## Part 1 General

### 1.1 GENERAL

.1 This Section covers items common to Sections of Division 26.

### 1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Comply with all laws, ordinances, rules, regulations, codes, and orders of all authorities having jurisdiction relating to this Work.

.3 Unless otherwise indicated, all references to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1, and the variations made thereto by Manitoba regulation, which are in force on the date of bid closing for the Contract.

.4 All electrical products shall be tested, certified and labeled in accordance with a certification program accredited by the Standards Council of Canada (at a minimum, STANDATA Section 2 – Electrical System Equipment). Where a product is not so labeled, provide written approval by the authority having jurisdiction.

.5 Submit to The City, copy of electrical permit obtained from authority having jurisdiction.

.6 If authority having jurisdiction conducts an electrical inspection, submit copy of certificate of acceptance provided by authority having jurisdiction.

.7 All equipment supplied to have 75°C termination ratings and suitable for connection of copper or aluminum conductors.

.8 All cable ampacities in the drawings and specifications are based on equipment termination ratings of 75°C. Should equipment be provided with a different rating it is the Contractors responsibility to size cable accordingly to meet the electrical code requirements.

### 1.3 DRAWINGS AND SPECIFICATIONS

.1 The intent of the Drawings and Specifications is to include all labour, products, and services necessary for complete Work, tested and ready for operation.

.2 These Specifications and the Drawings and Specifications of all other divisions shall be considered as an integral part of the accompanying Drawings. Any item or subject omitted from either the Specifications or the Drawings but which is mentioned or reasonably specified in and by the others, shall be considered as properly and sufficiently specified and shall be provided.

.3 Provide all minor items and Work not shown or specified but which are reasonably necessary to complete the Work.

.4 If discrepancies or omissions in the Drawings or Specifications are found, or if the intent

or meaning is not clear, advise the Contract Administrator for clarification before submitting Bid, in accordance with B4.

## 1.4 CARE, OPERATION AND START-UP

.1 Instruct City maintenance and operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 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 all aspects of its care and operation.

## 1.5 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Notify Contract Administrator of changes required by Electrical Inspection Department prior to making changes.

.4 Furnish a Certificate of Final Inspection and approvals from inspection authority to the Contract Administrator.

## 1.6 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Contract Document.

.2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.

.3 Minimum enclosure type to be used is NEMA 12 unless otherwise specified.

## 1.7 ELECTRICAL EQUIPMENT MODIFICATION

.1 Where electrical equipment is field modified, arrange for special inspection and pay all associated fees.

## 1.8 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 indoor switchgear and distribution enclosures light grey to ANSI 61 grey enamel, unless otherwise specified.

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

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

## 1.9 EQUIPMENT IDENTIFICATION

.1 Refer to City of Winnipeg Electrical Design Guidelines section 2.3 for Identification Lamacoid Requirements.

## 1.10 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings on both ends of phase conductors of feeders and branch circuit wiring.

.1 Wire tags to be heat shrink type with black letters on white background.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

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

## 1.11 MANUFACTURERS AND CSA LABELS

.1 Visible and legible, after equipment is installed.

## 1.12 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department and the Contract Administrator.

.2 Lamacoid 3 mm thick plastic engraving sheet, red face, white core, mechanically attached with self tapping screws, 20mm text.

## 1.13 WALL MOUNTED DRAWINGS

.1 Provide drawings in plexiglass holder adjacent to the main electrical distribution.

.1 Plexiglass holder to be designed for the purpose and allow for easy replacement of the drawing.

.2 Size: 432 x 279 mm minimum size.

.1 Single Line Diagram

.2 Process P&ID

## 1.14 LOCATION OF OUTLETS

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

## 1.15 MOUNTING HEIGHTS

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

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

.3 Install electrical equipment at following heights.

.1 Panelboards: 1800 to top

.2 Light switches: 1420 to top

.3 Wall receptacles: 900 to top

.4 Control panels: 1800 to top

.5 Emergency lights: 2400 (minimum)

.6 Emergency stop switches: 900 to top

.7 Motor disconnect switches: 1800 to top

## 1.16 CONDUIT AND CABLE INSTALLATION

.1 Sleeves through concrete: schedule 40 galvanized steel pipe, sized for free passage of conduit.

.2 For wall, partitions, and ceilings the sleeve ends shall be flush with the finish on both sides but for floors they shall extend 100 mm above finished floor level.

.3 Fire stop opening with ULC approved assembly for the installation conditions.

## 1.17 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or apprentices as the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties

.2 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province of Manitoba.

**1.18 TESTING**

.1 All test instruments utilized are to have been calibrated within one year of the date utilized.

.2 Prior to energizing any portion of the electrical system, perform megger tests on all parts of the distribution system. Results shall meet the requirements of the CEC, authority having jurisdiction and the Contract Documents.

.3 Test results shall be consolidated into a typed report and included in the Operation and Maintenance Manuals.

**1.19 SUBMITTAL**

.1 Prior to delivery of any Products to job Site and sufficiently in advance of requirements to allow ample time for checking, submit Shop Drawings for review as specified in Division.

.2 Submit Shop Drawings (including Product Data) for all equipment as required in each Section of this Specification. At minimum the following should be included in each submission.

.3 Submit shop drawings, product data and samples of equipment and materials. Shop drawings to include but not be limited to the following:

.1 Complete product part numbers for each piece of equipment
.2 Corresponding equipment tag numbers with part numbers
.3 Product specification sheets indicating product features and options
.4 Dimensions in metric measurement (mm or meters)
.5 Weights in metric measurement
.6 Wiring/interconnection diagrams with manufacturer terminals numbers
.7 Any additional information requested by The City or The Citys representative

**1.20 AS-BUILT MARKUPS**

.1 The Contractor shall keep one (1) complete set of white prints at the Site during work, including all addenda, change orders, Site instructions, clarifications, and revisions for the purpose of **As-Built Markups**. As the Work on-site proceeds, the Contractor shall clearly record in Red Pencil all as-built conditions, which deviate from the original Contract Documents. **As-Built Markups** to include circuiting of all devices, conduit and feeder runs (complete with conductor size and number) and locations of all electrical equipment.

.2 **Provide red line as-built markups in pdf format to Contract Administrator. MPE will prepare Record Drawings based on the Contractor as-built markups.**

.3 Record actual locations of all pull boxes, panelboards, luminaires, feeders, electrical equipment and electrical site services.

.4 Record any changes to circuit designations.

.5 Include on **as-built markups**, revisions due to engineering change orders, site alterations, additions and field ordered changes made during construction.

.6 Record any changes to control circuit wiring including but not limited to terminal numbering, wire and cable labels, interconnect wiring between equipment.

.7 Record any changes to schedules including panel, luminaire, mechanical, and conduit/cable schedules.

**1.21 OPERATION AND MAINTENANCE DATA**

.1 Provide the following for all systems and components:

.1 Manufacturer's product data, including performance curves, schematics, and wiring diagrams for all electrical control systems.

.2 Manufacturer's installation instructions.

.3 Manufacturer's operation instructions.

.4 Manufacturer's maintenance instructions, including complete parts list for all serviceable components.

.2 Provide a comprehensive list of subcontractors and suppliers who supplied and installed systems and components.

.3 Provide copies of all inspection certification reports from authorities having jurisdiction.

.4 Reference Section 40 05 01

**1.22 COMMISSIONING**

.1 Commission all instruments as described in Section 26 91 90 and 40 80 11.

.2 Retain the services of the equipment Manufacturers Technical Representative as required in each specification section.

.3 Upon completion of construction, all circuits are to be operational and all instruments operating within manufacturer's specifications.

.4 Prior to notifying The City’s Representatives Commissioning Team to begin commissioning activities, verify all control logic, inputs, and outputs, and complete Record Drawings as described in this section.

.5 Electrical controls, circuits and systems shall be tested by trial operation of control equipment after all wiring is completed to see that each interlock and control function operates in accordance with the contract drawings and the description of operation for the equipment. Where field conditions prevent actual equipment functioning during testing, the contractor shall simulate the intended operating condition in the associated control circuits.

.6 The contractor shall locate the cause of any malfunction and make the necessary wiring and / or equipment changes or corrections to obtain the particular systems intended operation as defined by the contract drawings. Such changes shall be included in the test report.

.7 Control Panels shall be operated through all design functions. This shall include remote operation of all equipment and actuation of alarms and indicating devices according to design requirements.

.8 Complete operation tests shall be given to all relays, and control devices to show that the equipment performs all design functions and meets design and procurement specifications.

.9 During start-up, assist Commissioning Team in debugging system operation and correct any deficiencies and omissions which appear.

## 1.23 AMBIENT ENVIRONMENT

.1 Unless otherwise indicated, supply equipment enclosures, boxes, electrical materials and products suitable for ambient environment of the following areas:

| | Area | General Classification | Equipment Enclosure Type | Cable / Raceway |
|---|---|---|---|---|
| 1. | Outdoor Areas | Wet | NEMA 4 | Note 1 |
| 2. | Sewage Wet Well | Zone 1 (Division 1) | See CEC Section 18 | PVC coated Rigid aluminum, TECK, See Note 2 |
| 3. | Dry Well | Ordinary | NEMA 12 | Note 1 |

Note 1 Install cable or conduit type as per drawings.
Note 2 Seal all conduits with poured EYS conduit seals (or similar).

# Part 2 Products

## 2.1 NOT USED

.1 Not Used.

# Part 3 Execution

## 3.1 NOT USED

.1 Not Used.

**END OF SECTION**