are in Autocad.

.2 Specifications are in MS Word.

.3 Amendments and addenda are in MS Word.

.4 Record following significant deviations:

.1 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.

.2 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

.3 Field changes of dimension.

.4 Other significant deviations which are concealed in construction and cannot be identified by visual inspection.

.5 Alternative materials and systems installed replacing original materials and systems specified by trade name.

.5 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit pdf files on USB compatible with PWGSC encryption requirements, through email or alternate electronic file sharing service such as ftp.

.6 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.10 OPERATIONS AND MAINTENANCE DATA

.1 On completion of project submit to Departmental Representative 4 copies of Operations and Maintenance Data assembled in four 255 x 295 mm vinyl-covered, 3-ring, loose-leaf binders with title sheet labelled "Operations Data and Maintenance Manual", project title, date and list of contents. Organize content into applicable sections between hard paper dividers with labelled tabs.

.2 Include in each binder maintenance instructions for finished surfaces, warranties and guarantees in form approved by Departmental Representative and operations and maintenance data for equipment and systems with parts list, suppliers' names and addresses, hardware schedule, schematic diagrams for electrical hardware, complete set of final shop drawings (bound separately), names, addresses and phone numbers of sub-contractors and suppliers, list of materials with names of manufacturer and source of supply. Neatly type lists and rates. Use clear drawings, diagrams or manufacturer's literature.

1.11 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Prior to submission check and certify as correct, shop drawings and product data sheets. Issue to Departmental Representative each submission at least 14 days before dates reviewed submission will be needed.

.2 Where technical sections specify that shop drawings bear the stamp of a Registered Professional Engineer, the Engineer must be registered in the Province of Ontario.

.3 Submit 3 prints and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.4 Submit 3 prints and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.5 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

.6 Submit 3 prints and 1 electronic of product data sheets for standard manufactured items. Indicate VOC's in g/l for adhesives, primers, sealants, paints, curing and sealing compounds, sealers, particleboard, plywood, preserved wood, and any other product that emits more than 25 g/l VOC during application, curing, initial off gassing or end use.

.7 Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.

1.12 CONSTRUCTION PHOTOGRAPHS

.1 Submit electronic and hard copy of colour digital photography in jpg format, fine resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 2 Locations. Viewpoints and location of viewpoints determined by Departmental Representative.

.4 Frequency: monthly with progress statement.

1.13 DESIGN DATA, TEST REPORTS, CERTIFICATES, MANUFACTURER'S INSTRUCTIONS, MANUFACTURER'S FIELD REPORTS

.1 Prior to submission check and certify as correct each submission. Issue to Departmental Representative each submission at least 14 days before reviewed submission will be needed.

.2 Submit 3 white print copies of each item requested.

.3 For products bearing the 'Ecologo' of the Environmental Choice Program, Environment Canada, Canadian Environmental Protection Act, Environmental Choice Product Guidelines:

.1 Submit two copies of the licensing criteria statements and the verification of compliance with Sections 3(a) and 3(b) of the ECP to the Departmental Representative. For adhesives, paints, primers and sealants, cleaners and degreasers, floor polishes, water borne surface coatings, indicate VOC in g/l.

.2 Alternatively, material in original containers bearing the 'Ecologo' or products bearing the 'Ecologo' will satisfy this requirement.

.4 Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.

1.14 SAMPLES

.1 Submit duplicate samples in full range of colours.

.2 Identify manufacturer's name, product and colour.

.3 Installed work shall match reviewed sample.

1.15 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.16 PROTECTION

.1 Protect existing work from damage.

.2 Replace damaged existing work with material and finish to match original.

.3 Cover furniture and fittings prior to commencing work.

.4 Remove coverings and clean following completion of each work period.

.5 Provide temporary hoarding between finished and work areas. Maintain access to fire exits and washroom facilities. Remove hoarding on completion of work.

.6 Protect existing trees and plants on site and adjacent properties.

1.17 EXISTING SERVICES

.1 Establish location, protect and maintain existing utility lines.

.2 Maintain existing services in occupied areas.

.3 Use designated existing sanitary facilities.

.4 Use existing water and electrical services at no cost.

.5 Use elevator designated, protect walls from damage.

1.18 TEMPORARY FACILITIES AND SERVICES

.1 Provide and maintain temporary facilities and services required to carry out work.

.2 Remove temporary facilities and services on completion of work.

1.19 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.20 MATERIAL AND EQUIPMENT

.1 Use new products unless otherwise specified.

.2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.

.3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.21 CONCEALMENT

.1 Conceal pipes, ducts, conduits and wiring in finished areas.

1.22 CUTTING AND REMEDIAL WORK

.1 Co-ordinate work to keep cutting and remedial work to a minimum.

.2 Execute cutting and remedial work required. Notify Departmental Representative before cutting, boring or sleeving structural members.

.3 Do not cut, puncture or drill any member of ceiling system which forms part of an integrated assembly with mechanical or electrical components.

.4 Use specialists in affected material to execute cutting and remedial work.

.5 Match work to adjoining construction and finishes.

.6 Fit components tight to adjoining surfaces.

.7 Make good surfaces exposed or disturbed by work with material and finish to match existing adjoining surfaces.

.8 After patching wall, ceiling or other painted surfaces, paint the entire wall or area up to the next change in plane or direction as directed by Departmental Representative.

1.23 FASTENINGS

.1 Provide fastenings of type, size and spacing required to assure secure anchorage.

.2 Obtain Departmental Representative's permission before using explosive actuated fasteners.

1.24 CO-ORDINATION AND CO-OPERATION

.1 Building will not be occupied during execution of work.

.2 Execute work with minimum disturbance to public and normal use of site.

1.25 SITE OFFICE

.1 Provide office heated to 16°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

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

.3 Subcontractors may provide their own offices as necessary. Direct location of these offices in coordination with Departmental Representative.

.4 Departmental Representative's Site office.

.1 Provide temporary office for Departmental Representative in location as directed.

.2 Provide temporary office with power and phone/data connection.

.3 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with access steps landing and railing. Office to have four 50% opening windows and one lockable door. Windows shall face the construction site.

.4 Insulate temporary office and provide heating system capable of maintaining 22°C inside temperature at -20°C outside temperature.

.5 Equip Site office with window-installed air conditioner unit adequately sized to maintain 22 deg. C when exterior temperature is 30 deg. C or higher.

.6 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in white. Finish floor with 19 mm thick plywood.

.7 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component.

.8 Provide access to private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory, mirror, hand sanitizer. Maintain constant supply of paper towels, toilet tissue, and refill for hand-sanitizer. Washroom maintenance to include frequent cleaning/sanitizing and effluent removal (if chemical type toilet used).

.9 Equip office with 1 x 2 m table, four (4) chairs, 6 m of shelving 300 mm wide, one 3-drawer filing cabinet, one plan rack and one coat rack and shelf.

.10 Maintain office dry and in clean condition.

1.26 INSPECTION AND TESTING

.1 Inspection and Testing Agency shall be engaged by the Contractor. The cost of their services shall be paid for by the Contractor.

.2 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.

1.27 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown by Section aggregating contract amount.

.2 Show separately cost of equipment purchased exempt from Ontario Retail Sales Tax under your Ontario Sales Tax licence number.

.3 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.28 SCHEDULING

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

1.29 CLEANING

.1 Maintain project free of accumulated waste and rubbish.

.2 Final cleaning:

.1 Remove temporary protection.

.2 Remove dust, dirt and foreign matter from surfaces. HEPA vacuum interior surfaces.

.3 Broom clean paved exterior surfaces, rake clean other exterior surfaces.

.4 Remove snow and ice from access to building and parking lots.

1.30 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert from D&C waste destined for landfill to maximum extent possible. Reuse, recycle or sell material off site for reuse except where indicated otherwise. On site sales are not permitted. Target for this project is 50% diversion from landfill.

.2 For construction and demolition projects, even for those not over 2,000 m^2 total floor area, source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.

.1 Provide facilities for collection, handling and storage of source separated wastes.

.2 Source separate the following waste:

.1 Brick and Portland cement concrete.

.2 Corrugated cardboard.

.3 Wood, not including painted or treated wood or laminated wood.

.4 Gypsum board, unpainted.

.5 Steel.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.

.1 Indicate how material being removed from the site will be reused or recycled.

.4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.31 DESIGNATED SUBSTANCES

.1 There are no "designated substances" as defined by the Occupational Health and Safety Act Revised Statutes of Ontario, 1990, Chapter 0.1 as amended, on the project site.

1.32 HALOCARBONS

.1 Comply with Federal Halocarbon Regulations 2003 under the Canadian Environmental Protection Act 1999, EPAM and PWGSC Ontario Region Halocarbon Information Sheet dated March 2010.

1.33 SPECIAL PROTECTION AND PRECAUTIONS

.1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of material safety data sheets acceptable to ESDC - Labour Program.

1.34 IAQ - INDOOR AIR QUALITY

.1 Comply with CSA Z204-94(R1999), Guideline for Managing Indoor Air Quality in Office Buildings and CSA B651-12, Annex A, article A.5 Indoor Air Quality.

1.35 POLLUTION CONTROL

.1 Spills of deleterious substances:

.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.

.2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.

.3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

1.36 OPSS AND OPSD

.1 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage.

Part 2 Products

2.1 Not Used

Part 3 Execution

3.1 Not Used

END OF SECTION

Part 1 General

1.1 PURPOSE

.1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

1.2 DEFINITIONS

.1 "Contraband" means:

.1 An intoxicant, including alcoholic beverages, drugs and narcotics.

.2 Tobacco or associated tobacco products.

.3 An igniting device, lighter or matches.

.4 A weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization.

.5 An explosive or a bomb or a component thereof.

.6 Currency over any applicable prescribed limit, $ 50 when possessed by an inmate without prior authorization.

.7 Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.

.2 "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director, Warden or Superintendent of the Institution as applicable.

.6 "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

.7 "Departmental Representative" means the project manager from Public Works and Government Services Canada.

.8 "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.

.9 "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.

1.3 PRELIMINARY PROCEEDINGS

.1 Prior to the commencement of work, the Contractor shall meet with the Director or his/her representative to:

.1 Discuss the nature and extent of all activities involved in the Project.

.2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.

.2 Contractor shall:

.1 Ensure that all Construction Employees are aware of the security requirements.

.2 Ensure that a copy of the security requirements is always prominently on display at the job site.

.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all Construction Employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Submit to the Director a list of the names with date of birth of all Construction Employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC Institutions are not valid at this Institution.

.3 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are in the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:

.1 Appear to be under the influence of alcohol, drugs or narcotics.

.2 Behave in an unusual or disorderly manner.

.3 Are in possession of contraband.

1.5 VEHICLES

.1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.

.2 The Director may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter shall be locked when not in use.

1.6 PARKING

.1 Parking area(s) to be used by Construction Employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

1.7 SHIPMENTS

.1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the Institution's own shipments. The Contractor must have his/her own employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material, equipment or tools.

1.8 TELEPHONES

.1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the Institution unless prior approval of the Director is received.

.2 The Director will ensure that approved telephones, facsimile machine and computers with internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4 The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

.1 Work hours within the Institution are: Monday to Friday 07:30 hrs. to 16:00 hrs.

.2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.

.3 Work outside perimeter fence: no restrictions; comply with local industry standards.

1.10 OVERTIME WORK

.1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such as the completion of a concrete pour or work to make the construction safe and secure, the Contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to the Crown for such events may be attributed to the Contractor.

.2 When overtime work, weekend, or statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his/her designate, to maintain the security surveillance. The Departmental Representative may post extra staff for inspection of construction activities. The actual cost of this extra staff may be subject to reclamation by the Crown.

1.11 TOOLS AND EQUIPMENT

.1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.

.2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.

.3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.4 Store all tools and equipment in approved secure locations.

.5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the Contractor. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate.

.6 All missing or lost tools or equipment shall be reported immediately to the Director.

.7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:

.1 At the beginning and conclusion of every construction project.

.2 Weekly, when the construction project extends longer than a one week period.

.3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.

.8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The Contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.

.9 If propane or natural gas is used for heating the construction, the Institution will require that an employee of the Contractor supervise the construction site during non-working hours.

.10 If torches or grinders are required tools to perform Work, Contractor must complete a Hot Work Permit as supplied by CSC. Completed original form(s) are copied and posted

on the work site in a conspicuous location. Original documents are to remain with the Institutional Fire Chief.

1.12 SECURITY HARDWARE

.1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

1.13 PRESCRIPTION DRUGS

.1 Employees of the Contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

1.14 SMOKING RESTRICTIONS

.1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.

.3 Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.

1.15 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on Institutional Property.

.2 Discovery of Contraband on the construction site and the identification of the person(s) responsible for the Contraband shall be reported immediately to the Director.

.3 Contractors shall be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of Contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of Contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.16 SEARCHES

.1 All vehicles and persons entering Institutional property may be subject to search.

.2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of Contraband or unauthorized items, he/she may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of Contraband drug residue.

1.17 ACCESS TO AND REMOVAL FROM INSTITUTION PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the Institution after normal working hours, unless approved by the Director.

1.18 MOVEMENT OF VEHICLES

.1 Escorted commercial vehicles will be allowed to enter or leave the Institution through the vehicle access gate during the following hours:

.1 07:45 hrs. to 11:00 hrs.

.2 13:00 hrs. to 15:30 hrs.

.2 Construction vehicles shall not leave the Institution until an inmate count is completed.

.3 The Contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.4 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC Staff or Commissionaires working under the authority of the Director.

.5 Commercial Vehicles will only be allowed access to Institutional Property when their contents are certified by the Contractor or his/her representative as being strictly necessary to the execution of the construction project.

.6 Vehicles shall be refused access to Institutional Property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution.

.7 Private vehicles of Construction Employees will not be allowed within the security wall or fence of medium or maximum security Institutions without the permission of the Director.

.8 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.

.9 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

1.19 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Director will permit the Contractor and his/her employees as much freedom of action and movement as is possible.

.2 However, notwithstanding paragraph above, the Director may:

.1 Prohibit or restrict access to any part of the Institution.

.2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, Construction Employees only be allowed access when accompanied by a member of the CSC security staff.

.3 During the lunch and coffee/health breaks, all employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

1.20 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among Construction Employees and maintained throughout the construction project.

1.21 STOPPAGE OF WORK

.1 The Director may request at any time that the Contractor, his/her employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The Contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.

.2 The Contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

1.22 CONTACT WITH INMATES

.1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his/her security clearance revoked.

.2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this Contract.

1.23 COMPLETION OF CONSTRUCTION PROJECT

.1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

Part 2 Products

2.1 Not Used

Part 3 Execution

3.1 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 National Building Code 2015 (NBC):

.1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.2 National Fire Code 2015 (NFC):

.1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.3 Province of Ontario:

.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.

.2 O. Reg. 490/09, Designated Substances.

.3 Workplace Safety and Insurance Act, 1997.

.4 Municipal statutes and authorities.

.4 Treasury Board of Canada Secretariat (TBS):

.1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx ?id=17316&section=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Measures and controls to be implemented to address identified safety hazards and risks.

.2 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Building, Facility, Tenant's Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Building, Facility, Tenant's Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.

.3 Contractor's and Sub-contractors' Safety Communication Plan.

.4 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.

.5 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.

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

.7 Submit names of personnel and alternates responsible for site safety and health.

.8 Submit records of Contractor's Health and Safety meetings when requested.

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

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

.11 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.12 Submit copies of incident and accident reports.

.13 Submit Material Safety Data Sheets (MSDS).

.14 Submit Workplace Safety and Insurance Board (WSIB) - Experience Rating Report.

1.3 FILING OF NOTICE

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

1.4 WORK PERMIT

.1 Obtain building permits related to project prior to commencement of Work.

.2 Obtain Hot Work Permit from Works Department.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 GENERAL REQUIREMENTS

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

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

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.10 RESPONSIBILITY

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

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

1.11 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.12 POSTING OF DOCUMENTS

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

.1 Contractor's Safety Policy.

.2 Constructor's Name.

.3 Notice of Project.

.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).

.5 Ministry of Labour Orders and reports.

.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.

.7 Address and phone number of nearest Ministry of Labour office.

.8 Material Safety Data Sheets.

.9 Written Emergency Response Plan.

.10 Site Specific Safety Plan.

.11 Valid certificate of first aider on duty.

.12 WSIB "In Case of Injury At Work" poster.

.13 Location of toilet and cleanup facilities.

1.13 CORRECTION OF NON-COMPLIANCE

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

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

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

1.14 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.15 POWDER ACTUATED DEVICES

.1 Use of powder actuated devices is not permitted.

1.16 WORK STOPPAGE

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

.2 Assign responsibility and obligation to competent supervisor to stop or start Work when it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

Part 2 Products

2.1 Not Used

Part 3 Execution

3.1 Not Used

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 01 57 – Roofing Modifications.

1.2 REFERENCE STANDARDS

.1 ASTM International

- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
- .4 ASTM A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- .5 ASTM F593-13ae1, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- .6 ASTM F3125/F3125M-15a, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 German Institute for Standardization (DIN)

- .1 DIN EN 15865 (2009-08) Adhesives - Determination of torque strength of anaerobic adhesives on threaded fasteners (ISO 10964:1993 modified)

.3 CSA International

- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA S16-14, Design of Steel Structures.
- .3 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .4 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.4 Green Seal Environmental Standards (GS)

- .1 GS-11-2011, Third Edition, Paints and Coatings.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

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

.2 Submit two copies of WHMIS MSDS.

.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

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

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

.1 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: Conduct preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.

.2 Steel pipe: to ASTM A53/A53M extra strong, galvanized finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307; corrosion resistant types to ASTM F3125/F3125M, Type 3. Provide all required anchoring devices including anchor clips, bar and strap anchors, expansion bolts and shields, and other devices designed to support and secure work.

.6 Stainless steel sheet, strip, plate and flat bar: to ASTM A666, Type 304, AISI No. 4 finish, minimum 75% recycled content, minimum steel thickness 2.0 mm.

.7 SS bolts, nuts and washers: stainless steel to ASTM F593, minimum 75% recycled content.

.8 Drilled adhesive anchors: injection adhesive anchor consisting of fast curing 2-part adhesive injected into drilled hole, followed by insertion of bolt, rod or reinforcing bar.

.9 Expansion anchors: stud type expansion anchor driven into drilled hole, expands when nut torques. Minimum size 10 x 90 mm.

.10 Thread lock adhesive: general purpose for threaded fasteners requiring disassembly with standard hand tools, one component acrylic, medium strength, di-methacrylate ester adhesive for fasteners subjected to medium shock/vibration loads/medium levels of stress.

.1 Breakaway torque: 20 Nm to DIN EN 15865.

.2 Prevail torque: 7 Nm to DIN EN 15865.

.3 Breakloose torque: 24 Nm to DIN EN 15865.

.4 Maximum prevail torque: 24 Nm to DIN EN 15865.

.11 Security fasteners:

.1 Provide security screws, security nuts, rivets, spanner screws or other equally secure approved devices for affixing various items, i.e. torx pin head, socket pin head, phillips pin head, hex pin head or equivalent.

.2 Spanner screws to have slots that require a special spanner tool to remove screws.

.3 Round head screws not acceptable except at locations approved where material is not thick enough to permit counter-sinking.

.4 Standard screws not acceptable.

.12 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated. Use screws for interior work. Use welded connections for exterior work, unless approved otherwise by Departmental Representative

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Seal exterior steel fabrications to provide corrosion protection in accordance with CSA S16.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to ASTM A123/A123M, Coating Grade 85. All ferrous metal fabrication for exterior locations to be galvanized after fabrication.

.2 Shop coat primer: in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

.3 Zinc primer: zinc rich, ready mix in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

2.4 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.5 SHOP PAINTING

.1 Primer: VOC limit 250 g/L maximum to GS-11.

.2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.4 Clean surfaces to be field welded; do not paint.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with high tensile bolts, to CSA S16 or weld.

.7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:

.1 Primer: maximum VOC limit 250 g/L to GS-11.

.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

.1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 MISCELLANEOUS STEEL BRACKETS AND ANGLES

.1 Supply to respective trades and install miscellaneous metal items in accordance with reviewed shop drawings and details. Drill for countersunk screws and anchor bolts.

.2 Supply masonry section with steel loose angle lintels of sizes required to suit masonry openings.

.3 Provide 150 mm bearing at ends.

.4 Weld or bolt together back-to-back angles.

.5 Prime paint interior steel items and hot dip galvanized exterior steel.

3.5 ANCHORS, BOLTS AND OTHER ANCHORAGES

.1 Provide all anchors, bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where it is necessary to secure building components or equipment, other than anchorages specified under other sections. Supply anchor bolts, nuts and similar hardware to the respective sections for fastenings.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 CSA International

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.2 CAN/CSA-O80 Series-15, Wood Preservation.

.3 CSA O112.9-10 (R2014), Evaluation of adhesives for structural wood products (exterior exposure).

.4 CSA O112.10-08 (R2013), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).

.5 CSA O121-08(R2013), Douglas Fir Plywood.

.6 CSA O141-05(R2014), Softwood Lumber.

.7 CSA O151-09(R2014), Canadian Softwood Plywood.

.8 CSA O153-13, Poplar Plywood.

.9 CSA O325-16, Construction Sheathing.

.3 Underwriters' Laboratories of Canada (CAN/ULC):

.1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2014.

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

.1 SCAQMD Rule 1113-A2016, Architectural Coatings.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

1.3 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

- .1 No. 2 grade, Ontario White Pine, No. 2 Red Pine, or Construction No. 1 Jack Pine, or Construction Grade Douglas Fir.
- .2 Board sizes: "standard" or better grade.
- .3 Dimension sizes: "standard" light framing or better grade.
- .4 Post and timbers sizes: "standard" or better grade.

.3 Field applied wood preservative: copper napthenate to AWPA P8, green colour.

.4 Preservative treated plywood: Douglas Fir to CSA O121, G1S good one side, pressure treated with CCA to CSA O80, minimum retention 4.0 kg/m3 by assay.

- .1 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CSA O80-Series.

.5 Fire retardant treated plywood: to CAN/ULC-S102, Douglas Fir to CSA O121, G1S, fire retardant treated to CSA O80, maximum flame spread 25, maximum smoke developed 25.

- .1 Backboard: 19 mm thick, sanded, to Table E-1.

2.2 ACCESSORIES

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.4 Sealant: one-component, silicone base, solvent curing.

.5 Construction adhesive: to CSA O112 Series, cartridge loaded.

- .1 Maximum allowable VOC limit 140 g/L.
- .2 SCAQMD Rule 1168, Adhesives and Sealants Applications.

2.3 FINISHES

.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for pressure-preservative, treated lumber, interior highly humid areas, fire-retardant and exterior work.

Part 3 Execution

3.1 PREPARATION

.1 Treat surfaces of material in contact with roofing, concrete and masonry with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.2 INSTALLATION

.1 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit and other work as required.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

.4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

3.4 SCHEDULES

.1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Labour, Products, equipment and services necessary to complete the work of this Section for modifications of the existing roof.

1.2 QUALITY ASSURANCE

.1 Tie-in new work with adjacent existing roofing system in accordance with the manufacturer’s recommendations for the products used. All products to be compatible with the existing and new roofing system components.

.2 Do work to maintain existing roof warranty.

.3 All work shall meet the requirements of the Canadian Roofing Contractors Association (CRCA), including all amendments.

.4 Applicators: Member in good standing of the Canadian Roofing Contractors Association and which has a minimum of 5 years of proven satisfactory experience in the Work of this Section.

.5 Ensure surfaces to receive work of this Section are clean, level, smooth, solid and dry before commencing work each day.

.6 Ensure temperatures during application are not less than the minimum recommended by the material manufacturer. Do not perform work during inclement weather conditions.

.7 Stop work when temperature remains consistently below recommended temperature.

.8 Use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.9 Arrange for roofing material manufacturer's representative to visit the site and discuss roofing application and any special requirements, prior to commencement of work.

1.3 SUBMITTALS

.1 Submit 3 copies of the roofing materials manufacturers' recommended inspection and maintenance procedures for inclusion in the maintenance instructions and data book.

1.4 PROTECTION

.1 Provide all necessary protection measures to prevent fumes, dust particles, odours and other foreign matter created or caused by roofing operation from entering the building, including the return air ducts.

.2 Provide temporary protection at work areas or access to work areas with minimum 13 mm plywood underlaid with 25 mm polystyrene insulation board extending 900 mm beyond work area. Remove protection at completion of work.

.3 Prevent bitumen, precipitation and debris entering openings and drains during work.

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original containers, sealed, with labels intact.

.2 Do not store insulation in direct contact with the earth, road surface, or roof deck. Place suitable supports under the insulation upon delivery to protect it from absorbing dampness from the surrounding terrain or deck.

.3 Store materials to manufacturers' instructions. Provide and maintain dry, off-ground weatherproof storage. Take particular care to prevent materials from absorbing moisture. Remove unsatisfactory materials promptly and provide new dry materials.

.4 Deliver fasteners in boxes or kegs and keep in protective storage until used. Do not oil or grease fasteners.

.5 Remove materials only in quantities required for same day use.

.6 Remove and replace damaged, wet or broken materials.

.7 Cover gravel during inclement weather.

.8 Store materials away from open flame or ignition sources.

1.6 WARRANTY

.1 Provide Canadian Roofing Contractors' Association (CRCA) Standard Form of Warranty, complete with a copy of the CRCA's Preventative Maintenance Manual or similar written warranty acceptable to the Departmental Representative. The warranty shall be for a period of two years from date of Substantial Performance.

.2 Provide material and material/labour warranties offered by the material manufacturers.

.3 Repair defects within 24 hours of notification.

.4 Inspect the roof 30 days before expiry of warranty and correct defects within 15 days of inspection. This inspection shall be performed at no additional cost to the Contract.

.5 Carry out repair work required under the warranty in accordance with the recommendation of the Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Roofing products: Matching and compatible with existing installed materials.

Part 3 Execution

3.1 EXAMINATION

.1 Examine site conditions and surfaces to ensure that they are in satisfactory condition for the commencement of the work of this section. Do not proceed with work until surfaces are satisfactory.

.2 Examine existing work to ensure materials used for work of this Section are compatible with and matching existing roofing system.

3.2 ROOFING

.1 Remove only areas of the existing roofing system which can be replaced, complete with membrane flashings, on the same day.

.2 Adequately install cants at junctions between horizontal and vertical surfaces. Provide tight flush joints between length of cants and mitre corners.

.3 Provide roofing and flashing construction to matching existing.

.4 Install sheet metal work in accordance with CRCA specifications, using concealed fastenings except where approved before installation.

.5 Fabricate metal flashings and other sheet metal work to details shown. Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.1 Hem exposed edges on underside 50 mm. Miter and seal corners with sealant.

.2 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

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

.4 Counterflash membrane flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

3.3 CLEANING

.1 Remove all existing debris from all roof areas.

.2 Clear out roof drains, scuppers, eaves troughs and down spouts of debris resulting from work of this Section and ensure they are free draining at project completion.

.3 Daily as the work proceeds and on completion, remove all surplus materials and debris resulting from work.

.4 Remove stains, caulking or other adhesive from all affected surfaces.

END OF SECTION

DOOR NO	DOOR SIZE	DOOR TYPE	DOOR MAT'L	DOOR FIN	GLASS	FRAME TYPE	FRAME MAT'L	FRAME FIN	FIRE RATING	HDWARE GROUP	NOTES
BASEMENT FLOOR											
EX X008A (STAIR No. 3 TO EXT)	EX 900x2150	EX D6	EX IHM	EX PT	-	EX F2	EX HM	EX PT	-	EX 5014	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
EX 008B (STAIR No. 3 TO COR 009)	EX 900x2150	EX D1	EX HM	EX PT	EX GL4	EX F2	EX HM	EX PT	EX 45 MIN	EX 5006 (LESS CR AND ES)	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. MODIFY EXISTING DOOR AND FRAME TO SUIT NEW HARDWARE REQUIREMENT.
EX 019 (COR 009 TO DUCT BANK ROOM 019)	EX 900x2150	EX	EX	EX	-	EX	EX	EX	EX	EX	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. MODIFY EXISTING DOOR AND FRAME TO SUIT NEW HARDWARE REQUIREMENT.
EX X017A (STOR TO EXT)	EX 2x900x2150	EX D6	EX IHM	EX PT	-	EX F2	EX HM	EX PT	EX 45 MIN	EX 5027	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004
EX X018A (STOR TO EXT)	EX 2x900x2150	EX D6	EX IHM	EX PT	-	EX F2	EX HM	EX PT	EX 45 MIN	EX 5027	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
GROUND FLOOR											
EX 100 INT (VEST TO COMMON)	EX 2x900x2150	EX D2	EX AL	EX ANOD	EX GL1	-	EX AL	EX ANOD	-	EX 5011	PROVIDE CONNECTION FROM THE EXISTING DOOR OPERATOR TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
EX X100 EXT (VEST TO EXT)	EX 2x900x2150	EX D2	EX IAL	EX ANOD	EX GL3	-	EX IAL	EX ANOD	-	EX 5010	PROVIDE NEW DOOR CONTACTS COMPLETE WITH KEY SWITCH OVERRIDE AND CONNECTION TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
EX XA100 INT (COR TO POD A)	EX 900x2150	EX D1	EX IHM	EX PT	EX GL2	EX F1	EX IHM	EX PT	EX 45 MIN	EX 5022	PROVIDE POWER AND PUSH BUTTONS TO NEW DOOR OPERATOR (BFO). PROVIDE CONNECTION FROM THE NEW DOOR OPERATOR (BFO) TO THE EXISTING FIRE ALARM SYSTEM PANEL LOCATED IN ELECTRICAL ROOM 002.
EX XC100 INT (COR TO POD C)	EX 900x2150	EX D1	EX IHM	EX PT	EX GL2	EX F1	EX IHM	EX PT	EX 45 MIN	EX 5022	PROVIDE POWER AND PUSH BUTTONS TO NEW DOOR OPERATOR (BFO). PROVIDE CONNECTION FROM THE NEW DOOR OPERATOR (BFO) TO THE EXISTING FIRE ALARM SYSTEM PANEL LOCATED IN ELECTRICAL ROOM 002.

DOOR NO	DOOR SIZE	DOOR TYPE	DOOR MAT'L	DOOR FIN	GLASS	FRAME TYPE	FRAME MAT'L	FRAME FIN	FIRE RATING	HDWARE GROUP	NOTES
EX 101 INT (STOR TO COMM ON)	EX 900x2150	EX D7	EX SCWD	EX STN	EX GL1	EX F2	EX HM	EX PT	-	EX 5013	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. MODIFY EXISTING DOOR AND FRAME TO SUIT NEW HARDWARE REQUIREMENT.
EX X104 EXT (STAIR No. 1 TO EXT)	EX 900x2150	EX D5	EX IHM	EX PT	EX GL3	EX F2	EX IHM	EX PT	-	EX 5014	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
EX X107 EXT (STAIR No. 2 TO EXT)	EX 900x2150	EX D4	EX IAL	EX ANOD	EX GL3	-	EX IAL	EX ANOD	-	EX 5014	ADD DOOR CONTACT TO EXISTING DOOR AND FRAME AND CONNECT DOOR CONTACT TO THE NEW SECURITY PANEL BEING PROVIDED IN ROOM ESS-004.
EX 111 INT (RES ENT TO EXT)											PROVIDE CONNECTION FROM THE EXISTING DOOR OPERATOR, PUSH BUTTONS AND NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. CONNECT TO THE EXISTING FIRE ALARM SYSTEM PANEL LOCATED IN ELECTRICAL ROOM 002.
EX X111 EXT (RES ENT TO EXT)	EX 900x2150	EX D3	EX IAL	EX ANOD	EX GL3	-	EX IAL	EX ANOD	-	EX 5010	PROVIDE CONNECTION FROM THE EXISTING DOOR OPERATOR, PUSH BUTTONS AND NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
EX 112 INT (COM MON TO COR)	EX 900x2150	EX D1	EX HM	EX PT	EX GL2	EX SC03	EX HM	EX PT	EX 45 MIN	EX 5002A	PROVIDE POWER AND PUSH BUTTONS TO EXISTING DOOR OPERATOR (BFO). MODIFY EXISTING DOOR OPERATOR (BFO) TO INCLUDE OVERRIDE TO PREVENT OPERATION AFTER HOURS WHEN DOOR IS LOCKED PROVIDE CONNECTION FROM THE EXISTING DOOR OPERATOR (BFO) TO THE EXISTING FIRE ALARM SYSTEM PANEL LOCATED IN ELECTRICAL ROOM 002.
EX X117 EXT (WATE R TO EXT)	EX 900x2150	EX D6	EX IHM	EX PT	-	EX F2	EX IHM	EX PT	-	EX 5026	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.
SECOND FLOOR											
EX 212 INT	EX 900x2150	EX D1	EX SCWD	EX STN	EX GL1	EX SC03	EX HM	EX PT	-	EX 5002A	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004.

DOOR NO	DOOR SIZE	DOOR TYPE	DOOR MAT'L	DOOR FIN	GLASS	FRAME TYPE	FRAME MAT'L	FRAME FIN	FIRE RATING	HDWARE GROUP	NOTES
EX 203 INT	EX 900x2150	EX D1	EX SCWD	EX STN	EX GL1	EX SC03	EX HM	EX PT	-	EX 5002A	PROVIDE NEW DOOR OPERATOR (BFO), POWER AND PUSH BUTTONS DOOR OPERATOR (BFO) TO INCLUDE OVERRIDE TO PREVENT OPERATION AFTER HOURS WHEN DOOR IS LOCKED PROVIDE CONNECTION FROM THE NEW DOOR OPERATOR (BFO) TO THE EXISTING FIRE ALARM SYSTEM PANEL LOCATED IN ELECTRICAL ROOM 002.
EX 213 INT (SEC TO OFF)	EX 900x2150	EX D1	EX HM	EX PT	EX GL4	EX F2	EX HM	EX PT	EX 45 MIN	EX 5015	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. MODIFY EXISTING DOOR AND FRAME TO SUIT NEW HARDWARE REQUIREMENT.
EX 225 INT	EX 900x2150	EX D1	EX SCWD	EX STN	EX GL2	EX F2	EX HM	EX PT	-	EX 5002	PROVIDE CONNECTION FROM THE NEW DOOR CONTACT TO THE NEW SECURITY CONTROL PANEL BEING PROVIDED IN ROOM ESS-004. PROVIDE NEW ELECTRIC STRIKE AND CARD READER.

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS MATERIAL/ FINISH	CEILINGS MATERIAL/ FINISH	HEIGHT (mm)	NOTES
GROUND FLOOR – POD A							
A102	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
A104	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
A106	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
A116	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR A102 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING
A117	WATER ENTRY ROOM	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
GROUND FLOOR – POD B							
B102	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
B104	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
B106	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
B116	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR B102 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING
GROUND FLOOR – POD C							
C102	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
C104	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
C106	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
C116	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR C102 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING
SECOND FLOOR – POD A							
A202	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
A204	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
A206	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
A216	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR A202 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING
SECOND FLOOR – POD B							
B202	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS MATERIAL/ FINISH	CEILINGS MATERIAL/ FINISH	HEIGHT (mm)	NOTES
B204	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
B206	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
B216	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR B202 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING
SECOND FLOOR – POD C							
C202	B.F. WASHROOM	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
C204	SHOWER	VSF2(SR)	VSF2	EX GBD/EX PT	EX GBD/EX PT	EX 2440	WATERPROOFING UNDERLAY
C206	MECH ELEC	PAINT	EX	EX GBD/EX PT	EXPOSED	EX	PAINT EXISTING PLYWOOD FLOOR
C216	CORRIDOR	RMAT	EX	EX	EX	EX	AT DOOR C202 PROVIDE RUBBER RAMP OVER EX VT ON CORRIDOR SIDE OF OPENING

ROOM FINISH SCHEDULE ABBREVIATIONS	
CONC	CONCRETE
EX	EXISTING
GBD	GYPSUM BOARD
PT	PAINT
RB	RESILIANT BASE
RFT	RUBBER FLOOR TILE
RMAT	RUBBER RAMP
SCONC	SEALED CONCRETE
VT	VINYL TILE
VSF(SR)	VINYL SHEET FLOORING (SLIP RESISTANT)
VSF1	VINYL SHEET FLOORING TYPE 1 (ONE)
VSF2	VINYL SHEET FLOORING TYPE 2 (TWO)
WP	WATERPROOFING

END

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/ BHMA)

.1 ANSI/BHMA-A156.21-2009, American National Standard for Thresholds.

.2 ASTM International

.1 ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.

.2 ASTM D2047-11, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

.3 ASTM E662-15a, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.4 ASTM E648-15e1, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.5 ASTM F970-15, Standard Test Method for Static Load Limit.

.6 ASTM F1303-04(2014), Standard Specification for Sheet Vinyl Floor Covering with Backing.

.3 International Association of Plumbing and Mechanical Officials (IAPMO), an ANSI-accredited Standards Development Organization (SDO).

.4 National Fire Protection Association (NFPA)

.1 NFPA 253 – 2015 Edition, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

.2 NFPA 258 – 2001 Edition, Recommended Practice for Determining Smoke Generation of Solid Materials.

.5 South Coast Air Quality Management District (SCAQMD)

.1 SCAQMD Rule 1113-A2016, Architectural Coatings.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for resilient sheet flooring and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 300 x 300 mm sample pieces of sheet material, for colour selection, 300 mm long edge strips, treads, feature strips.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

.1 Ambient Conditions:

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

Part 2 Products

2.1 MATERIALS

.1 Sheet vinyl with backing (VSF-2) Slip Resistant: to ASTM F1303, 2.0 mm minimum thickness sheet vinyl flooring with moisture resistant backing Class A. Static coefficient of slip resistance in excess of 0.6 when tested in accordance with ASTM D2047.

.1 Type: II - PVC binder content 34%.

.2 Grade: 1.

.3 Flexibility: will not crack or break when bent over a 6.4 mm diameter mandrel.

.4 Static Load Limit: to ASTM F970.

.5 Tensile Strength: to ASTM D638.

.6 Fire Resistance: to ASTM E662/ NFPA 258 (Smoke Density) 450 or less, and to ASTM E648/NFPA 253 (Critical Radiant Flux) Class 1.

.7 Patterns and colours: as selected by Departmental Representative from manufacturer's standard range. Refer to drawings for number of colours and floor patterns.

.2 Resin welding rod: type recommended by flooring manufacturer.

.3 Reducing strip: same material as flooring.

.4 Ramp threshold: to ANSI/BHMA-A156.21, type J38130, aluminum, serrated and slip resistant surface with abrasive coating, to accommodate the 19 mm rise, width to suit 920mm ramp.

.5 External corner protectors: type recommended by flooring manufacturer.

.6 Edging to floor penetrations: type recommended by flooring manufacturer.

.7 Primers: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, compatible with surface preparation materials.

.8 Sub-floor filler/ Skim Coat: feathered-finish, polymer-modified, fiber-reinforced Premium cement-based skimcoating and patching compound, compatible with waterproofing underlay.

.9 Waterproofing Underlay: pre-mixed, single component, self-curing liquid-rubber polymer that forms a flexible, seamless waterproofing membrane, complete with reinforced corners, IAPMO listed for use as shower-pan liner, compatible with skim coat, self-levelling compound and adhesive used for sheet flooring.

.10 Self-levelling compound: Fast-setting, polymer-modified cement-based material diluted with an acrylic latex additive, compatible with waterproofing underlay and flooring adhesive used for sheet flooring.

.11 Adhesive: Low VOC, high-performance, wet-lay and pressure sensitive, designed specifically for installing resilient flooring, forming strong, durable, moisture-resistant and alkali-resistant bond, performing well under rolling loads and resisting indentations and shrinkage.

.12 Floor ramp transition into shower stalls: SafeShower ramp transitions for showers by Safe Path Products, colour to be selected by Departmental Representative.

.13 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

.1 Sealer: maximum VOC limit 100 g/L to SCAQMD Rule 1113.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for resilient sheet flooring installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 PREPARATION

.1 Remove existing resilient flooring.

.2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives. Remove sub-floor ridges and bumps.

.3 Do not install resilient flooring over gypsum-based toppings, underlayments, leveling or patching compounds. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.4 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.5 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.

.6 Waterproofing underlayment:

.1 Have work supervised during installation by a qualified representative of the manufacturer supplying the waterproofing materials.

.2 Conform to manufacturer's instructions for installation of waterproofing system.

.3 Over levelling coat, apply waterproofing in two (2) coat application.

.4 Reinforce all corners and changes in plane with 150 mm wide strips of reinforcement and a second membrane application to completely seal the fabric. Let dry overnight.

.5 Recoat membrane with third application of waterproofing paste where required to cover pinholes and any uncovered areas of reinforcement.

.6 Work membrane carefully around all fixtures, drains and other openings and recesses to provide a complete waterproof seal.

.7 Extend waterproof membrane up walls 150 mm above floor or as otherwise indicated on drawings.

.7 Apply self-levelling compound to manufacturer's printed instructions.

3.4 APPLICATION: FLOORING

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least 1 month following building occupation.

.2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.4 Heat weld and continuously seal sheet flooring according to manufacturer's printed instructions.

.5 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.6 Cut flooring neatly around fixed objects.

.7 Continue flooring over areas which will be under built-in furniture.

.8 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Drains: Fit sheet vinyl flooring and mechanically fasten to drain outlets to ensure a permanent, watertight installation.

.1 Install round flash clamping ring type drains to accommodate vinyl flooring. Install drains to fit flush with surrounding floor surface.

.10 Install PVC reducer strips at unprotected or exposed edges where flooring terminates.

3.5 APPLICATION: COVE BASE

.1 Carry sheet flooring material up wall to form base. Provide cove fillers and top edge caps as required.

3.6 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Clean flooring surfaces to flooring manufacturer's printed instructions.

3.7 PROTECTION OF FINISHED WORK

.1 Cover and protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting.

.2 Protection:

.1 Protect the newly installed flooring from foot traffic for 24 hours and heavy rolling traffic for 72 hours.

.2 Protect installed product and finish surfaces from damage during construction.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 The Master Painters Institute (MPI)

.1 Maintenance Repainting Manual (RSM) 2015, Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List.

.2 Environmental Protection Agency (EPA)

.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

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

.1 SCAQMD Rule 1113-04, Architectural Coatings.

1.2 QUALITY ASSURANCE

.1 Qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.2 Conform to latest MPI requirements for interior painting work including cleaning, preparation and priming.

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners and solvents) shall be in accordance with the latest edition of the MPI Approved Product List and shall be from a single manufacturer for each system used.

.4 Paint materials such as linseed oil, shellac, reducers and turpentine shall be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.

.5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.6 Standard of Acceptance: when viewed using final lighting source surfaces shall indicate the following:

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Bulkheads/Ceilings: no defects visible from floor at 45 degrees to surface.

.3 Final coat to exhibit uniformity of colour and sheen across full surface area.

1.3 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.1 Provide paint products meeting MPI "Environmentally Friendly" ratings based on VOC (EPA Method 24) content levels.

1.4 SCHEDULING

.1 Schedule painting operations to prevent disruption by other trades if applicable and by occupants in and about building.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Provide product data and manufacturer's installation/application instructions for each paint and coating product to be used.

.3 Provide samples.

.1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.

.2 Submit WHMIS MSDS - Material Safety Data Sheets for paint and coating materials.

.4 Closeout Submittals:

.1 Provide maintenance data for incorporation into O & M manual.

.1 Submit records of products used. List products in relation to finish system and include following:

.1 Product name, type and use (i.e. materials and location).

.2 Manufacturer's product number.

.3 Colour code numbers.

.4 MPI Environmentally Friendly classification system rating.

.5 Manufacturer's Material Safety Data Sheets (MSDS).

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels to indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Store and handle in accordance with manufacturer's recommendations.

.5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30 degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.

.7 Remove paint materials from storage in quantities required for same day use.

.8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.9 Fire Safety Requirements:

.1 Provide 9 kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada.

.10 Waste Management and Disposal:

.1 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.2 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.3 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.4 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

.5 Where paint recycling is available, collect waste materials by type and provide for delivery to recycling or collection facility.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application and until paint has cured sufficiently.

.2 Where required, provide continuous ventilation for 3 days after completion of application of paint.

.3 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.

.4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.5 Do not perform painting work unless minimum lighting level of 323Lux is provided on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by product manufacturer, do not perform painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C.

.3 Relative humidity within area to be painted is above 80%.

.2 Do not perform painting work when maximum moisture content of substrate exceeds:

.1 15% for wood.

.2 12% for plaster and gypsum board.

.3 Test painted concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint when previous coat of paint is dry or adequately cured, unless otherwise pre-approved by specific coating manufacturer.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems to be products of single manufacturer.

.3 Only qualified products with MPI “Environmentally Friendly" ratings are acceptable for use on this project.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract Award.

.2 Selection of colours will be from manufacturer’s full range of colours.

.3 First coat in two coat paint system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer' instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss defined as sheen rating of applied paint, in accordance with following MPI gloss / sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	85	

.2 Gloss level ratings of painted surfaces shall be as determined Departmental Representative.

2.5 INTERIOR PAINTING SYSTEMS

.1 RIN 6.5 – Plywood Floors:

.1 RIN 6.5J – Latex Porch and Floor system, consisting of Full Prime Coat and two coats of Floor Enamel, low gloss @ max 25 units.

.2 RIN 9.2 - Plaster and Gypsum Board: (gypsum wallboard, drywall, and "sheet rock type material".

.1 RIN 9.2D - 2 Component Epoxy (Tile Like), consisting of Full Prime Coat and two coats of Epoxy.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Perform preparation and operations for interior painting in accordance with MPI Maintenance Repainting Manual requirements except where otherwise specified.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare interior surfaces to be painted in accordance with MPI Maintenance Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using stiff bristle brush to remove dirt, oil and surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and to dry thoroughly. Allow sufficient drying time and test surfaces using an electronic moisture metre before commencing work.

.5 Use water-based cleaners in place of organic solvents where surfaces will be painted using water based paints.

.4 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from distance up to 1000 mm.

3.3 EXISTING CONDITIONS

.1 Prior to commencing work, examine site conditions and existing interior substrates to be painted. Report in writing to Departmental Representative damages, defects, or unsatisfactory or unfavourable conditions or surfaces that will adversely affect this work.

.2 Do not commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable.

.3 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

Condition	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required).

3.4 PROTECTION

.1 Protect existing surfaces and adjacent fixtures and furnishings from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and surface mounted equipment, fittings and fastenings prior to undertaking re-painting operations. Store items and re-install after painting is completed.

.5 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.6 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Departmental Representative.

3.5 APPLICATION

.1 Apply paint by method that is best suited for substrate being painted. Conform to manufacturer's application instructions unless specified otherwise. Methods of application as pre-approved by Departmental Representative before commencing work.

.2 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple unless approved by Departmental Representative.

.5 Remove runs, sags and brush marks from finished work and paint.

.3 Spray Application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application by either intermittent agitation or continuous mechanical agitation.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern.

.4 Back roll spray applications and brush out runs and sags immediately.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.5 Apply paint coats in continuous manner and allow surfaces to dry and properly cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Sand and dust between coats to remove visible defects.

.7 Paint surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

3.6 CLEANING

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.2 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.

.3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

.4 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as other cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction and as noted herein.

.5 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to authorities having jurisdiction.

.6 Recycle paint and coatings in excess of painting requirements as specified.

3.7 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 MINIMUM STANDARDS

.1 Conform to the following standards:

.1 National Building Code of Canada 2015.

.2 National Fire Code of Canada 2015.

.3 NFPA 13-2016, Standard for the Installation of Sprinkler Systems.

.4 NFPA 14-2016, Standard for the Installation of Standpipe and Hose Systems.

1.2 FIRE COMMISSIONER'S INSPECTION AND TEST

.1 Notify the Departmental Representative that the installation of fire protection system is complete. Provide certificate that components are compatible and the systems conform to the requirements of the specifications, applicable codes and standards. A copy of the contractor's Material and Test Certificate shall be submitted prior to the final inspection.

.2 Fire protection systems shall be subject to the final inspection and test of the PWGSC Fire Protection Engineer or their authorized representative. Work shall not be considered complete until a satisfactory inspection report from the PWGSC Fire Protection Engineer is obtained.

1.3 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit shop drawings and product data sheets in accordance with Sections 01 11 01 and 23 05 00 for review before commencing work.

.2 Shop drawings shall bear the stamp of a Registered Professional Engineer, registered in the Province of Ontario.

.3 Shop drawings and product data sheets shall include the following equipment:

.1 Sprinkler system and components.

Part 2 Products

2.1 PIPE, FITTINGS AND VALVES

.1 Pipe: ferrous to NFPA 13 for Sprinkler Systems and to NFPA 14 for Standpipe and Hose Systems.

.2 Fittings and joints to be ferrous, screwed, welded, flanged or roll grooved to NFPA 13 for Sprinkler Systems and to NFPA 14 for Standpipe and Hose Systems.

.3 Valves:

.1 ULC listed and labelled for fire protection service.

.2 Swing check valves.

.3 Ball drip.

.4 Pipe hangers to be ULC listed for fire protection services.

.5 Drain valve to be NPS 1 complete with hose end, cap and chain.

.6 Inspectors test connections to be NPS 1 gate valves.

2.2 FIRE DEPARTMENT CONNECTION

.1 To NFPA 13 and ULC listed, flush, flat plate type, location as indicated. Thread specifications to be compatible with local fire department.

.2 Polished bronze with identifying sign cast on plate “TEST”. Threaded metal caps and chains.

2.3 SIGNS

.1 Signs for control drain and test valves: to NFPA 13.

Part 3 Execution

3.1 INSTALLATION

.1 Install material and fixtures in accordance with referenced standards and manufacturer's written instructions.

3.2 TESTS

.1 Conform to Section 23 05 00 for tests.

.2 Conduct tests in the presence of the Departmental Representative and the Representative of PWGSC Fire Protection Engineer.

.3 Perform flow test of backflow preventer at system demand flow rate per NFPA. Provide all hoses and test equipment for test and drain water to site storm system.

.4 During tests, repair any leaks and remove and replace any defective parts. Repeat test until satisfactory results are obtained.

.5 Refer to other Sections for requirements of commissioning.

END OF SECTION

Part 1 General

1.1 MINIMUM STANDARDS

.1 Conform to or exceed:

.1 National Plumbing Code.
.2 Canadian Standards Association Standards.
.3 Local Municipal By-laws and Regulations.
.4 National Building Code of Canada (NBC) 2015.
.5 Ontario Building Code (OBC) 2012.
.6 National Fire Code of Canada 2015 (NFC)
.7 CSA B651-12, Accessible Design for the Built Environment.

1.2 REFERENCES

.1 Material standards:

.1 ASME A112.18.2/CSA-B125.2-2011, Plumbing Waste Fittings.
.2 ASME B16.22-2013, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
.3 ASTM B88M-13, Standard Specification for Seamless Copper Water Tube Metric.
.4 ASTM B306-13, Standard Specification for Copper Drainage Tube (DWV).
.5 ASTM D2564-(2012) e1, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
.6 CAN/CSA-B70-12, Cast Iron Soil Pipe, Fittings and Means of Joining.
.7 CAN/CSA-B125.3-12, Plumbing Fittings.
.8 CAN/CSA-B149.1-15, Natural Gas and Propane Installation Code.
.9 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.3 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit shop drawings and product data sheets in accordance with Sections 01 11 01 and 23 05 00 for the following:

.1 Cleanouts.

Part 2 Products

2.1 SOIL, STORM, WASTE AND VENT PIPE AND FITTINGS

.1 Piping inside building above ground: copper tube type DWV to ASTM B306 with drainage pattern wrought copper or cast brass solder joint fittings to CAN/CSA-B125.3; cast iron soil pipe to CAN/CSA-B70 with cast iron fittings, hub and spigot joints or mechanical joints, and with heavy bituminous coating.

.2 Piping inside building below ground: cast iron soil pipe to CAN/CSA-B70 with cast iron fittings, mechanical joints, and heavy bituminous coated. Buried vent pipe 40 mm and smaller to be copper tube type "L" to ASTM B88M with drainage pattern wrought copper or cast brass solder joint fittings to ASME B16.22.

2.2 VALVES

.1 Gate valve size 50 mm and smaller: bronze, rising stem, wedge disc, solder joint ends, ANSI Class 125, 1.4 MPa cold working pressure non-shock.

.2 Globe valve size 50 mm and smaller: bronze, solder joint ends, renewable composition disc, ANSI Class 125, 1.4 MPa cold working pressure non-shock.

.3 Check valve size 50 mm and smaller: bronze swing check, solder joint ends, ANSI 125, 1.4 MPa cold working pressure non-shock.

.4 Provide gate valves at each piece of plumbing equipment and at each branch line take-off, and globe valves where balancing is required.

2.3 CLEANOUTS

.1 Provide cleanouts to conform to National Plumbing Code and where shown on drawings.

.2 Type: heavy CI male ferrule with bronze bolted plug.

.3 Make each cleanout accessible and wherever necessary, extend branch connections to finished surfaces of wall, etc, and provide access covers or plates.

2.4 SLOPE OF DRAINS

.1 Drainage piping shall have a minimum slope as follows:

.1 Size 75 mm and smaller: 2% slope.

.2 Size 100 mm and larger: 1% slope.

Part 3 Execution

3.1 INSTALLATION

.1 Install material and fixtures in accordance with referenced standards and manufacturer's written instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 35 29, Health and Safety Requirements.

.2 Section 23 05 00, Common Work Results for Mechanical

1.2 REFERENCES

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

.1 ASTM A126-04(2014), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-15, Standard Specification for Composition Bronze or Ounce Metal Castings.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 11 01.

.2 Indicate, for all plumbing specialties and accessories:

.1 Dimensions, construction details, roughing-in dimensions.

.3 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 11 01, include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

Part 2 Products

2.1 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass of bronze plug. Sealing-caulked lead seat or neoprene gasket.

2.2 STRAINERS

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

.2 NPS2 and under, bronze body, screwed ends, with brass cap.

.3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

2.3 STORM DRAINAGE – PUMP STATION AND SANITARY DRAINAGE PUMP STATION

.1 Provide as indicated on drawings, sanitary drainage sump pump. Automatic sewage pump station.

.2 The assembly shall be underground, two pumps, station shall be furnished with piping, valves, and all necessary automatic controls, two submersible pumps, float type liquid level controls and a duplex pump control panel.

.3 Pumps shall be heavy duty cast iron, non-clog sump pumps: type sewage, oil filled, submersible pumps. Each pump shall have a capacity of 3.1 L/s (50 gpm) against a total dynamic head of 30 kPa (10 ft) operating at a maximum speed of 3,450 RPM with a recessed non-clog type impeller which passes 50mm (2") solids. Pump motors to be 1/2 HP, 120V, 1PH, and 60 cycle. Pumps shall be furnished in standard construction c/w 6m of power cable and adaptors for pipe size indicated.

.4 Each pump shall be assembled complete with a lift-out slide rail system. Each rail shall include a 50mm (2") cast iron discharge assembly, upper and lower guide rail support, pump carrier and galvanized pump lifting chains.

.5 Provide “Oil Minder” system on pumps to prevent pump operation if hydraulic fluid is in the pit.

.6 Provide 3 float type, non-mercury, liquid level controls for automatic pump control of the liquid level. A support bracket with strain relief connectors shall be supplied. A CEMA 4 junction box shall be provided for electrical connection. FS#3 Lag Pump #2 ON and Lead Pump OFF FS#2 Lead Pump #1 ON FS#1 OFF-alternate pumps

.7 A duplex automatic 2 pump control panel shall be furnished in a CEMA 1 enclosure with the following equipment.

.1 Inner door mounted controls.

.2 Pump circuit breaker disconnects.

.3 Magnetic contactors with 3 leg overloads.

.4 H.O.A. selector switches for each pump.

.5 Run lights for each pump.

.6 Automatic alternator relay and Duty/Standby operation (only one pump can operate at a time).

.7 Pump motor overload alarm and automatic interlock to lag pump.

.8 Lead lag pump selector switch.

.9 High level alarm with buzzer, light and silencing switch, test switch and automatic reset.

.10 Provide also remote alarm panel to repeat light and buzzer signal, silencing switch and lamicoid label reading "High Water in Sewage Sump".

.11 Arrange with electrical contractor for wiring in accordance with manufacturer's installation instructions.

.8 Provide 50mm (2") cast iron check valve and 50mm (2") ball type isolation valve shall be factory installed on the discharge of each pump. Piping shall be schedule 40 PVC pipe fabricated to suit the installation. A 50mm (2") discharge NPT coupling shall be furnished for connection to force main and field piping to complete the installation.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.2 CLEANOUTS

.1 Install cleanouts at locations required code, and as indicated.

3.3 PEFORMANCE VERIFICATION

.1 General:

.1 In accordance with Section 23 05 00.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to more than one section of the Mechanical Divisions 21, 22, and 23.

.2 "Provide" shall mean "supply, install and connect".

.3 Provide new materials, equipment and plant of proven design and quality, and of current models with published ratings for which replacement parts are readily available.

1.2 CUTTING AND REMEDIAL WORK

.1 Cutting and remedial work is specified in Section 01 11 01.

.2 Assume full responsibility for laying out mechanical work and for any damage caused by incorrectly located equipment and mechanical services.

1.3 CO-ORDINATION

.1 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.

.2 Where interference occurs, Departmental Representative shall approve relocation of equipment and materials.

1.4 DRAWINGS

.1 Working drawings, except where dimensioned, indicate general mechanical layouts only. Do not scale.

.2 Existing equipment and services shown on the drawings:

.1 The information shown on the drawings is incomplete and is for reference only. Some of the existing equipment, ducts, pipes and other services are not shown on the drawings.

.2 The Contractor shall make arrangements to examine existing conditions, determine conditions affecting the work, and verify sizes and location of existing equipment, ducts, pipes and any other services. Refer to Section 01 11 01 for instructions regarding site visits.

.3 Unless the discrepancies are noted and reported to the Departmental Representative prior to close of the bid, the Contractor shall be responsible for the work to relocate existing equipment and to reroute existing ducts, pipes and any other services required for the installation of new work at no extra cost to the contract.

.3 If required by Departmental Representative, provide field drawings to show relative positions of various services. Obtain approval before beginning work.

1.5 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit shop drawings and product data sheets for major equipment listed in each section.

.2 Submit early enough to permit Project Schedules to be met.

.3 Show materials; sizes, dimensions, performance ratings, curves and operating characteristics, compliance with codes and standards, wiring, controls, piping diagrams, installation instructions, fabrication, assembly and installation details.

.4 For additional requirements pertaining to shop drawings and product data refer to Section 01 11 01.

1.6 OPERATION AND MAINTENANCE DATA

.1 Supply operating and maintenance instructions complete with names and addresses of spare parts suppliers in accordance with requirements of Section 01 11 01.

1.7 EQUIPMENT DESIGN AND INSTALLATION

.1 Uniformity:

.1 For equipment or material of same type or classification, use product of one manufacturer.

.2 Installation:

.1 Install equipment to manufacturer's recommendations with adequate and easy access for inspection, servicing and lubrication.

.2 Install equipment to permit maintenance and disassembly with minimum disturbance to connecting piping and duct systems and without interference with building structure or equipment.

.3 Provide support brackets, bases, and all necessary fastenings.

1.8 ELECTRIC MOTORS AND CONTROLS

.1 Electrical equipment shall bear CSA label. Obtain inspection labels required by Provincial authority having jurisdiction.

.2 Use high efficiency motors. Minimum acceptable motor efficiency levels shall be based on the latest table of motor efficiency levels in accordance with CSA C390-10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors.

.3 Refer to Electrical Division 26, 27 & 28 regarding specifications of power wiring (i.e. wiring carrying the full load current), conduits, starters, disconnect switches, etc., for mechanical equipment specified in Mechanical Divisions. Unless noted and specified in Electrical Divisions to be provided by Electrical Divisions, all field installed power wiring, conduit, starters, disconnect switches, etc., shall be provided by Mechanical Divisions.

.4 Provide motors, control wiring and controls together with associated relays, signalling devices, thermostats, control transformers, firestats, pressure switches, electric-pneumatic switches, required to form a complete control system for the equipment specified in Mechanical Divisions.

1.9 PIPING INSTALLATION

.1 Conform to requirements of ASME B31.1-2014, Power Piping.

.2 Provide dielectric couplings where piping of dissimilar metals are joined.

.3 Provide easily accessible unions close to equipment, to permit easy removal of equipment with minimum disturbance to piping systems.

.4 Valves:

.1 Provide easy access for servicing and operation. Install access doors where concealed.

.2 Install with stems above horizontal.

1.10 PIPE HANGERS AND SUPPORTS

.1 Fabricate hangers, supports and sway braces in accordance with ASME B31.1-2014.

.2 Provide adjustable clevis type hangers on all sizes of pipe except where roller type hangers are required.

.3 Minimum 150 mm hanger rod length.

.4 Support hangers from unistrut at underside of GB floor assembly. Screw unistrut to floor joists and ensure integrity of rated floor assembly is maintained.

1.11 TESTS

.1 Give written 48 hours notice of date when tests will be made.

.2 Conduct tests in presence of Departmental Representative and representatives of agencies having jurisdiction.

.3 Bear all costs in connection with all tests.

.4 Obtain acceptance certificates from authorities having jurisdiction. Work shall not be considered complete until certificates are delivered to the Departmental Representative.

.5 Piping pressure tests:

.1 Fill water piping with water and test at 1-1/2 times system operating pressure or at 860 kPa, whichever is greater.

.2 Maintain test pressures without loss for four hour period.

.3 Repair leaks and defects. Retest until approved by Departmental Representative.

.6 Testing plumbing systems:

.1 Conform to requirements of National Building Code, National Plumbing Code, and Municipal regulations.

.2 Test in presence of Departmental Representative and Municipal Plumbing Inspector.

1.12 ACCESS DOORS

.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm for body entry and 300 x 300 mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Departmental Representative.

.2 Remaining areas: use prime coated steel.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

1.13 INSTRUCTION OF OPERATING STAFF

.1 Furnish competent instructors to fully instruct operating staff in care, adjustment and operation of mechanical systems. Use factory trained instructors.

.2 Instruct during regular work hours before systems accepted and turned over to operating staff for regular operation.

.3 Where significant changes or modifications in equipment are made under terms of guarantee, instruct operating staff about changes or modifications.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 MINIMUM STANDARDS

.1 Conform to or exceed:

.1 CSA Standards.

.2 ASHRAE Standards.

.3 SMACNA Standards.

.4 Provincial Codes, Local Municipal By-Laws, all codes of utility authorities having jurisdiction.

1.2 REFERENCES

.1 Material and installation standards:

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2006.

.2 SMACNA Duct Leakage Test Manual 1985.

.3 NFPA 90A-2015, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.4 CAN/ULC-S110-13, Standard Methods of Test for Air Ducts, Third Edition.

.5 CAN/ULC-S112-10, Standard Method of Fire Test of Fire Damper Assemblies.

.6 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.7 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.3 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit shop drawings and product data sheets in accordance with Sections 01 11 01 and 23 05 00 for the following:

.1 Access Doors.

Part 2 Products

2.1 LOW PRESSURE DUCTWORK

.1 Material: forming steel FS Type A steel with Z275 designation zinc coating to ASTM A653/A653M, minimum 30% recycled content.

.2 Gauge and construction of ducts and fittings shall be in accordance with SMACNA HVAC Duct Construction Standards for rectangular ducts for positive and negative static pressure up to 500 Pa with leakage rate of 5% maximum.

.3 Seal classification: to SMACNA seal class A with transverse joints and connections made airtight with sealant.

.4 Hangers:

.1 Ducts up to size 900 mm shall be supported with 25 mm x 1.6 mm thick galvanized strap hangers spaced at not over 3 m centres.

.5 Radius of duct elbow shall be at least equal to the width of the elbow.

.6 Duct leakage: in accordance with SMACNA HVAC Duct Leakage Test Manual.

.7 Applications: supply air ducting to boiler intake for sealed combustion boilers.

2.2 DUCT SEALANTS AND TAPES

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of -30°C to +93°C.

2.3 DUCT ACCESS DOORS

.1 Provide for access to fire or other dampers and for service or inspection, and for cleanouts where required, panel type access doors, 300 x 300 mm unless otherwise stated, complete with two sash locks.

2.4 FIRE DAMPERS

.1 Fire dampers: listed and bear label of ULC, and shall meet requirements of Federal Fire Commissioner (FFC), CAN/ULC-S112 "Test of Fire Damper Assemblies", and authorities having jurisdiction.

.2 Factory fabricated for fire rating requirement to maintain integrity of membrane being pierced.

.3 Fire dampers shall be single-blade, multi- blade or curtain type, sized to maintain full flow cross section as indicated.

.4 Complete with frame and 40 x 40 x 3 mm steel angle on full perimeter of frame on both sides of barrier being pierced.

.5 Provide at each fire damper an access door for access to fusible links.

.6 Follow NFPA 90A and manufacturer's installation instructions including the installation of drywall filler pieces when installed in a gypsum board wall.

2.5 CEILING MOUNTED TRANSFER FAN OR EXHAUST FANS

.1 Provide CSA approved and labelled ceiling- mounted transfer fans or exhaust fans of capacities and performance as indicated on the drawings.

.2 Fans shall be cabinet type, complete with centrifugal blower wheel, acoustic lined cabinet, and bear AMCA seal for air and sound performance. Maximum loudness 5 sones.

.3 Provide each exhaust fan with backdraft damper and intake grille.

.4 Provide each fan with a wall-mounted solid state speed controller with "OFF" switch and up to 50% speed reduction.

Part 3 Execution

3.1 INSTALLATION

.1 Install material and equipment in accordance with referenced standards and manufacturer's written instructions.

.2 Make good all existing insulation where previously damaged by others or damaged by work under this contract.

3.2 AIR BALANCING

.1 Use qualified personnel and approved instruments to balance each air system to air flow rates specified on the drawings.

.2 Standard: Testing, Adjusting and Balancing (TAB) to be to most stringent of this section or TAB standards of AABC, or NEBB.

.3 Do TAB of all air systems installed in this contract.

.4 Qualifications: personnel performing TAB to be current member in good standing of AABC, or NEBB.

.5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), voltage.

.6 Permissible deviation from design air quantities shall be 5%.

.7 Permanently mark settings of all splitters, dampers and other adjustment devices.

.8 For additional requirements refer to Sections 23 05 00.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.3 No.1-15, Overhead Systems.

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

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

.3 Ontario Electrical Safety Code, 2015.

1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.6 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.2 Building Energy and Water Consumption: for monitoring end-uses as follows, submit Measurement and Verification Plan following IPMVP:

.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Variable frequency drive (VFD) operation.

.4 Chiller efficiency at variable loads (kW/ton).

.5 Cooling load.

.6 Air and water economizer and heat recovery cycle.

.7 Air distribution static pressures and ventilation air volumes.

.8 Boiler efficiencies.

.9 Building-related process energy systems and equipment.

.10 Indoor water risers and outdoor irrigation systems.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer post-industrial content, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

.4 Use one label, nameplate for each language.

2.2 MATERIALS AND EQUIPMENT

.1 Material, equipment to be CSA certified. Where CSA certified equipment, material are not available, obtain special approval from inspection authorities, authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 05 21 – Wires and Cables (0-1000V) and Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings, wiring and connections below 50 V which are related to control systems and as specified in mechanical sections.

2.4 WARNING SIGNS

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

.2 Decal, Porcelain enamel signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: 3 mm thick plastic engraving sheet melamine, black, matt white finish face, white core, lettering accurately aligned and engraved into core, mechanically attached with self-tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

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

.4 Allow for minimum of twenty-five (25) letters per label, nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. Departmental Representative

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes numbered, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

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

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 FINISHES

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

.1 Paint outdoor electrical equipment "equipment green" finish to ANSI Grey.

.2 Paint indoor switchgear and distribution enclosures light gray to _____

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: plastic, schedule 40 steel pipe, sheet metal, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

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

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.6 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: 450 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.

.3 Panelboards: as required by Code or as indicated.

.4 Telephone and interphone outlets: 300 mm.

.5 Wall mounted telephone and interphone outlets: 1200 mm.

.6 Fire alarm stations: 1200 mm.

.7 Fire alarm bells: 2100 mm.

.8 Television outlets: 450 mm.

.9 Wall mounted speakers: 2100 mm.

.10 Clocks: 2100 mm.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.8 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 11 01 – General Instructions.

.1 Power distribution system including phasing, voltage, grounding.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: communications, fire alarm, security systems.

.2 Carry out tests in presence of Departmental Representative.

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

.4 Manufacturer's Field Services:

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

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

3.9 SYSTEM STARTUP

.1 Instruct operating personnel, Departmental Representative in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA-C22.2 NO. 18.2-06 (R2011) - Non-metallic Outlet Boxes.

.2 CAN/CSA-C22.2 No.65-13, 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-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

.4 Ontario Electrical Safety Code, 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.2 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.4 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.5 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.2 Building Energy and Water Consumption: for monitoring end-uses as follows, submit Measurement and Verification Plan following IPMVP:

.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Variable frequency drive (VFD) operation.

.4 Chiller efficiency at variable loads (kW/ton).

.5 Cooling load.

.6 Air and water economizer and heat recovery cycle.

.7 Air distribution static pressures and ventilation air volumes.

.8 Boiler efficiencies.

.9 Building-related process energy systems and equipment.

.10 Indoor water risers and outdoor irrigation systems.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer post-industrial content, and total cost of materials for project.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded, conductors, bar, copper.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors, bar.

.5 Bolts for aluminum bar, conductors.

.6 Sized for conductors, bars as indicated.

.4 Clamps or connectors for TECK cable, mineral insulated cable, armoured cable, flexible conduit, non-metallic sheathed cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors cables and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2 NEMA.

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit in accordance with Section 01 11 01 – General Instructions.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, packaging materials, crates and padding.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermos setting polyethylene material rated RW90 XLPE Non Jacketted.

2.2 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket.

.2 Type: low energy 300 V control cable: solid annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: PVC, polyethylene.

.2 Shielding: metallized tapes, over conductors pairs.

.3 Overall covering: interlocked armour.

.3 Type: 600 V conductors, sizes as indicated: ACM alloy, semi-annealed aluminum.

.1 Insulation: TWH.

.2 Shielding: each conductor.

.3 Overall covering: PVC thermosetting compound, thermosetting jackets.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform test for local authority having jurisdiction over installation, Departmental Representative.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors- (0-1000 V).

.2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF CONTROL CABLES

.1 Install control cables, underground ducts, conduit, cable troughs.

.2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-15, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

.2 Ontario Electrical Safety Code, 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.2 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.4 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.5 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.2 Building Energy and Water Consumption: for monitoring end-uses as follows, submit Measurement and Verification Plan following IPMVP:

.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Variable frequency drive (VFD) operation.

.4 Chiller efficiency at variable loads (kW/ton).

.5 Cooling load.

.6 Air and water economizer and heat recovery cycle.

.7 Air distribution static pressures and ventilation air volumes.

.8 Boiler efficiencies.

.9 Building-related process energy systems and equipment.

.10 Indoor water risers and outdoor irrigation systems.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer post-industrial content, and total cost of materials for project.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Long barrel, Copper compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

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

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

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.5 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended set in poured concrete walls and ceilings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with nylon shields.

.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 steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

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

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

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

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

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

.11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

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

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 23rd Edition.

.2 Ontario Electrical Safety Code, 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.6 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.2 Building Energy and Water Consumption: for monitoring end-uses as follows, submit Measurement and Verification Plan following IPMVP:

.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Variable frequency drive (VFD) operation.

.4 Chiller efficiency at variable loads (kW/ton).

.5 Cooling load.

.6 Air and water economizer and heat recovery cycle.

.7 Air distribution static pressures and ventilation air volumes.

.8 Boiler efficiencies.

.9 Building-related process energy systems and equipment.

.10 Indoor water risers and outdoor irrigation systems.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer post-industrial content, and total cost of materials for project.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on turned edge covers.

2.2 CABINETS

.1 Construction: welded as indicated sheet steel, hinged door, handle, lock 2 keys and catch

.2 Type E Empty: flush overlapping sides mounting as indicated.

.3 Type T Terminal: surface return flange as indicated.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating voltage and phase or as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

.2 Ontario Electrical Safety Code, 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

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.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

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.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

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.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Variable frequency drive (VFD) operation.

.4 Chiller efficiency at variable loads (kW/ton).

.5 Cooling load.

.6 Air and water economizer and heat recovery cycle.

.7 Air distribution static pressures and ventilation air volumes.

.8 Boiler efficiencies.

.9 Building-related process energy systems and equipment.

.10 Indoor water risers and outdoor irrigation systems.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer post-industrial content, and total cost of materials for project.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.6 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.7 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

- .1 CSA C22.2 NO. 18.2-06 (R2011) - Nonmetallic Outlet Boxes
- .2 CSA C22.2 No. 45-M1981 (R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985 (R2013), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-06 (R2011), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-15, Non-metallic Mechanical Protection Tubing (NMPT), and Fittings.

.2 Ontario Electrical Safety Code, 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

- .1 Submit cable manufacturing data.

.3 Quality assurance submittals:

- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse, recycling in accordance with Section 01 11 01 – General Instructions.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with expanded ends.

.4 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal, steel.

.6 Flexible pvc conduit: to CAN/CSA-C22.2 No. 227.3.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm NPS 2.

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

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

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

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

.2 Conceal conduits except in mechanical and electrical service rooms.

.3 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.

.4 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.

.5 Use rigid pvc conduit underground.

.6 Use flexible metal conduit for work in movable metal partitions, connection to surface or recessed fluorescent fixtures, connection to recessed incandescent fixtures without prewired outlet box.

.7 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.8 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.9 Minimum conduit size for lighting and power circuits: 19 mm.

.10 Bend conduit cold:

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

.11 Mechanically bend steel conduit over 19 mm diameter.

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

.13 Install fish cord in empty conduits.

.14 Run 2-NPS 1 spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel.

.1 Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in flush concrete, surface type box.

.15 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.16 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface channels.

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

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

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.

.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.

.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.8 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association: CSA

.2 C22.3 No. 1-15, Overhead Systems

.3 C22.2 No. 0.3-09 (R2014), Test Methods for Electrical Wires and Cables

.4 C22.2 No. 04 (R2013), Bonding of Electrical Equipment.

.5 C22.2. No. 41-13, Grounding and Bonding Equipment.

.6 American Society for Testing and Materials: ASTM

.7 National Electric Testing Association Inc.: NETA

1.2 SUBMITTALS

.1 Submit certified Test Reports in accordance with Section 26 05 01.

Part 2 Products

2.1 MATERIALS

.1 Furnish all materials, instrumentation, etc. required to execute testing and commissioning as specified, including manufacturers testing and commissioning.

.2 Calibrate test instruments and for each instrument record identifying numbers, date of calibration and percentage of error (if any) on appropriate test reports.

.3 Furnish megger test instruments as follows:

Megger Voltage	System Voltage
500 V	up to 250 V (low voltage)
1000 V	277 V to 1000 V (low voltage)

Part 3 Execution

3.1 PRE-TEST INSPECTION AND CLEANING

.1 Check that all dust, debris, surplus materials and tools, have been removed from equipment.

.2 Inspect all parts of the power distribution systems at each voltage level for completeness, check and set circuit protective devices, fuses, breaker relays, trips, and all ancillary devices in accordance with the reviewed coordination studies, approved drawings and manufacturer’s instructions.

.3 Check phase sequence throughout the systems and application of colour codes to equipment and cables.

.4 Verify all cable sizes, equipment ratings, trip settings conform to specifications and coordination study.

3.2 TESTING GENERAL

.1 Test the electrical installation including all safety devices as the Work progresses and on completion.

.2 Without adjustment to the Contract price:

.1 Repair, rework or replace any equipment, material or workmanship which fails specified tests.

.2 Perform such additional tests and re-tests as may be directed by the Consultant and/or Owner's Representative.

.3 Energize each voltage level of the system immediately after testing is complete.

.4 In case this is not feasible verify all fuse sizes and trip settings and repeat megger tests of each feeder and equipment with circuit breakers and switches open, immediately before energization.

.5 Distribution Panels and Panelboards

.1 Check bolted connections bus to bus, and bus to cable lug with torque wrench, to manufacturer's values. Mark with adhesive tape or label when satisfactory.

.2 Measure contact resistance on low voltage fusible and non-fusible switches, circuit breakers, contactors and auxiliary equipment. Acceptable values:

	Microhms
Low voltage - up to 250 V	500
Low voltage - 277V to 1000V	500

.3 Megger test insulation resistance phase to phase and phase to ground of fusible switches, circuit breakers, contactors, buswork, auxiliary equipment. Acceptable values:

	Megohms
Low voltage, up to 250V	1
Low voltage, 277V to 1000 V	50
Duration of each test:	one (1) minute

.4 Check ground bus and ground path for continuity, and connection to all non-current carrying metalwork. Maximum acceptable reading 0.1 ohms.

.5 Check for physical faults: damaged or dirty insulators, alignment of contacts, switchblades, operating mechanism, clearances, barriers, mounting.

.6 Operate circuit breakers, switches, contactors, 3 times.

.7 Operate equipment through design functions, including remote control operation, actuation of alarm and indication devices, mechanical and electrical operation and operation from protective relays.

.8 Check 600V circuit breakers for trip and target operation. Test long time, short time, instantaneous and ground fault trips. Trip settings shall conform to values selected in the coordination study. Verify pickup and time values. Compare actual trip time with manufacturer's specifications and present in tabular form.

.9 Balance loads on all panelboards. Use shop drawing information for all equipment loads.

3.3 LOW VOLTAGE STARTERS, CONTACTORS UP TO 1000 VOLT SERVICE

.1 Visually inspect components and the complete assembly.

.2 Check each contactor and starter for switch or breaker operation, fuse or breaker rating, contactor size and operation, auxiliary contact operation.

.3 Check starter overloads with motor nameplate ratings.

.4 Check controls and starters and contactors operation on load.

.5 Check motor rotation.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Provide all wall mounted equipment in sprinklered areas with accessories, new switchboard with accessories to prevent the entry of water into the enclosures in the event that the sprinkler system is activated.

Part 2 Products

2.1 MATERIALS

.1 Gaskets on lighting, receptacle and distribution panelboards, doors and drip shield on switchboard.

.2 Gaskets on doors and drip shields on fire alarm and communication systems panels and enclosures.

.3 Louvres facing outward and downward where openings are required for heat dissipation. Expanded metal screening is not acceptable.

.4 CSA certified sealing rings for rigid steel galvanized conduit and CSA certified raintight connectors for steel galvanized electrical metallic tubing (EMT).

Part 3 Execution

3.1 INSTALLATION

.1 Install sealing rings and raintight connectors on all conduit terminations entering the top or side of all panel enclosures and for all conduit terminations for pull boxes, junction boxes, splitter troughs, wireways, auxiliary gutters, cable troughs and disconnect switches installed below the level of the sprinkler heads.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes:

.1 Labour, products, equipment and services necessary to complete the work of this Section.

Part 2 Products

2.1 FIBER OPTIC CABLES

.1 Optical characteristics:

.1 Type: 4 Fibres, single mode

.2 Operating Wavelength: 1310 and 1550 nm

.3 Maximum Attenuation at 1310 nm: 0.4 db/km

.4 Maximum Attenuation at 1550 nm: 0.3 db/km

.2 Cable characteristics:

.1 Maximum Installing Tension: 600 lbs

.2 Maximum Operating Tension: 132 lbs

.3 Minimum Installing Bending Radius: 16.5 cm

.4 Minimum Operating Radius: 8.2 cm

.5 Maximum Vertical Rise: 641 m

.6 Operating and Storage Temperature: -40C to +80C

.3 Terminations: ST connectors.

Part 3 Execution

3.1 FIBER OPTIC CABLE INSTALLATION

.1 Contractor shall test cables before installation.

.2 Contractor shall not exceed manufacturer’s minimum bend radius of the maximum tensile rating.

.3 Use pull boxes to allow fiber optic cable access for backfeeding at every third 90 degree bend. When pulling long lengths of fiber optic cables in conduit, maintain less than 80% fill ratio by cross section.

.4 Pull cables through conduit or lay-in tray. In the FEC No. 5, all cables shall be securely fastened in place with cable ties and identified as fiber optic cables.

.5 Take care not to damage the fiber or connector during shipping, handling and installation.

.6 Arrange for test equipment to demonstrate that the cables are performing in accordance with these specifications. Perform a continuity test to detect splice fractures or other defects through analysis of backs scattering signal using an Optical Time Domain Reflectometer (OTDR). Provide Departmental Representative with written certified results of testing.

.7 Splicing to existing F.O. cables and terminations shall be carried out by an approved fiberoptic contractor.

.8 No splice is allowed for new F.O. cables.

.9 Mark fiber optic cables in maintenance holes and pullpits with yellow PVC tape.

END OF SECTION

Part 1 General

1.1 PURPOSE

.1 To verify that the fire alarm system installations are in accordance with project requirements.

.2 To ensure proper system operation.

1.2 COMMISSIONING ORGANIZATIONS

.1 Certified member of ECAO or CFAA.

1.3 REFERENCE STANDARD

.1 CAN/ULC-S537-13, Standard for Verification of Fire Alarm Systems.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PROCEDURES

.1 Follow manufacturer's recommendations for testing.

.2 Inspect wiring connections to all devices comprising the system.

.3 Verify supervision of wiring at every device connection to a supervised circuit.

.4 Test operation of every device on a system to verify its function.

.5 Examine equipment for any apparent damage or tampering that may interfere with its intended operation.

.6 Test equipment with capabilities for field adjustment to establish that it functions as intended under the conditions prevailing at its point of installation.

.7 Examine devices for evidence of damage or obstructions which may interfere with their operating mechanisms.

.8 Test automatic devices by simulating an operating condition.

.9 Wiring:

.1 Inspect every device and test to demonstrate that disconnection of the device from the circuit or malfunction of the equipment or wiring activates the required supervisory signals. Inspection shall include verification that:

.1 Supervisory signals operate in response to open circuits, short circuits, ground faults and disconnection of plug-in components;

.2 Terminations of conductors entering and leaving equipment have been made;

.3 Circuit polarities are in accordance with the system design, where applicable.

.2 In addition, test to establish that the power supplied to any device is within its recommended operating range and that the required voltage levels are maintained and that the fusing is correct.

.10 Initiating Devices - Manual:

.1 Inspect manual alarm stations in consideration of the following:

.1 The device shall be mounted with sufficient clearance to facilitate ease of access and proper operation;

.2 Operate each manual alarm station, toggle switch and key switch to verify proper functions.

.11 Automatic heat detectors:

.1 Use a heat source reproducible in its intensity, as recommended by the manufacturer of the device, to initiate an alarm.

.2 Test equipment - Heat lamp or Air heater. DO NOT USE AN OPEN FLAME HEAT SOURCE.

.3 Apply heat source as to not damage or operate fusible disc parts.

.12 Automatic heat detectors - non-resettable:

.1 Test by simulating its electrical operation by jumpering the wiring points (creating a short) adjacent to its operating mechanism.

.13 Automatic smoke detectors - area type:

.1 Test by introducing smoke into its detecting chamber. This may consist of actual smoke from burning materials or artificially generated smoke aerosol spray as recommended by the manufacturer. The sensitivity should be noted and adjusted if necessary.

.14 Automatic smoke detectors:

.1 Examine the air sampling arrangements of the detectors under actual conditions of balanced air circulation by conducting a check of the field sensitivity and a check of the air velocity in accordance with the manufacturers' recommendations.

.2 Test gas to be used similar to Automatic Smoke Detector.

.15 Alarm signals - audible:

.1 Test on main power supply and standby power supply with the maximum expected load on the system.

.2 The audible signalling appliances shall function as intended and shall be audible throughout the building over the background noise present.

.3 Decibel recordings in each are covering 100 sq. metres shall be taken.

.4 The level of sound should usually be 15 db above ambient noise level.

.16 Alarm signals - visual:

.1 The visual signal appliances shall function as intended and shall be clearly visible.

.17 Annunciators, printers and workstations:

.1 Inspect and operate to establish that their operation in conjunction with the control equipment and other system components, is as intended. The equipment shall be inspected to ensure:

.1 The zone of each alarm initiating device is properly indicated;

.2 The legend is clearly visible;

.3 Adequate voltage under local conditions is present;

.4 Wiring connections have been made in a workmanlike manner.

.5 Proper care must be taken to establish that each item is complete and satisfactory.

.18 Standby power supplies - batteries:

.1 Examine batteries for possible damage and consideration of the following:

.1 The charging system functions as intended;

.2 The installation has not resulted in the bypassing of a fuse or a similar protective device;

.3 The installation protects the batteries from accidental or mechanical damage.

.4 The batteries must be able to operate the fire alarm system with the charger input disconnected for one rated load cycle.

.19 Control equipment and transponders:

.1 Test to establish that they function as intended. The following examinations and tests shall be performed:

.1 A visual and physical inspection of all cables, plug interconnections, plug-in circuit components, lamps, sockets and controls to establish that their mechanical and electrical connections and mounting are as required for intended function and, where applicable, to confirm electrical supervision;

.2 Verification that all field wiring is terminated in a workman-like manner;

.3 All lamps and indicators shall be tested for operation and intended function;

.4 All keypad functions shall be tested for operation and intended function;

.5 All control unit functions shall be operated to verify appropriate response including all software routines and programme functions are simulated;

.6 Simulation of open circuits, short circuits and ground faults on all relevant internal circuits in order to confirm the appropriate supervisory response;

.2 Commissioning Report: Provide Commissioning Report, supplemented as specified herein. Report to include relevant information of the system including:

.1 Each system part described.

.2 How the system is operated.

.3 What functions the system performs.

.4 Requirements for tests and service.

.5 Itemization of all devices connected on the system, their general location.

.6 The date of the performed tests.

.7 All pertinent details of the report sheets requested.

.3 Verification:

.1 The Commissioning Report to be submitted to the Commissioning Manager upon completion of commissioning and will be subject to verification by the Commissioning Manager.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S301-09, Standard for Signal Receiving Centre Burglar Alarm System and Operations

.2 CAN/ULC-S302-14, Standard for Installation, Inspection and Testing of Intrusion Alarm Systems.

.3 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.

.4 CAN/ULC-S310-M91 (R1999), Installation, Inspection and Testing of Intrusion Alarm Systems.

.5 ULC-S318-96 (R2016), Standard for Power Supplies for Burglar Alarm Systems.

.6 ULC-C634-86, Guide for the Investigation of Connectors and Switches for Use with Burglar Alarm Systems.

.3 Underwriters' Laboratories (UL)

.1 UL 294-2013, Access Control System Units.

.2 UL 603-08, Power Supplies for Use with Burglar Alarm Systems.

.3 UL 681-2014, Installation and Classification of Burglar and Holdup Alarm Systems.

.4 UL 827-2014, Central-Station Alarm Services.

.5 UL 1023-2009, Household Burglar Alarm System Units.

.6 UL 1076-2005, Safety for Proprietary Burglar Alarm Units and Systems.

.7 UL 1641-2015, Safety for Installation and Classification of Residential Burglar Alarm Systems.

1.2 ABBREVIATIONS

.1 Electronic Access Control (EAC): control of people through entrances and exits of controlled area. Security utilizing hardware systems and specialized procedures to control and monitor movements within a controlled area.

.2 CPVX: Central Station Burglar Alarm Systems.

.3 CVSG: Mercantile Burglar Alarm Systems.

.4 CVWX: Proprietary Burglar Alarm Systems.

.5 DRS: Door Release System.

.6 PIN: Personal Identification Number.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.2 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed system.

.4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.4 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Manufacturer's Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

Part 2 Products

2.1 MATERIALS

.1 Products to match existing.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access control system installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION: BURGLAR ALARM SYSTEM

.1 Provide tamperproof unobtrusive dual gang receptacle back box with stainless steel cover plate where door release items installed in areas with suspended ceiling, fixed tile, plaster, or concrete walls, and/or metal door frames.

.2 Fully enclose external cables in conduit or flexible protective armor, from activating unit location's enclosure receptacle back box to and above ceiling wall mounted junction boxes.

.3 Provide tamperproof attachments for each activation unit cover plate to receptacle back box.

.4 Enclose in conduit or flexible protective armor external cables for associated junction box to remaining system locations, from junction box to above ceiling mounted cable ducts or master conduit routes.

.5 Securely fasten all components to wall, ceiling, or other substrate or structure.

3.3 INSTALLATION: SECURITY ACCESS

.1 Install security access systems and components in accordance with CAN/ULC-S310, CAN/ULC-S302.

.2 Install components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.

.3 Install components secure to walls, ceilings or other substrates.

.4 Install required boxes in inconspicuous accessible locations.

.5 Conceal conduit and wiring.

3.4 SITE TEST AND INSPECTION

.1 Perform verification inspections and test in presence of Departmental Representative.

.1 Provide all necessary tools, ladders and equipment.

.2 Ensure appropriate subcontractors, and manufacturer's representatives and security specialists are present for verification.

.2 Pretesting procedure:

.1 Verify (utilizing an approved spectrum analyzer and test equipment) that system is fully operational and meets all system performance requirements of this specification.

.2 Measure and record, control (and/or voice) carrier levels of every system channel at each of following points in the system:

.1 Door located actuating devices.

.2 Door control panel functions.

.3 Electronic supervisory control units inputs and outputs.

.4 Distribution system input and output.

.5 Telephone system interface input and output.

.3 Submit to Departmental Representative 2 copies of recorded system pretest measurements, along with pretest certification.

.3 Performance testing:

.1 Test procedure: perform test on a "go-no-go" basis.

.1 Make only operator adjustments required to show proof of performance.

.2 Test to demonstrate and verify that installed system complies with installation and technical requirements of this specification under operating conditions.

.3 Test results to be evaluated by Departmental Representative as either acceptable or unacceptable using following procedures.

.2 Documentation review:

.1 This review will determine if information provided is sufficient to meet requirements of this specification.

.2 Provide for review all System manuals, as installed drawings, pretest forms, antenna radiation patterns, equipment cabinet pictorials, antenna pictorial, antenna mount pictorial, video and audio equipment details.

.3 Mechanical inspection:

.1 Departmental Representative and Contractor to tour areas to insure that Systems and Subsystems are installed in place for proof of performance testing.

.2 Take system inventory at this time. Verify following items before beginning proof of performance tests:

.1 Electrical power circuits designated for system equipment are properly labelled, wired, phased, protected and grounded.

.2 Conductor ends are protected by heat shrink wrap; audio spade lugs, barrier strips and punch blocks are used.

.3 Dust, debris, solder splatter, etc. are cleaned and removed from site.

.4 Equipment is properly labelled.

.5 Equipment identified in system's equipment lists are in-place and properly installed.

.6 Each lightning and System ground method are installed in accordance with manufacturer's instructions and this specification.

.4 Subsystem functional test:

.1 Conduct operational testing after review of documentation and mechanical inspection completed. Proceed as follows.

.1 Perform operational test of each Subsystem to verify that all equipment is properly connected, interfaced and is functionally operational to meet requirements of this specification.

.2 Control units:

.1 Take S/N readings from control unit's input and output in manual (and/or automatic) mode. Check output of DC/Data converter for S/N. Evaluate entire signal quality at baseband connector output of control unit and remote equipment.

.3 Audio:

.1 Take S/N readings from transmitter input and receiver output with equipment placed in manual gain mode. Check output of the audio converter, modulator or demodulator for S/N. Evaluate entire audio signal at baseband connector input and output of control unit.

.4 Distribution (or interface) system:

.1 Check each door utilizing a volt/ohm (or signal level) metre to confirm each function and to insure that system meets all performance requirements.

.2 Test each interconnection point (i.e.: door unit, junction box "cross connection", control unit, etc.) to ensure compliance with this specification.

.5 Total system test:

.1 Proceed with testing when system and subsystems are functionally tested and accepted. Total system tests to verify that requirements have been met for DC (and/or audio), sub carrier, and control signals in accordance with this specification.

.6 Safety:

.1 Demonstrate with documentation that access control system meets safety requirements specified in UL 294.

.5 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:

.1 Sturdiness of equipment fastening.

.2 Non-existence of installation related damages.

.3 Compliance of device locations with reviewed shop drawings.

.4 Compatibility of equipment installation with physical environment.

.5 Inclusion of all accessories.

.6 Device and cabling identification.

.7 Application and location of ULC approval decals.

.6 Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:

.1 Validate sensitivity of readers and applicability and application of cards.

.2 Connecting joints and equipment fastening.

.3 Compliance with manufacturer's specification, product literature and installation instructions.

.7 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:

.1 Operation of each device individually and within its environment.

.2 Operation of each device in relation with programmable schedule and or/specific functions.

3.5 FIELD QUALITY CONTROL

.1 Manufacturer Services:

.1 Manufacturer of products, supplied under this Section, to review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.

.2 Manufacturer's Field Services:

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

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

.3 Ensure manufacturer's representative is present before and during critical periods of installation.

.4 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.6 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.1 Remove protective coverings from accessories and components.

.2 Clean housings and system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

.3 Clean components free from dirt and fingerprints.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by access controls and equipment installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Ontario Electrical Safety Code 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.2 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment, material is not available, submit such material, equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.4 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESCRIPTION

.1 System to consist of security control panel, motion detectors, intrusion switches, and door contacts located at doors to be supervised. Refer to drawings for detailed requirement at each door.

2.2 CONTROL PANEL

.1 Control panel: surface mounted with circuit with rectifier to supply 24 V dc to operate complete system. Standby power of batteries sized to provide supervisory and trouble signal current nickel cadmium

2.3 MAGNETIC DOOR SWITCHES

.1 Door switches: suitable for surface and flush mounting on door as indicated.

2.4 TERMINAL CABINETS AND BLOCKS

.1 Terminal cabinets: Type T. In accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

2.5 END-OF-LINE RESISTORS

.1 Mount end-of-line resistors to control supervisory current in each circuit, in control panel.

2.6 LOCAL ALARM

.1 Buzzer for local alarm at each door location and mount in single gang box as indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for security door system installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install complete door supervision system as indicated and in accordance with manufacturer's instructions.

3.3 SEQUENCES OF OPERATION

.1 System operation: when supervised door is opened, zone indicating lamp flashes and operates audible alarm at control panel. When "acknowledge" button is operated, audible signal is silenced and flashing light changes to steady glow.

.2 System restored to normal when door is closed and "reset" key switch on control panel operated.

.3 Buzzer located at each door to give pulsating signal when door opened. Upon acknowledgement from control panel signal to change to continuous note. Buzzer at door location to be silenced only after door reclosed and "reset" key switch operated. Closing of door alone not to affect signal once it has started to sound.

.4 When deactivating switch is operated, supervised door on that zone opened without causing alarm. Zone trouble lamp illuminated when zone is deactivated but audible trouble signal not to sound.

.5 Fault in wiring of one zone to cause audible signal to sound even if zone in deactivated position.

3.4 SITE TESTS

.1 Perform tests in accordance with Ontario Electrical Safety Code and manufacturer's recommendations.

.2 Test system components in presence of Departmental Representative to ensure correct operation of system. On completion of tests, submit to Departmental Representative certificate listing components tested.

3.5 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by security door system installation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes:

.1 Labour, products, equipment and services necessary to complete the work of this Section.

.2 This building has an existing two-stage addressable fire alarm system.

.3 Scope of Work: Install smoke detectors complete with relay base at elevator lobbies for elevator recall purpose. Tie them to the existing building fire alarm system.

.4 Refer to electrical drawing for exact quantities of smoke detectors.

.5 Test installation to ensure proper system operation. Refer to section 28 08 01 – Commissioning Fire Alarm Systems.

1.2 REFERENCE STANDARDS

.1 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.2 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)

.1 Fire Protection Standard-10.

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-14, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S526-16, Visible Signal Devices for Fire Alarm Systems, Including Accessories.

.3 CAN/ULC-S527-16, Standard for Control Units for Fire Alarm Systems.

.4 CAN/ULC-S528-13, Manual Stations for Fire Alarm Systems, Including Accessories.

.5 CAN/ULC-S529-16, Smoke Detectors for Fire Alarm Systems.

.6 CAN/ULC-S530-M91(R1999), Standard for Heat Actuated Fire Detectors for Fire Alarm Systems.

.7 CAN/ULC-S531-14, Standard for Smoke Alarms.

.8 CAN/ULC-S537-13, Standard for the Verification of Fire Alarm Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets as noted in each product section.

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material and equipment.

.2 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 11 01 – General Instructions.

.2 Submit system verification report as per CAN/ULC-S537-13 Standard for the Verification of Fire Alarm Systems.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit maintenance materials in accordance with Section 01 11 01 – General Instructions.

Part 2 Products

2.1 AUTOMATIC ALARM INITIATING DEVICES

.1 Smoke detector: photo-electric type air duct type with sampling tubes with protective housing.

.1 Wire-in base assembly with integral red alarm LED, and terminals for remote alarm LED.

.2 Addressable smoke detector.

.1 Photo-electric type.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Addressable variable-sensitivity smoke detectors.

.1 Photo-electric type.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Sensitivity settings: determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.

.4 Ability to annunciate minimum of 2 levels of detector contamination automatically with trouble condition at control panel.

.4 Smoke Detectors model shall match existing system device and are from the same manufacturer.

2.2 END-OF-LINE DEVICES

.1 End-of-line devices to control supervisory current in alarm circuits, 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 and remotely as indicated.

2.3 WIRING

.1 Twisted copper conductors.

.2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

.3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.

.4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524.

.2 Locate and install detectors and connect to alarm circuit wiring. Mount detectors more than 1 m from air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.3 Connect alarm circuits to main control panel.

.4 Install smoke detector complete with relay base for elevator recall.

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

.6 Install door releasing devices.

.7 Install fault isolators as required.

.8 Make necessary connections between door operators and main fire alarm panel as indicated on drawings.

.9 Splices are not permitted.

.10 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.

.2 Test smoke detectors to ensure correct function of elevator recall.

.3 Test installation to ensure power operated fire doors are automatically disconnected during fire alarm.

3.4 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by fire alarm system installation.

3.6 CLOSEOUT ACTIVITIES

.1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION