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## **1 General**

### **1.1 DESCRIPTION OF WORK**

- .1 The work will take place at the Northwest Atlantic Fisheries Centre, located 80 East White Hills Rd, St. John's, NL A1A 5J7.
- .2 The Description of Work generally includes, but is not limited to the following items:
  - .1 The Contractor must coordinate, administer, and supervise all labor, material, tools and equipment necessary to perform electrical maintenance service work, minor repairs, emergency repairs and other related work as requested by Public Services and Procurement Canada and provide the services listed in items 1.3 and 1.5 of this section.
  - .2 Contractor to embrace the safety and security culture mandatory under this standing offer agreement. Failure to comply 100% will result in removal of workers and/or Contractor from site.
  - .3 In addition to a site Safety Plan, which is required under this standing offer agreement, the Contractor is advised that a COVID-19 onsite response plan is required, further details are provided in Section 01 35 29.06 - Health, Safety and Emergency Response Procedures. This is to be a living document, outlining the procedures the Contractor will employ for the safety of their workforce, and that of the NAFC Facility pertaining to the issue of COVID-19.

### **1.2 CONTACTING AND REPORTING**

- .1 The Contractor shall maintain and provide to the Departmental Representative, current telephone numbers to ensure the provision of acceptable response to requests for service of all priorities from the local Departmental Representative and/or the National Service Call Centre (NSCC). This involves ensuring that cellular phones and pagers are of a type that can be contacted from the National Service Call Centre in Toronto. The Departmental Representative will provide the Contractor's response numbers to the NSCC. Service is to be provided on a twenty-four (24) hour, seven (7) days per week basis.
- .2 When a request for emergency service is originated from the Departmental Representative and/or the NSCC, the Contractor shall immediately proceed to the site, and repair or protect the system or equipment from further damage.
- .3 When the system or equipment has been made safe, the Contractor shall provide within one (1) working day, a detailed quotation to the requesting authority for the complete repairs required to put the system or equipment into proper working order.
- .4 When responding to any priority level work that is requested by the NSCC, the Contractor shall advise the Departmental Representative at the earliest possible opportunity of the request and shall inform both the Departmental Representative and the NSCC of the action taken to correct the problem.
- .5 When responding to any priority level work that is requested by the NSCC, the Contractor shall advise the Departmental Representative at the earliest possible opportunity of the request and shall inform both the Departmental Representative and the NSCC of the action taken to correct the problem.
- .6 The Contractor shall contact the Departmental Representative, on the first working day following an "after normal working hours" emergency or urgent request for service to obtain a requisition number.
- .7 Where required, the Contractor shall register with the on- site Representative or his/her designated official upon entering and leaving the premises.

### **1.3 PRIORITIES AND RESPONSE TIMES**

.1 The Contractor shall comply to the following Work Priorities and Response Times:

**.1 Emergency Priority**

A priority of "Emergency" is defined as a deficiency or breakdown that requires immediate attention to reduce the potential for damage and/or danger to the occupants, the general public, the environment and/or the facility. Work identified to be of an emergency priority shall be responded to and reported on, without delay to the appropriate authority.

**Emergency Response Times**

Urban **Immediate**

Rural **ASAP (travel-time considered)**

**.2 Urgent Priority**

A priority of "Urgent" is defined as a deficiency or breakdown that requires same day attention to reduce the potential for damage and/or danger to the occupants, the general public, the environment and/or the facility.

**Urgent Response Times**

Urban **Within 4 hours**

Rural **Within 12 hours**

**.3 Routine Priority**

A priority of "Routine" is defined as essential maintenance requirements which shall be rectified at the earliest possible opportunity, within the standard response times noted. A routine priority is considered to be a deficiency or breakdown that will not impair current operations or pose any potential for damage and/or danger to the occupants, the general public, the environment and/or the facility.

**Routine Response Times**

Urban **Within 24 hours**

Rural **Within 48 hours**

**1.4 COST BREAKDOWN**

.1 The cost breakdown shall be as described in the Unit Price Table.

**1.5 CONTRACTOR RESPONSIBILITIES**

.1 The Contractor must have a staffed office at all times during normal business hours and a demonstrated ability to receive and respond to calls for service during other than normal business hours. This involves ensuring that cellular phones of a type that can be contacted from the National Service Call Centre.

.2 On award of Standing Offer, the Contractor must provide names of personnel performing work on this standing offer complete with proof of their qualifications and security clearance.

.3 Contractors must be certified electricians.

.4 The Contractor must report to the site with a service vehicle which is stocked with replacement parts to carry out repairs on electrical equipment in use in these facilities.

**1.6 JOB SLIP**

.1 The Contractor shall complete all applicable job slips outlining all work performed. Payment shall not be made if job slip is incomplete.

## 1.7 INVOICING

- .1 The Contractor shall submit Job Slip(s) signed by the Departmental Representative with a monthly invoice. No invoice will be considered for payment unless accompanied by signed Job Slip(s), and a current letter of good standing from the Workers Compensation Board.
- .2 Invoice must show:
  - .1 Standing Offer number
  - .2 Work location
  - .3 Date
  - .4 Job Slip number
  - .5 Hours broken down as per Unit Price Table
  - .6 Shop materials cost
  - .7 Replacement parts net cost and % mark-up
  - .8 Copies of all third-party receipts
- .3 In the event of a dispute, the Contractor is to make any and all records available to the Department to substantiate time and/or materials spent on any one job.
- .4 The Contractor must submit a completed "Request for Isolation" form, when applicable, before any invoice can be processed. See Appendix "D".
- .5 All invoices for the fiscal year must be submitted for payment before 31 March of each year.

## 1.8 SERVICE DEFINITIONS

- .1 The following definitions apply to the work to be directed by the Departmental Representative.
  - .1 Add  
Make an addition to.
  - .2 Adjust  
Bring components to a more effective relative position.
  - .3 Assemble  
To take apart and put together again.
  - .4 Balance Load  
To balance the three (3) phase and single-phase circuits which enter (or leave) the main switchboards, transformers and distribution panelboards, by calculating new and existing loads accordingly.
  - .5 Breakdown Maintenance  
To perform repairs to damaged equipment due to failures.
  - .6 Clean  
Scrape, brush, flush and vacuum as required to remove dust, dirt and foreign matter.
  - .7 Check/Inspect  
View closely for dirt, foreign substance, lack of lubricant, wear, damage, tightness, tension, alignment, leaks, cracks, spalling, deformation, overloading and settings. Make a critical appraisal of equipment, component and parts' ability to fulfil their function to a high degree of efficiency.

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- .8 Energy Source  
Any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other source of energy of potential harm to workers.
  - .9 Instruct  
Inform Departmental Representative of any new operating procedures. Demonstrate and explain purpose, benefit and method of implementing new procedures.
  - .10 Isolate  
To physically prevent the transmission or release of an energy source to machinery or equipment.
  - .11 Lubricate  
Apply oil or grease to joints between moving parts and joints between fixed and moving parts.
  - .12 Measure  
To determine capacity or amount in standard units using an appropriate instrument. Measure condenser and evaporator pressure drop with differential pressure meter or "U" tube manometer. Measure motor overload with instrument approved by overload manufacturer.
  - .13 Normal Working Hours  
Monday to Friday, between the hours of 0800 hrs. and 1630 hrs. inclusive, weekends and statutory holidays excluded.
  - .14 Paint  
Clean, prepare and paint surfaces to paint manufacturer's recommendations with paint and primer recommended by paint manufacturer for applicable surface and use.
  - .15 Predictive Maintenance  
To perform required repairs that have been declared in advance, on the basis of observation, experience and/or scientific reasons.
  - .16 Preventative Maintenance  
To inspect, test and re-condition a system, in order to prevent failures, at regularly scheduled intervals in accordance with specific instructions.
  - .17 Prove  
Operate and determine if operation produces intended response.
  - .18 Remove  
Take off or away from.
  - .19 Repack  
Fill with packing again.
  - .20 Repair  
Restore to a sound state.
  - .21 Replace  
Restore by removing old components and replacing with new components.
  - .22 Report  
To Departmental Representative on-site and include in work report, results of inspection and proving, note problems encountered, services required, services performed and readings taken.
  - .23 Shut Down

- Take out of service.
- .24 Start Up  
Return to service.
- .25 Tighten  
Securely fix in place.
- .26 Torque  
A predetermined amount of force (work measured in newton meters) determined by a manufacturer and executed with the use of a torque wrench to turn a nut on a bolt, relating to specific equipment or system.
- .27 Treat  
Act upon with agent.

### **1.9 DEPARTMENTAL REPRESENTATIVE(S) AUTHORIZED PERSONNEL**

- .1 The Contractor will be notified of, on award of the Standing Offer, the name and phone number of the PSPC Departmental Representative.

### **1.10 TAXES**

- .1 Pay applicable Federal, Provincial and Municipal taxes.

### **1.11 EMERGENCIES**

- .1 The Departmental Representative has authority in an emergency to stop the progress of the work whenever in his or her opinion, such stoppage may be necessary to ensure the safety of life, or of the structure. This includes authority to make such changes and to order, access and award the cost of such work extra to the Standing Offer or otherwise as may in his or her opinion be necessary.

### **1.12 EXECUTION**

- .1 Execute work with least possible interference or disturbance to building operations, public and normal use of premises.

### **1.13 MITIGATION OF IMPACT ON EXISTING BUILDING**

- .1 Protect and maintain existing active services.
- .2 Use designated sanitary facilities.
- .3 Any shutdown to execute service or repair must first be approved by Departmental Representative or his designate. Normal working hours shall be construed as 0800 hrs. to 1630 hrs., Monday through Friday, inclusive excluding holidays.
- .4 Ensure that capacity of services is adequate prior to imposing additional loads. Connecting to and disconnecting is Contractor's expense and responsibility.
- .5 Inform the Departmental Representative immediately of any code violations or required repairs which could pose a hazard to employees or building occupants.
- .6 When connecting to or disconnecting from an existing electrical system, ensure of a balanced load upon completion of work.
- .7 This Contractor is responsible to ensure that the existing building is kept free from any contamination that may result from any of the Work.

- .8 The life safety and security systems in the existing building are required to remain functional during construction. This Contractor is responsible to ensure that such systems are not inadvertently activated or deactivated during construction.

#### **1.14 CUTTING, FITTING AND PATCHING**

- .1 Cut, fit and patch where required for work under this Standing Offer. Make good all disturbed surfaces to original condition.
- .2 All firewall penetrations shall be properly sealed using approved fire rated patching material.

#### **1.15 CO-ORDINATION AND PROTECTION**

- .1 Execute work with minimum disturbance to occupants, public and normal use of building. Make arrangements with Department to facilitate execution of work. Maintain access and exits as work area could be occupied during execution of work.
- .2 Movement of office furniture is the Contractor's responsibility.
- .3 Furniture including desks, file cabinets, shelving units, chairs, and cabinets which are moved because of the work requirements will be moved back at the end of each workday.
- .4 Protect existing work from damage.
- .5 Where necessary, cover all building contents, materials and fittings in work areas prior to commencing work, remove covers on completion of work.
- .6 Obtain Departmental Representative's approval before cutting, boring or sleeving load bearing members.
- .7 All possible safety precautions are to be taken to ensure the protection of employees or occupants during the course of the work.
- .8 Asbestos assessment drawings, where available, are to be referenced before any interior finished surfaces are disturbed.
- .9 Obtain Departmental Representative's approval before isolating any security, monitoring or audible alerting devices.
- .10 In the event the Fire Alarm System is deemed inoperable due to ongoing work by the Contractor, a trained sentry/rounds man will carry out the functions of fire watch.
- .11 The Contractor must maintain continuously adequate protection of all his or her work from damage and must take reasonable precautions to protect the Departmental Representative's property from all injury arising in connection with this Standing Offer. He or she must make good any damage or injury to his or her work and must make good any damage or injury to the property of the Departmental Representative resulting from the lack of reasonable protective precautions.

#### **1.16 PRODUCT APPROVALS**

- .1 The Contractor shall ensure that all controlled products used in the performance of the work are classified and labelled according to the Workplace Hazardous Materials Information System (WHMIS).
- .2 The Contractor shall submit for approval the Material Safety Data Sheets (MSDS) for all controlled products that will be used in the performance of this work.
- .3 No controlled products are to be brought on-site without prior approved Material Safety Data Sheets (MSDS).

**.4** Material Safety Data Sheets (MSDS) to remain on-site at all times.

### **1.17 PERSONNEL**

- .1 The Contractor will provide only journeymen personnel with a valid Provincial Department of Labor License for applicable trades required for this Standing Offer. PSPC may at any time during this Standing Offer request to inspect a work person's certification.
- .2 The Contractor will provide the Departmental Representative with a list of all qualified trades people working on or in Federal facilities, complete with copies of their journey person license(s). Copies of WHMIS, First Aid, CPR and any other required safety or work-related training certificates are to be forwarded to the Departmental Representative. The Contractor is to ensure this list is updated immediately upon change in personnel, and personnel qualifications are to be kept current.
- .3 The Contractor and his/her personnel must adhere to the Federal Government "NO SMOKING" policy while in Federal facilities.
- .4 All Contractor's employees working with controlled products on Federal property and/or in Federal facilities will require WHMIS certification.
- .5 The PSPC Departmental Representative shall coordinate arrangements for the Contractor to be briefed on site safety within 14 days of award of Standing Offer.

### **1.18 WORK DONE BY OTHER MEANS**

- .1 This Standing Offer does not create an exclusive right of the Contractor to perform all electrical work which might be required. The Department reserves the right to have any work done by other means.

### **1.19 WORKMANSHIP**

- .1 All equipment panels and control covers must be replaced and properly fitted utilizing all fastening screws and/or bolts according to equipment design. All workmanship is subject to inspection and approval.
- .2 All work shall be performed by skilled tradespeople and supervised by a competent supervisor at all times.
- .3 Replace all work unsatisfactory to the Departmental Representative without extra cost.

### **1.20 COMMUNICATION**

- .1 All submissions and inquiries will be directed to the Departmental Representative for review.
- .2 All direction will be transmitted to the Contractor by the Departmental Representative.

### **1.21 CODES AND REGULATIONS**

- .1 The following codes and standards in effect at the time of award are subject to change / revision. The latest editions of each shall be enforced during the term of the Standing Offer.
  - .1 National Building Code of Canada.
  - .2 National Fire Code.
  - .3 Part II of the Canada Labour Code.
  - .4 Canada Occupational Safety and Health Section of Part II of the Canada Labour Code.
  - .5 Canadian Environmental Protection Act.
  - .6 Fire Commission of Canada #301 Standard for Building Construction Operations.

- .7 Canadian Construction and Canada Labour Safety Codes; Provincial Government, Workers' Compensation Board; and Municipal Statutes and Authorities.
- .8 Canadian Electrical Code, Part I, CSA C22.1.
- .9 CAN/CSA - C282-00, Emergency Electrical Power Supply for Buildings
- .10 Public Services and Procurement Canada "Electrical Safety Requirements". (Includes Lockout Procedures). \*
- .11 \* Please Note: The Electrical Safety Requirements (the Procedures) are only a tool which the Contractor may use to assist him or her in interpreting the Codes and Standards set out in the Maintenance Services Standing Offer-Electrical, General Requirements, Codes and Legislative Requirements, Items 1.1.1, 1.1.2, 1.1.3, 1.1.4 and 1.1.5 (the cited Codes and Standards). Public Services and Procurement Canada does not warrant the adequacy of these Procedures and advise that the Procedures do not replace the cited Codes and Standards.
- .12 The Contractor is responsible to be familiar with the cited Codes and Standards and to ensure that all work undertaken on behalf of Public Services and Procurement Canada is completed in a safe manner and, at a minimum, in compliance with the cited Codes and Standards. In the event there is a conflict between these Procedures and the cited Codes and Standards, the cited Codes and Standards are to prevail.
- .13 Materials and workmanship must conform to or exceed applicable standards of Canadian Government Specifications Board (CGSB), Canadian Standards Association (CSA), and American Society for Testing Materials (ASTM) and referenced organizations.
- .14 The Contractor can obtain addresses for codes and standards from Departmental Representative upon request.
- .15 In the event of a conflict between any of the above codes or standards the most stringent shall apply.
- .16 These standards shall be considered an integral part of the specifications and shall be read in conjunction with the drawings and specifications. The Contractor shall be fully familiar with their contents and requirements as related to the work and materials specified.
- .17 All equipment supplied installed will be CSA approved for the intended use.

## **1.22 ENVIRONMENTAL**

- .1 All work is to be performed in accordance with the Federal Environmental Protection Act and the Provincial Environmental Acts and Regulations.

## **1.23 EXAMINATION**

- .1 Examine the existing conditions and determine those conditions affecting the work.

## **1.24 CLIENT ACTIVITIES**

- .1 The Contractor is not to negatively impact DFO activities in any way. The building is to remain fully functional.

## **1.25 CONTRACTOR'S USE OF SITE**

- .1 Do not unreasonably encumber site with materials or equipment.
- .2 Contractor to coordinate with the Departmental Representative an appropriately sized and placed laydown area which does not interfere with site operations.

- .3 The contractor is responsible for securing stored materials onsite in a sufficient fashion, the Departmental Representative will not be responsible for or compensate in any way loss claims to due theft or pilferage.

#### **1.26 MEETINGS**

- .1 Attend meetings at site when notified by Public Services and Procurement Canada.

#### **1.27 SITE INSPECTIONS**

- .1 The Departmental Representative may, without prior notification, visit the site.
- .2 No work is to be covered without having received approval from the Departmental Representative. The Departmental Representative will have the authority to cause any part of the work to cease, should, in his or her opinion, there because to do so.
- .3 This work must be examined by the Departmental Representative and approval granted to resume when a satisfactory solution has been found out.

#### **1.28 LOCATION OF EQUIPMENT AND FIXTURES**

- .1 Locate equipment, and fixtures to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .2 Inform Departmental Representative of impending installation and obtain his/her approval for actual location.
- .3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

#### **1.29 EXISTING SERVICES**

- .1 Contractor will pay for any or all repairs to existing services that have been damaged due to the Contractor's negligence in the course of his work.
- .2 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

**END OF SECTION**

## **1.0 COMPLIANCE REQUIREMENTS**

### **1.1 STANDARDS, CODES AND LEGISLATIVE REQUIREMENTS:**

1. Comply with the Canada Labour Code Part II and the *Canada Occupational Health and Safety Regulations*.
2. All work is to be performed in accordance with the Federal *Environmental Protection Act* and the provincial environmental acts and regulations.
3. Comply with the Provincial Occupational Health and Safety Act and supporting Occupational General Safety Regulations, as amended from time to time.
4. Observe and enforce safety measures required by the following statutes and authorities:
  - .1 The National Building Code of Canada
  - .2 The National Fire Code of Canada.
  - .3 Provincial Workers Compensation Board.
  - .4 Municipal Statutes and Ordinances.
  - .5 Applicable CSA Standards
  - .6 Canadian Electrical Code
  - .7 Applicable Provincial Codes
5. In the event of a conflict between any of the above codes or standards, the most stringent shall apply.
6. These standards shall be considered an integral part of the specifications and shall be read in conjunction with the drawings and specifications. The contractor shall be fully familiar with their contents and requirements as related to the work and materials specified.
7. The Contractor and his/her personnel must adhere to the Federal Government "NO SMOKING" Policy and/or Scent Free Policy, if applicable, while in Federal facilities.
8. The Health and Safety of our Employees and Contractors are our main priority. Please follow the measures in place and abide by the rules laid out by both Public Health and Government of Canada when accessing our facilities. Your Departmental Representative will keep you informed on any updates that should be followed.
9. All sub-contractors shall adhere to the above qualifications.
10. It is the Contractor's responsibility to be familiar with all applicable Safety acts, regulations, codes and Standing Offer requirements.

### **1.2 LICENSES, PERMITS AND FEES**

1. It is the contractor's responsibility to provide all permits, compliance certificates and other applications be obtained for projects as specified by provincial / territorial / municipal authorities having jurisdiction.
2. Provide the authorities having jurisdiction with all information requested.
3. Pay all fees and obtain certificates and permits required.
4. Provide these certificates and permits when requested.

### **1.3 PRE-JOB MEETING / MEETINGS**

1. Attend meetings at site when notified by Public Works and Government Services Canada.
2. Pre-job meeting shall be scheduled within fourteen (14) days of Standing Offer award.

3. Minutes of the meeting, attendance and subject matters discussed will be recorded and maintained on file.

#### **1.4 PROJECT/SITE CONDITIONS**

SPEC NOTE: Obtain site information and pertinent hazard identification/environmental reports from PWGSC Project Mgr. in order to edit this article. List only those specific items having a likelihood of being encountered by Contractor during the Work.

SPEC NOTE: List in sub-article 1.1 below known hazardous liquids and controlled products used by tenants and stored on site within vicinity of work area(s).

SPEC NOTE: List in sub-article 1.2 below any designated substance, any hazardous substances or contaminated materials found on site. Examples: contaminated soil, hazardous waste, asbestos, PCB's, lead paint etc.

SPEC NOTE: List in sub-article 1.3 below known latent and environmental conditions at the Work Site which could create a safety hazard to Contractor's work operations and workforce. Examples: structurally unsound component or condition, known confined space, adjacent wildlife activity, high tides, etc. Note: Apparent or obvious hazards at the Work Site as well as potential H&S hazards created by Contractor's work operations and activities should not be listed in this article but rather left for Contractor to address in Contractor's hazard assessment of the Work.

SPEC NOTE: List in sub-article 1.4 below on-going tenant operations at the Facility which could be impacted by Contractor's work operations and affect health and safety of Facility personnel and the public. Examples: pedestrian and vehicular traffic adjacent to the Work, continued use of building entrances, corridors adjacent to the Work, etc.

1. Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
  - .1 Existing hazardous and controlled products stored on site:
    - .1 Refer to Hazardous Building Materials Assessment.
  2. Existing hazardous substances or contaminated [building] materials:
    - .1 Refer to Hazardous Building Materials Assessment.
  3. Known latent site and environmental conditions:
    - .1 Refer to Hazardous Building Materials Assessment.
  4. Facility on-going operations:
    - .1 The North Atlantic Fisheries Centre operates 8 a.m. – 5 p.m. daily and consists of office space and special purpose laboratory space.
2. Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.
3. Include above items in the hazard assessment of the Work.
4. MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

#### **1.5 SUBMITTALS**

##### **1. Hazard assessment**

1. Prior to begin work the contractor shall provide a comprehensive site-specific hazard assessment based on the maintenance worksite conditions and the method of work.

2. The Contractor shall perform site hazard assessments to establish site specific safe work practices/procedures for the safety and wellbeing of their employees. Copies shall be made available to the Departmental Representative upon request.
3. All copies of the formal hazard assessments conducted by the Contractor throughout the duration of the work shall be retained and made available to the Departmental Representative immediately upon request.
4. It is the contractor's obligation to ensure the safety of persons on the maintenance worksite and any persons adjacent to the worksite that may be affected by the work, as well as the protection of property.

## **2. Inspections**

1. It is the contractor's obligation to provide a written report of action taken to correct non-compliance where health and safety issues are identified.
2. Conduct regular inspections as per the requirements of the AHJ and the contractors OHS Program and keep records of inspections on file.
3. Provide all reports to DR and make available to CMHSA upon request.
4. It is the contractor's obligation to ensure that all directions, notices or orders issued by the appropriate provincial and territorial authorities or their authorized agents be posted at the site and complied with by all onsite staff, a copy must be submitted to the DR.

## **3. Investigations**

1. The contractor must ensure that any notification be provided to the appropriate provincial and territorial authorities in accordance with their requirements; DR and CMHSA are to be included.
2. All contractor-related hazardous occurrences at PWGSC-managed or -administered maintenance worksites must be investigated by the contractor as per applicable provincial and territorial regulations. The incident report is to be submitted to the DR to be included in the Standing Offer file with a copy sent to the CMHSA for their information and review.

## **4. Communication plan**

1. The contractor is responsible to ensure that all employees and sub-contractors are orientated in accordance with the provincial and federal regulations. At a minimum, but not limited to, they must be and made aware of Emergency Plans, Site Specific Safety Plans, Site Specific Hazards and Controls.
2. Regular safety meetings will be arranged as required and prescribed.
3. Records of meetings are to be maintained and made available upon request.

## **5. Emergency Plan**

1. The contractor must ensure that the emergency response plan aligns with the facilities emergency response plan.
2. The contractor must have, separate from the facility, resources necessary available to respond to emergencies arising under their scope of work.

## **6. WCB Letter**

1. Prior to award the contractor must submit a letter of good standing with the provincial WCB.

2. Signed statement by the Departmental Representative of company that the company, and any sub-contractor, will maintain Worker's Compensation Board coverage for the life of the Standing Offer Agreement (SOA).

#### **7. External Safety Audit**

1. Documentation indicating that the Contractor has successfully completed a recognized current (within the last 3 years) **EXTERNAL SAFETY AUDIT**. This audit to be performed by an independent company/person qualified to conduct safety audits.

#### **8. Proof of insurance**

1. Proof of Insurance must be submitted and maintained up to date for the duration of the SOA / SC.

#### **9. OHS Policies / Program**

1. The Contractor shall provide a copy of their company's occupational health and safety policy and program. It shall meet the requirements of the provincial occupational health and safety acts. The Departmental Representative shall advise the Contractor where the federal standards apply.

#### **10. SWP**

1. It is the Contractor's responsibility to be familiar with all applicable Safety acts, regulations, codes and Standing Offer requirements. These must be identified and addressed in the Safety Plan, by identifying Standard Operating Procedures (SOP) and safe work practices (SWP) that incorporate clear and specific control measures, applicable rules, procedures and practices, all of which shall become mandatory.
2. The Contractor shall perform site hazard assessments to establish site specific safe work practices/procedures for the safety and wellbeing of their employees. Copies shall be made available to the Departmental Representative upon request.

#### **11. Hazard Identification, Assessment And Control Plan (HIACP)**

1. Following an assessment of the hazards specific to a maintenance worksite, as identified in the maintenance specifications, tender and Standing Offer documents and their proposed method of work, the contractor must develop a hazard identification, assessment and control plan (HIACP) that documents the controls the contractor will employ to manage all of the identified hazards. The HIACP must also include specific procedures to be implemented during emergency situations.
2. Submit within five workdays of notification of Bid Acceptance. Allow for 5-10 days for Department review and recommendations prior to the commencement of work.
3. Departmental Representative will review Hazard Identification, Assessment and Control Plan and provide comments.
4. Revise the Plan as appropriate and resubmit within five workdays after receipt of comments.
5. Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.
6. Submit revisions and updates made to the Plan during the course of Work.

7. Post the HIACP Plan at a common location on the site visible to all workers and persons accessing the site. Ensure that all employees, including sub-contractors' personnel, are advised of such Safety Plan and of the posted location.
8. The Contractor shall ensure all workers and authorized persons entering the work site are notified of and abide by the posted Safety Plan, safety rules, procedures, safe work practices and applicable safety acts, regulations and codes. Any person in noncompliance shall be subject to disciplinary procedures.
9. The Contractor shall ensure that all applicable personal protective equipment (PPE) is used

## 12. Training

1. Before Work Begins Contractors are to provide documentation:
  - .1 Certification of training for safety for all personnel that will be involved with the Standing Offer Agreement. Updated list complete with licenses shall be kept on site including personnel changes.
  - .2 Training for workers shall include (but not be limited to)
    - i. Safe operation of tools and equipment.
    - ii. Proper use and maintenance of personal protective equipment (PPE).
    - iii. Safe work practices and procedures for their given work tasks or function.
    - iv. Site conditions and minimum site safety rules. (HICAP)
2. Documentation and records must be maintained and made available immediately upon request.
3. Training to be kept up to date for the duration of SOA.

### 1.6 DISCIPLINARY PROCEDURES FOR SAFETY VIOLATIONS

1. Contractors shall have their own written disciplinary procedures for violation of or non-compliance with work site safety rules and regulations.
2. Contractor shall immediately address, correct and report any health and safety violations and non-compliance issues.
3. The Crown retains the right to stop the contractor's work, without penalty to the Crown, if the contractor does not comply with the applicable provincial and territorial OHS legislation, as well as all contractual requirements, or if the contractor creates an unacceptable health and safety hazard.
4. Disciplinary Procedures applied by the PWGSC Departmental Representative for non-compliance and safety violations shall be as follows:
  - .1 **First Violation:** Verbal warning issued to the Contractor for the first violation of safety regulations, rules, policies and procedures. (Violation will be documented on Standing Offer file, with copy to Contractor and PWGSC.)
  - .2 **Second Violation:** Written warning to Contractor for second violation of safety regulations, rules, policies and procedures. (Violation will be documented on Standing Offer file, with copy to Contractor and PWGSC.)
  - .3 **Third Violation:** A third violation of safety regulations, rules, policies and procedures may result in the termination of the Standing Offer with a recommendation to the Contracting Authority that the Contractor be denied access to future SOA/SC(s). (Documented to contract file, with copies to Contractor and PWGSC.)

- .4 Serious Violation:** For a serious violation of a safety regulations, rules, policies and procedures as deemed by a Regulator, Project Manager or Safety Officer a recommendation will be made to the Contracting Authority to immediately terminate the SOA. (Violation documented on contract file, with copies to Contractor and PWGSC).
  
- .5 Charges Laid or Guilty Determination by Courts:** Infractions of safety regulations, rules, policies and procedures that result in charges being laid by a Regulator against the Contractor or the Contractor being found guilty by the courts may result in that Contractor being denied access to future contracts.

#### **1.7 SEPARATION OF MAINTENANCE ACTIVITIES FROM STAFF**

1. Where it is not possible to relocate staff to a suitable space away from the planned maintenance activities, then the bidders must be made aware in the maintenance specifications, tender and Standing Offer documents of this fact and that their maintenance worksite may also be subject to the provisions of the Canada Labor Code. This means that the affected Workplace Health and Safety Committee (WHSC) / Workplace Health and Safety Representative (WHSR) must be made aware of the activity. In such cases it is mandatory that an invitation be sent to the WHSC/WHSR to attend the maintenance activity start-up meeting.
  
2. In this meeting the contractor must clearly define its maintenance worksite, identify the methods to be used to protect nearby staff and control access to those areas adjacent to the worksite by the contractor's employees and subcontractors. The contractor should also identify any staff that will have to be moved while work is being performed in their workplace.

## **1 General**

### **1.1 GENERAL**

- .1 This section covers items common to all sections of Divisions 26.

### **1.2 CODES AND STANDARDS**

- .1 As a minimum standard perform all work in accordance with the requirements of the Canadian Electrical Code C22.1 (most recent version) Part 1, CSA Standards CAN Z32.4 and CAN Z32.2, National Building Code, and ULC-S524, most recent version of. These standards together with all local or municipal rules, regulations, and ordinances shall be considered as the latest approved editions at the time of tender closing. In no instance, shall the standard established in these Standing Offer documents, be reduced by any codes.
- .2 Abbreviations for electrical terms: to CSA Z85.
- .3 Comply with CAN/CSA C860-11 (R16) standard for exit signs.
- .4 Comply with CSA Certification Standards and Electrical Bulletins in force at the time of work.

### **1.3 INSPECTIONS, PERMITS AND FEES**

- .1 Obtain all inspections and permits required by all laws, ordinances, rules and regulations by the public authority having jurisdiction at the place of this building for work of this Standing Offer and obtain certificates of such inspections and submit same and pay all charges in connection therewith. The final certificate of inspection shall be obtained before final payment for work shall be considered due.

### **1.4 CARE, OPERATION AND START UP**

- .1 Instruct operating personnel in the operation, care and maintenance of the equipment.
- .2 Arrange and pay for services of the manufacturer's service engineer to supervise start-up and to check, adjust, balance and calibrate components.
- .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.

### **1.5 VOLTAGE RATINGS**

- .1 Operating voltages to meet requirements of CAN3-C235.
- .2 Motors, control and distribution equipment to operate satisfactorily at 60 Hz within normal operating limits established by the above standard. Equipment to operate in extreme operating conditions established in the above standard without damage to the equipment.

### **1.6 MATERIAL AND EQUIPMENT**

- .1 Equipment and materials to be C.S.A. certified and manufactured to standard quoted.
- .2 Where there is no alternative to supplying equipment, which is not C.S.A. certified, obtain special approval from C.S.A.
- .3 Factory assemble control panels and component assemblies.
- .4 For the purposes of uniformity similar materials shall be of one manufacturer (i.e., all panels; all motor control equipment; all fixtures in as much as is possible, etc.).
- .5 Equipment and materials to be new, CSA certified and manufactured to standard quoted.

- .6 Use products of one manufacturer or same type as existing, including classification, unless otherwise specified.
- .7 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .8 Deliver, store and maintain materials with manufacturer's seals and labels intact.
- .9 Store materials in accordance with manufacturer's and supplier's instructions.
- .10 Do not store materials on-site without Departmental Representative's approval.
- .11 Public Services and Procurement Canada accepts no responsibility for materials or equipment stored on-site.
- .12 When an equipment inventory numbering system exists, identify to the appropriate Departmental contact all pertinent data relative to the new piece of equipment upon installation.
- .13 Where the Contractor supplies equipment purchased from a supplier or manufacturer, the Contractor shall obtain from the manufacturer or supplier, a warranty for the manufacturer's normal warranty period and such warranty shall be made out to Her Majesty the Queen in right of Canada.

## **1.7 GROUNDING**

- .1 All equipment and exposed non-current carrying metal, conduits and parts shall be permanently and effectively bonded to ground to meet minimum requirements of the C.E.C. Section 10, and as indicated on the drawings and further specified. Standards set either by drawings or specifications which are above those covered by C.E.C. Section 10, shall not be reduced under any circumstances.

## **1.8 ELECTRIC MOTOR, EQUIPMENT AND CONTROLS**

- .1 Provide final connections to all motors, equipment, controls, etc., indicated on the drawings. These motors, equipment, controls, etc., shall include those supplied under other sections of this specification, as well as Owner supplied items. Ensure that equipment will operate properly (e.g., proper rotation) and report any instance of defective equipment to the Departmental Representative.

## **1.9 FINISHES**

- .1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, 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 EEMAC Y1-1-1955.
  - .2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean, prime and paint exposed hangers, racks, and fastenings to prevent rusting.
- .4 Where wire guards are required in other sections, they are to be constructed of stainless steel. Painted steel is not acceptable.

## **1.10 EQUIPMENT IDENTIFICATION**

- .1 All, motor control centers, starters, disconnect switches, receptacles, voice/data/CATV/multimedia outlets, control transformers, pushbuttons, timeclocks, control panels, etc., shall have "Lamacoid" nameplates mounted on or adjacent for identification which shall include the panel designation, voltage, phase, wires overcurrent protection, H.P., KW and

amperage as applicable. The nameplates shall be affixed to metal equipment with metal type pop rivets, and to all other equipment with contact type cement applied to the entire nameplate backing. Contact type cement shall be applied (buttered) to complete rear side of plate, as opposed to several points or locations on same.

- .2 Panel directories are to be brought up to date with each new circuit change or installation. Install directories on the back of each door of panel boards, neatly arranged and mounted in frame under transparent cover. Directories shall be typed and shall show system voltage, which outlets are on each circuit and any special information, such as sizes of fuses, etc., necessary for the proper operation and maintenance of the system.
- .3 All sectionalizing panels shall have lamacoid plates affixed adjacent to each breaker.
- .4 Size of identification shall be suitable for equipment and importance of information.
- .5 All fused disconnect switches shall have lamacoid plates identifying the equipment they feed and a separate plate indicating maximum fuse size and type.
- .6 Lettering shall be of sufficient size to be readable from normal viewing distance and the information required on the nameplates shall dictate the physical size of plates.
- .7 Nameplates shall have white lettering on black background except for equipment connected to emergency power source, which shall have white lettering on red background.
- .8 All transformers to have lamacoid plates identifying source of primary feeder and secondary equipment which it feeds plus distribution designation lettering and/or numbers.
- .9 All new circuits to be numbered at breakers, junction boxes and wiring devices.
- .10 All "D" and "E" boxes 200mm x 200mm x 100mm or larger and "C" and "T" cabinets shall have lamacoid plates affixed indicating voltages and/or systems housed within.
- .11 Nameplates:
  - .1 Lamicoid 3mm thick plastic engraving sheet on metal surfaces, 1.5mm where not applied to metals.

**NAMEPLATE SIZES**

Size 1	10mm x 50mm	1 line	5mm high letters
Size 2	13mm x 75mm	1 line	6mm high letters
Size 3	16mm x 75mm	2 lines	5mm high letters
Size 4	19mm x 91mm	1 line	10mm high letters
Size 5	38mm x 91mm	2 lines	12mm high letters
Size 6	25mm x 100mm	1 line	12mm high letters
Size 7	25mm x 100mm	2 lines	6mm high letters
Size 8	50mm x 150mm	2 lines	12mm high letters

- .12 Labels:
  - .1 Embossed plastic labels with 6.5mm high letters unless specified otherwise.
- .13 Wording on nameplates and labels to be approved by the Departmental Representative prior to manufacture.
- .14 Allow for average of forty (40) letters per nameplate and label.
- .15 Identification to be English.

**1.11 WIRING IDENTIFICATION**

- .1 Conductor insulation shall be color coded as follows:

Phase A	-	Red
Phase B	-	Black
Phase C	-	Blue
Neutral	-	White/Grey
Ground /Bond	-	Green
Isolated Ground	-	Green w/Yellow stripe

This shall apply to all phase conductors up to and including #2AWG and all sizes of neutral, bond and ground conductors up to and including #3/0AWG.

- .2 For conductors exceeding sizes as described above, identification of wiring with approved colored plastic tapes shall be acceptable. Attach to both ends of all conductor runs a minimum of 12" from terminations, and in all junction and/or pull boxes.
- .3 Maintain phase sequence and color coding throughout.
- .4 Color code shall be as per Section 26 05 21 2.1.1.
- .5 Use color coded wires in branch circuit wiring, systems wiring and communication cables.
- .6 Include **panel number and circuit number** on each conductor.

#### 1.12 CONDUIT, CABLE AND JUNCTION/PULLBOX IDENTIFICATION

- .1 Identify all conduit fittings and junction/pull boxes along with their covers with colors as described below. Boxes shall be colored both inside and out where one color is required, and inside only where two are required. Metal cover plates shall be completely painted where one color is required and shall have both colors applied diagonally where two colors are required. All junction boxes shall be color identified prior to installation.
- .2 

System	Color
120/208V Lighting & Power	Yellow
347/600V Lighting & Power	Orange
Telephone (voice only)	Black
Grounding/bond	Green
Fire Alarm	Red
Security	Brown
0 to 50V	Violet
CATV	Yellow/White
Data only	Black/White
Voice & Data	Blue/White
Energy Management	Red/White

#### 1.13 WIRING TERMINATION

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.

#### 1.14 MANUFACTURERS' AND CSA LABELS

- .1 Manufacturers' and CSA labels shall be visible and legible after equipment is installed.

#### 1.15 WARNING SIGNS

- .1 Provide warning signs, as specified and/or to meet the requirements of the Department of Labour Inspection Department.
- .2 Use decal signs, minimum 175mm x 250mm size.

### 1.16 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150mm horizontal clearance between boxes.
- .2 Locate light switches on latch side of doors and safety switches in mechanical rooms on latch side of door where possible.
- .3 Coordinate on site the location of outlets with respect to counters, heating cabinets, etc., before work is to start.
- .4 All outlets to have brushed stainless steel cover plates regardless of the system involved, includes light switches, receptacles, communication outlets and etc.

### 1.17 MOUNTING HEIGHTS

- .1 Mounting heights of equipment is from finished floor to center line of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not indicated verify before proceeding with installation.
- .3 Install electrical equipment at the following heights unless indicated otherwise.
  - .1 Local switches, to switch: 1220mm Wal Wall
  - .2 receptacles:
    - .1 General: 457mm
    - .2 Above top of continuous baseboard 200mm
    - .3 Above counters or splash back: 1067mm
    - .4 In mechanical rooms: 1200mm
  - .3 Panelboards: as required by code or as indicated
  - .4 Data/Telephone outlets: 457mm
  - .5 End of line resistor: 2100mm
  - .6 Motor starters, disconnect, etc.: 1500mm
  - .7 Luminaires: as indicated on drawings
  - .8 Fire alarms pull stations: 1200mm
  - .9 Fire alarm bells: 2100mm
  - .10 Unit emergency lighting equipment: 2100mm

### 1.18 PROTECTION

- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark live parts "LIVE 120 VOLTS" or with appropriate voltage in English.
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

### 1.19 LOAD BALANCE

- .1 Balance all phase currents of transformers, main switchboard, distribution Panel boards, etc., and where applicable, adjust transformer taps to obtain within 2% of the rated voltage of the load being supplied. Adjust and/or increase conductor size so as to limit voltage drops to 3% and make such adjustments under average load conditions in presence of Departmental Representative.
- .2 Submit to Departmental Representative, at completion of work, a report listing the voltage, phase and neutral currents on the switchboard, Panel boards and dry-type transformers, operating under normal load. On the report, also state hour and date on which each load was measured

### 1.20 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete shall be constructed of sheet metal, sized for free passage of conduit, and protruding 50mm.
- .2 Install cables, conduits, and fittings to be embedded neatly and close to building structure so furring can be kept to minimum.

### **1.21 FIRESTOPPING AND SMOKE SEALS**

- .1 All fire stopping and smoke seals required to properly accommodate the work of this Division shall be the financial responsibility of Division 26 and carried out by trades to the applicable ULC approved system of one of the approved Manufacturers provided in this document. Trade's personnel must be trained by the manufacturer and provide documentation stating same.

### **1.22 TESTS**

- .1 Conduct and pay for tests of the following:
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.
  - .3 Lighting and its controls.
  - .4 Motors and associated control equipment including sequenced operation of systems where applicable.
  - .5 Polarity check on receptacles.
  - .6 Structured cabling system.
  - .7 Fire Alarm system.
  - .8 Security System
  - .9 Emergency Lighting System
  - .10 Exit Signage
  - .11 Access Control System
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturers' instructions.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .4 The Departmental Representative reserves the right to use any piece of electrical equipment, device, or material installed under this Standing Offer for such reasonable lengths of time and at such times as he/she may require, to make a complete and thorough test of the same, before the final completion and acceptance of the work.
- .5 Such tests shall not be construed as acceptance of any part of the work.
- .6 Submit test results for Departmental Representative's review.

### **1.23 INSULATION RESISTANCE TESTING**

- .1 Test all wiring, included in the work to ensure that there are no shorts and/or grounds are present on phase conductors for feeders or branch circuits and that insulation values are as required by the Canadian Electrical Code.
- .2 All testing of conductors to be done prior to energization of conductors with 600 volt and 1000 volt meggers as required by the Canadian Electrical Code.
- .3 Capacitive leakage testing of all phases and neutral feeder conductors at various system originating points, are to be recorded for each individual feeder with test results to be submitted to Departmental Representative for approval.
- .4 Systems to be tested for capacitive leakage are as follows: 120/208V/3PH/4W, 347/600V/3PH/4W.

- .5 Check resistance to ground before energizing. Ensure resistance to ground is not less than 50 megohms.
- .6 Submit test results for Departmental Representative's review. Test results shall include time of test, feeder tested, and instrument readings.

#### **1.24 COORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure circuit protective devices such as over-current trips, relays, fuses, are installed to values and settings as indicated.

#### **1.25 SUPERVISION**

- .1 Provide supervision and sufficiently qualified foreman for work of this Standing Offer to ensure that the work proceeds in proper and efficient manner to its completion. If in the opinion of the Departmental Representative, such personnel are not competent to carry out the work, replace these men immediately upon written request of the Departmental Representative.

#### **1.26 JOURNEYMAN ELECTRICIAN**

- .1 The journeyman electrician shall:
  - .1 Carry out and assist in various types of building electrical maintenance as requested by Public Services and Procurement Canada. Maintenance types defined in Section 1, Paragraph 8, Service Definitions.
  - .2 Relocate, install or repair electrical equipment, such as, but not limited to, lighting fixtures, receptacles, relays, pac poles, wiring runs, panels, breakers, portable equipment, or any other electrical requirements requested by Public Services and Procurement Canada, such as, testing, calibrating, programming or electrical measurements.
  - .3 Inform the Departmental Representative of any "phase unbalance" (voltage or current) produced by new or additional equipment in a new or existing system. Carry out adjustments and record results.
  - .4 Produce all certificates and permits upon request of the Departmental Representative.
  - .5 Instruct the Departmental Representative on-site of any new operating procedures when installing or modifying new or existing equipment.
  - .6 Shall immediately inform the Departmental Representative of any unsafe situations or conditions related to the work site.
- .2 Distribution conduits entering or exiting the equipment enclosures equipped with sprinkler hoods shall be installed with rain tight EMT connectors equipped with O-rings.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 CSA C22.2 No. 18 - Metallic Outlet Boxes.
- .2 CSA C22.2 No. 65 Wire Connectors.

## **2 Products**

### **2.1 MATERIALS**

- .1 All connections shall be made electrically and mechanically secure. Sizes of connectors shall be according to manufacturer's recommendations for each size and combination of wires.
- .2 Joints required in branch wiring #10 AWG and smaller shall be made using fixture twist-on type connectors with current carrying parts made of copper.
  - .1 Standard of Acceptance: Marrette #31, #33 or #35 as required.
- .3 Joints for wiring #8 AWG and larger shall be made using pressure type color keyed compression connectors with current carrying parts made of copper using compression tools. A first layer of tape shall be compound type followed by a layer of Scotch #3 vinyl type.
  - .1 Standard of Acceptance: 54000 series.
- .4 Bushing stud connectors are not acceptable.
- .5 Clamps or connectors for armored cable and flexible conduit as required.

## **3 Execution**

### **3.1 INSTALLATION**

- .1 Remove insulation carefully from ends of conductors and:
  - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No. 65.
  - .2 Install fixture type connectors and tighten with pliers or appropriate tool. Finger-tightening alone is not acceptable. Replace insulating cap.
- .2 All connections shall be made electrically and mechanically secure. Sizes of connectors shall be according to manufacturer's recommendations for each wire size and combination of wires. Twist wires together before installing connectors. All stranded conductors shall be twisted together prior to connection around terminal.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 CSA C22.2 No. 38 - Thermoset insulated Wires and Cables.
- .2 Wire and cable shall conform to the latest specification of the Canadian Standards Association (CSA), Electrical and Electronic Manufacturers Association of Canada (EEMAC), the Insulated Power Cable Engineers Association (IPCEA), and the American Society of Testing Materials (ASTM).

## **2 Products**

### **1.1 BUILDING WIRES**

- .1 Conductors: Copper, soft drawn stranded, at least 98% conductivity for #12 AWG and larger. Minimum size conductors for branch circuit wiring shall be #12 AWG. Insulation shall be chemically cross-linked thermosetting polyethylene rated 600 volts on all RW90 conductors and 1000 volts for RWU-90 for incoming service. Size as indicated on drawings and schedules. Conductor insulation shall be color coded as follows:

Phase A	-	Red
Phase B	-	Black
Phase C	-	Blue
Neutral	-	White/Grey
Ground /Bond	-	Green
Isolated Ground	-	Green w/Yellow stripe
Isolated Power	-	as indicated hereinafter.

Where extra colors are required for three-way switches, etc., they shall be yellow.

Approved color-coded tape is acceptable for color coding phase conductors #1 AWG and larger and for neutral and ground conductors #4/0 and larger.

Neutral conductors for feeders to branch panels feeding computerized equipment shall be sized at 200%.

### **1.2 CONTROL CABLES**

- .1 600 V Type: 2 stranded copper conductors, 95% conductivity, full size AWG gauge, sizes as indicated with PVC insulation Type TW with shielding of magnetic tape wire braid over each pair of conductors and overall covering of thermoplastic jacket. Color code shall be yellow.

### **1.3 SYSTEM WIRING**

- .1 Wiring for auxiliary systems will be as indicated in specification or on drawings and/or as recommended by Manufacturer of the system.

## **3 Execution**

### **1.1 INSTALLATION OF BUILDING WIRES**

- .1 Install all building wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34.
  - .2 BX cable is not acceptable.

### **1.2 INSTALLATION OF CONTROL CABLES**

- .1 Install control cables in EMT conduit complete with all associated steel connectors and couplings where run on surfaces of walls or open ceilings. Conduits shall be extended to within 760mm of all devices associated with the piece of equipment which they control. Final connection shall be made using liquid-tight flexible metal conduit and associated liquid-tight connectors.
- .2 EMT type conduit wall-stub c/w flush installed device box shall be located in all partitions to accommodate wiring between the device and the accessible ceiling space.
- .3 EMT connectors complete with nylon insulated throat or threaded type bushing shall be installed on end of EMT stubs where they protrude through the wall above, and within finished accessible ceilings. CSA approved EMT plastic end cap bushings may also be used.
- .4 All EMT conduit stubs shall be bonded to ground as required by CEC.
- .5 Control cable shields, if applicable, shall be bonded to ground.

### 1.3 INSTALLATION – GENERAL

- .1 Where pulling wires and cables, the use of an approved lubricant only will be permitted. No wires or cables shall be pulled in conduits until such conduits are free from moisture and in no case shall wires be pulled until approval of the Departmental Representative is obtained.
- .2 All stranded conductors prior to terminating under device bolts such as circuit breakers, light switches, receptacles, etc., to be twisted together to form a single conductor to ensure a reliable mechanical connection.
- .3 All branch circuits are to utilize conduit pathways for home runs to each room or area, including rooms in which the panel is located. The home run conduit shall be continued until the final room destination splice or drop off is reached.
- .4 No splices allowed inside panelboards (distribution, power and lighting).
- .5 "Labelling" of all branch circuit wiring including phase conductors, neutrals, grounding and/or bonding conductors to be done on **both ends** of all circuit wires plus in any junction and/or pull boxes located in between using "Panduit" write-on, self-laminating labels Nos. PDL-1 and PDL-2 as required.
- .6 The following wiring methods are designed to enhance the ability to perform capacitive leakage tests:
  - .1 All circuit conductors are to be individually tie wrapped to their corresponding labelled neutral conductor in all panelboards, pull boxes and junction boxes. Enough slack conductor length should be left to enable the ability to clamp the ground detector around the individually tie-wrapped circuit conductor and its corresponding labelled neutral. This wiring method is to be neat and of good workmanship quality.
  - .2 The tie wrapping of the neutral with its respective phase conductors is to be made at the closest point of entry into panelboards, pull boxes and junction boxes.
  - .3 The main switchboard, CDP's, panelboards, MCC's etc., are to have their respective feeder phase and neutral conductors tie-wrapped together and enough slack conductor length to enable the ability to clamp the ground detector around each set of feeders. This wiring method is to be neat and of good workmanship quality.
- .7 After all electrical wiring has been completed by the Electrical Contractor, is to test the grounded electrical distribution system to ensure there are not ground shorts and capacitive leakage in the system.
- .8 All feeders or branch circuits which do not have neutral conductors are to have their respective phase conductors tie-wrapped together in accordance with the methods described previously.

- .9 Run all circuits so that the voltage drop in no case exceeds 3% of the line volts. The neutral wire, wherever it is run, shall be continuous with no fuses, switches, or breaks of any kind.
- .10 For 15-amp, 120-volt circuits the following table shall be used to determine the minimum conductor sizes required to compensate for voltage drop.
- .11 Find below the branch circuit maximum lengths (120-volt one way length from panelboard to load including vertical drops. Voltage drop shall not exceed 3% in any instance.
  - .1 From 0.3m to 24m #12 Wire
  - .2 From 24m to 37m #10 Wire
  - .3 From 37m to 55m #8 Wire
- .12 Increased wire sizes where required shall not be decreased in size in any portion of length of run between panelboard and the wiring device itself.
- .13 All wiring shall be color coded as per Code requirements and/or as specified herein.

**END OF SECTION**

## **1 Products**

### **1.1 SUPPORT DEVICES**

- .1 U shape, size 41mm x 41mm, 2.5mm thick, surface mounted or suspended as required.
- .2 Supply and install all necessary inserts, rods, channels, brackets, etc., to form a support system capable of carrying at least twice the weight of the equipment supported.
- .3 In concrete, use cast-in threaded inserts wherever possible. Should additional inserts be required use a "red head" type of insert capable of carrying at least 45 kgs.
- .4 All hanger rods shall be 10mm diameter continuous threaded rod cut to required lengths. Cut off excess to within 13mm of bottom of channel.
- .5 All conduits not installed on Unistrut or approved equal type support channels to be supported as follows:
  - .1 13mm up to and including 35mm conduits - one hole steel straps.
  - .2 41mm and larger sizes - two-hole steel straps.
- .6 All suspended conduit runs containing horizontal or vertical elbows shall have one additional support rod installed at not more than 300mm from midpoint of all 90-degree bends.
- .7 Beam clamps to secure conduit to exposed steel work.
- .8 In no case will the use of tie-wraps for supporting purposes be acceptable unless explicitly approved for the purpose, such as for securing wiring in-place.
- .9 All trays, wireways, and multiple conduits, shall be supported by a steel channel support system with all components, hangers, wall supports, cable clamps, etc., specifically manufactured and approved for their application.
- .10 Fastening devices for cabinets, boxes, supports, etc., shall be nut and bolt, ramset, expansion shields, wedge anchors, or toggle bolts, size and number to suit the application. Toggle bolts shall not be used in gypsum wallboard construction.
- .11 Fastening devices for outlet boxes shall be nut and bolt, ramset, expansion shields, wedge anchors or caddy clips, size and number to suit the application or as detailed on the drawings.
- .12 Suspended outlet, pull, and junction boxes shall be supported with minimum 10mm threaded rod, nuts and flat washers. Threaded rods shall be secured to boxes with one flat washer and nut installed on both sides of box. Threaded rods shall be installed as follows:
  - .1 One rod required for all types of boxes sized 150mmx150mm and smaller.
  - .2 Two rods required for all types of boxes sized larger than 150mmx150mm up to and including 300mmx300mm.
  - .3 Minimum of four rods required for all boxes larger than 300mmx300mm.

## **2 Execution**

### **1.1 INSTALLATION**

- .1 Secure equipment to hollow or solid masonry tile and plaster surfaces with lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry wall, 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 Suspended support systems.
  - .1 Support individual cable or conduit runs with 10mm dia threaded rods and spring clips.
  - .2 Support 2 or more cables or conduits on channels supported by 10mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .7 For surface mounting of two or more conduits use channels at 1.5m on center spacing.
- .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.
- .13 Coordinate the location of any insert to miss concrete reinforcement and obtain approval of Departmental Representative prior to installing.
- .14 Secure all equipment in a manner so as not to distort or cause undue stress on any components.
- .15 Support of any equipment shall not rely on the strength of plaster or gypsum board construction.

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 Materials to new, CSA certified, and manufactured to standard quoted, where applicable.
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
  - .2 CSA C22.2 No. 45, Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83, Electrical Metallic Tubing.

## **2 Products**

### **1.1 CONDUITS**

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded, size as indicated.
- .2 Flexible metal conduit and liquid-tight flexible metal conduit: to CSA C22.2 No. 56.
- .3 Thin wall type electrical metallic tubing "EMT" with steel set screw couplings, galvanized, size as indicated.
- .4 BX cable and PVC conduit are not acceptable.

### **1.2 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 in all directions.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

### **1.3 FISHCORD**

- .1 6.5 mm standard nylon pull rope with tensile strength of 5 kN.

## **3 Execution**

### **1.1 INSTALLATION**

- .1 All EMT and flexible conduit to have #14 insulated green ground wire minimum.
- .2 Install separate ground wire in EMT.
- .3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .4 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- .5 Use epoxy coated conduit in underground or in corrosive areas.
- .6 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury.

- .7 Use rain-tight connectors and couplings where vertical portion of EMT conduit runs terminate into the top of electrical equipment incorporating drip shields or hoods.
- .8 Flexible conduit and #12 RW90 conductors to be installed as fixture drops from junction boxes. No BX cable allowed. Use 1/2" flex for lengths over 1.5 meters.
- .9 Flexible metal conduit runs shall not exceed 1.5 meters.
- .10 Use flexible metal conduit for connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures and work in movable metal partitions.
- .11 Use liquid tight flexible metal conduit (minimum 3/8" internal diameter) for connection to motors or vibrating equipment in all locations, including controls and related devices.
- .12 Install conduit sealing fittings in hazardous areas. Fill with compound.
- .13 Minimum conduit size for lighting and power circuits: 19 mm.
- .14 Install EMT conduit from branch circuit panel to outlet boxes located in sub floor.
- .15 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10<sup>th</sup> of its original diameter.
- .16 Mechanically bend steel conduit over 19 mm diameter.
- .17 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .18 Install fish cord in empty conduits.
- .19 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .20 Dry conduits out before installing wire.

## 1.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with minimum 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.

END OF SECTION

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 CSA C22.2 No. 5 – Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.

## **2 Products**

### **2.1 BREAKERS GENERAL**

- .1 Bolt-on moulded case circuit breaker, quick-make, quick-break type, de-ionizing arc chambers for manual and automatic operation with temperature compensation for 40 degree C ambient. Breakers to be trip-free of operating handles on overloads with a definite indication when tripping has taken place.
- .2 Mini type circuit breakers are not acceptable.
- .3 Multi-pole breakers shall have common trip mechanisms; tie handles are not acceptable.
- .4 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting. Trip settings on breakers with adjustable trips to range from 10 to 12 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.
- .6 Minimum acceptable circuit breaker interrupting rating shall be 14,000 RMS symmetrical amperes or to match existing.

### **2.2 BREAKER TYPE GROUND FAULT INTERRUPTER**

- .1 Ground fault protection where required by circuit breakers in branch circuit panelboards shall be CSA listed as Class "A", Group "1", with a sensitivity of 5 milliamps or greater. Breakers shall be of the thermal magnetic type incorporating a solid-state ground fault sensing circuit and push to test push button. Breakers shall be of the bolt on design, and interchangeable with other panelboard breakers. Interrupting capacity shall be 22,000 RMS symmetrical amperes or to match existing.

### **2.3 MANUFACTURERS**

- .1 Breaker manufacturer shall match that of panel in which they are installed.

## **3 Execution**

### **3.1 INSTALLATION**

- .1 Circuit breakers shall be securely mounted in switchboards, panelboards, or EEMAC one (1) enclosures as indicated on the drawings and as required by other sections of the specifications.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCE STANDARDS**

- .1 ANSI C82.-SSL1-20XX – Solid state lighting power, supplies and drivers
- .2 CSA C22.2 No. 8 - Radio interference suppressor. Electromagnetic Interference (EMI) Fitters.
- .3 CSA C22.2 No. 250.13 - Light emitting diode (LED) equipment for lighting applications

### **1.2 GUARANTEE**

- .1 Replace:
  - .1 LED drivers that fail within 5 years of replacement.

## **2 Products**

### **2.1 LUMINAIRE DETAILS**

- .1 Provide supporting devices, surface mounted junction boxes and outlet boxes where required.
- .2 LED light fixtures shall be Reduction of Hazardous Substances (RoHS)-compliant.
- .3 LED modules shall comply with IES LM-80 at 50,000 hours.
- .4 Minimum CRI of 80 and color temperature of 3500k unless existing fixtures in the same room are different – then match the existing fixtures.
- .5 Lenses or diffusers shall be of glass or acrylic material, as indicated.
- .6 Include finishes to Section 26 05 00 and as indicated.
- .7 Provide gasketing, stops and barriers to form light traps to prevent light leaks.

### **2.2 LUMINAIRE SUPPORTS**

- .1 Provide supports for suspended fixtures as recommended by manufacturer
- .2 Additional T-Bar grid supports that may be required for light fixtures installed in, or secured to, T-Bar type ceilings, shall be identified accordingly to the applicable ceiling contractor, who in turn will be responsible for supplying and installing additional hangers as may be required.
- .3 The installation of any additional T-Bar grid ceiling support wires is the sole responsibility of the ceiling installation contractor.
- .4 Independent supporting of light fixtures in T-Bar grid ceilings utilizing materials other than tie-wires, i.e., threaded rods, metal channels, etc., are the sole responsibility of the electrical contractor.

## **3 Execution**

### **3.1 INSTALLATION**

- .1 This work shall include the supplying and installation and connection of all lighting units and allied equipment as specified hereinafter as well as the receiving, storing and testing of same.
- .2 Catalogue references numbers given for individual fixtures may not necessarily be correct but are intended as a guide when read with the description and may not agree with the type of fixture

finally supplied; therefore, the catalogue reference shall be verified with the description and coordinated with the installation conditions with particular regard to ceiling construction details, type and finish before ordering the fixtures.

- .3 Recessed fixtures shall have trim and frame details to match the ceiling suspension system.

### **3.2 WIRING**

- .1 Recessed, surface and/or suspended fixtures shall not be wired in a daisy-chain manner, nor have their power sources looped between fixtures unless they are installed end-to-end.
- .2 Each luminaire shall be complete with its own separate fixture drop originating from a junction box located within the same ceiling space as the luminaire. An exception shall be made for recessed downlights, which may be wired from one fixture to another, provided they have integral junction boxes and the luminaire access opening is 150mm or greater in diameter.

### **3.3 RECESSED DOWNLIGHTS**

- .1 Non-Accessible Ceilings: If the luminaire opening is less than 150mm in diameter, a separate fixture drop shall be provided. Fixture drops shall be run to an accessible junction box above an accessible ceiling or an access panel. Fixture drops shall not exceed 4.5m in length.
- .2 Accessible ceilings: Fixtures are to be securely fastened to the T-bar ceiling. No part of the fixture is to derive support from the T-bar ceiling tiles.

### **3.4 FIXTURE ALIGNMENT**

- .1 Align fixtures mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

### **3.5 FIXTURE SUPPORTS**

- .1 Provide luminaire supports required to mount fixtures as specified.
- .2 Hang all light fixtures in such a manner that their attachment to the ceiling shall be secure in all respects.
- .3 Fixtures shall not be hung directly from suspended gypsum board ceilings but shall derive their support from channels independently mounted in the ceiling space.
- .4 Generally, wire hangers shall be used to adequately secure and support the fixtures; these shall be provided and installed under work of this Standing Offer.

### **3.6 DEFECTIVE OR DAMAGED FIXTURES**

- .1 Check fixtures and replace all defective lamps, ballasts and accessories on any fixtures that have been damaged or scratched during construction.
- .2 Replace lamps that have burned out as per paragraph 1.5 of this section.

### **3.7 TESTS**

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

**END OF SECTION**