CITY OF TORONTO

KF WALLACE SWANEK PARK
PATHWAY LIGHTING

MARCH 2025

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 26 – ELECTRICAL

DRAWING LIST

END

1 **GENERAL**

1.1 **SECTION INCLUDES**

1.1.1 Documents

1.1.2 Description of the Work.

1.1.3 Contract method.

1.1.4 Documents provided.

1.1.5 Performance of the Work.

1.1.6 Work sequence.

1.1.7 Phasing

1.2 **RELATED SECTIONS**

1.2.1 Section 01 78 10 - Closeout Procedures.

1.2.2 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.3 **RELATED DOCUMENTS**

1.3.1 Agreement, General Conditions, and Supplementary Conditions.

1.3.2 Other Division 1 specification sections.

1.3.3 This section describes requirements applicable to all Sections.

1.4 **WORDS AND TERMS**

1.4.1 Refer to and acknowledge other words, terms, and definitions in CCDC 2 Definitions.

1.5 **COMPLEMENTARY DOCUMENTS**

1.5.1 Drawings, specifications, and schedules are complementary each to the other and what is called for by one shall be binding as if called for by all. Should any discrepancy appear between documents which leaves doubt as to the intent or meaning, abide by Precedence of Contract Documents article below or obtain direction from the Consultant.

1.5.2 Drawings indicate general location and route of services. Install services not shown or indicated diagrammatically in schematic or riser diagrams to provide an operational assembly or system.

1.5.3 Install components to physically conserve headroom, to minimize furring spaces, or obstructions.

1.5.4 Locate devices with primary regard for convenience of operation and usage.

1.5.5 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional work beyond work described to be brought to attention of Consultant.

1.6 PRECEDENCE OF CONTRACT DOCUMENTS

1.6.1 The order of precedence of the Contract Documents shall be as follows:

.1 Contract General and Supplementary Conditions

.2 Specifications

.3 Drawings

.4 Owner's Written Standard Documents

.5 Codes where no requirements exceeding requirements of Codes have been noted in the Contract Documents

1.7 DESCRIPTION OF THE WORK

1.7.1 Remove and dispose of existing hydro service and electrical distribution and make safe.

1.7.2 Provide new power supply pedestal and foundations including new power service from Toronto Hydro, underground power distribution including coordination with Toronto Hydro.

1.7.3 Provide new LED pathway lighting fixtures and precast concrete poles.

1.7.4 Provide new lighting controls.

1.7.5 Provide excavation, backfill, and restoration for all trenching.

1.7.6 Provide underground ductwork and wiring.

1.7.7 Provide direct buried precast concrete poles and installation as per details on Contract Drawings.

1.7.8 Provide direct buried power post, receptacle, conduit and wiring.

1.7.9 Reconnect existing flood light lighting standard at playground area.

1.7.10 Provide precast concrete handwells as shown on Contract Drawings.

1.7.11 Provide testing, commissioning and verification of pathway lighting system.

1.8 WORK SEQUENCE

1.8.1 Construct Work in stages during the construction period, coordinate construction schedule and operations with Owner and Consultant.

1.8.2 Maintain fire access and control of fire protection equipment and fire alarm system.

1.8.3 During the course of work, the area of work must remain Safe, Clean, secure for occupants, and must be protected from vandalism, fire and damage.

1.8.4 Contractor shall schedule deliveries during times that will not interrupt day to day operations (coordinate with owner). Contractors must be present for and receive all deliveries. The Owner will not receive deliveries on behalf of Contractors and will turn away deliveries if Contractors are not present. The Contractor shall not be compensated for rescheduling of deliveries that were previously turned away due to absence of the Contractor.

1.8.5 The Contractor shall make provisions so that dust and noise are not emitted outside the area of work. Waste and hazardous materials must be disposed of safely and may not be stored at the site outside the area of work.

1.8.6 The Contractor shall commission the Work in co-ordination with the Owner and in accordance with the requirements of section 01 79 00. The Contractor shall provide all personnel and equipment required to commission the Work and demonstrate the operation of the equipment to the Owner's personnel.

END OF SECTION

Stopped here

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Coordination Work with other contractors and work by Owner under administration of Consultant.

1.1.2 Pre-installation and scheduled progress meetings.

1.2 RELATED SECTIONS

1.2.1 Section 01 11 00 - Summary of Work

1.2.2 Section 01 33 00 - Submittal Procedures.

1.2.3 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.3 CO-ORDINATION

1.3.1 Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of others, under instructions of Consultant.

1.4 PROJECT MEETINGS

1.4.1 Schedule and administer weekly project meetings throughout progress of Work as determined by Consultant.

1.4.2 Schedule and administer pre-installation meetings when specified in sections and when required to coordinate related or affected Work.

1.4.3 Prepare agenda for meetings.

1.4.4 Distribute written notice of each meeting four (4) days in advance of meeting date to Consultant.

1.4.5 Provide physical space and make arrangements for meetings.

1.4.6 Preside at meetings.

1.4.7 Record minutes. Include significant proceedings and decisions. Identify action by parties.

1.4.8 Reproduce and distribute copies of minutes within three (3) days after each meeting and transmit to meeting participants, affected parties not in attendance.

1.5 ON-SITE DOCUMENTS

1.5.1 Maintain at job site, one copy each of the following:

.1 Contract Drawings.

.2 Contract Specifications.

.3 Addenda.

.4 Reviewed shop drawings.

.5 Change Orders. Stopped here

.6 Other modifications to Contract.

.7 Field test reports.

.8 Copy of approved Work Schedule.

.9 Manufacturers' installation and application instructions.

.10 Building Permit and Documents Stamped by the City

.11 Applicable current editions of municipal regulations and by-laws. Current building codes, complete with addenda bulletins applicable to the Place of the Work.

1.6 **SCHEDULES**

1.6.1 Submit preliminary construction progress schedule in accordance to Consultant coordinated with Consultant's project schedule.

1.6.2 After review, revise and resubmit schedule to comply with revised project schedule.

1.6.3 Schedule is to show weekly progress and is to include detailed coordination with the sub- contractor's anticipated progress and a final completion date within the time period stated on the Tender Form.

1.6.4 Changes to the Substantial Performance date are to be recorded by change order notice with the revised date listed.

1.6.5 Schedule to show dates for submission of shop drawings, material, lists and samples and delivery of a detailed list of equipment and material.

1.6.6 During progress of Work revise and resubmit as directed by Consultant.

1.7 **CONSTRUCTION PROGRESS MEETINGS**

1.7.1 During course of Work schedule progress meetings weekly.

1.7.2 Contractor, major subcontractors involved in Work and are to be in attendance.

1.7.3 Notify parties minimum 5 days prior to meetings.

1.7.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

1.7.5 Minutes to be sequentially numbered. Items to remain from previous meetings until removed by consent of the owner, consultant and contractor.

1.7.6 Challenges to the minutes shall be settled as priority matter under "Old Business" on the agenda.

1.7.7 Agenda to include following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Review site safety and security issues.

.13 Other business.

1.8 **SUBMITTALS**

1.8.1 Submit preliminary shop drawings, product data and samples for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Consultant.

1.8.2 Submit requests for payment for review, and for transmittal to Consultant.

1.8.3 Submit requests for interpretation/information (RFIs) of Contract Documents, and obtain instructions through Consultant.

1.8.4 Process substitutions through Consultant.

1.8.5 Process change orders through Consultant.

1.8.6 Deliver closeout submittals for review and preliminary inspections, for transmittal to Consultant.

1.9 **REQUESTS FOR INTERPRETATION/INFORMATION**

1.9.1 All RFIs shall be submitted to the Consultant with copy to the Owner. Contractor shall submit Request for Information on form with Contractor company letterhead to Consultant and Owner wherever Contractor requires a clarification of the requirements of the Contract Documents or wherever work cannot proceed as indicated by the Contract Documents.

1.9.2 The Contractor shall await the Consultant's response to the RFI before proceeding with the work documented in the RFI. No delays to work or submissions of shop drawings not affected by the matter discussed in the RFI shall occur as a result of outstanding responses from Consultant.

1.10 **SITE INSTRUCTIONS**

1.10.1 The Consultant may provide specific instructions on how equipment is to be installed or change the layout arrangement of the arrangement to be installed prior the installation of said equipment. The Consultant will issue these instructions on a Site Instruction

form with the Consultant's company letterhead. Work described by Site Instructions shall not incur additional costs to the Owner.

1.11 **CONTEMPLATED CHANGE NOTICES AND CHANGE ORDERS**

1.11.1 Where equipment or service not indicated in the Contract Documents shall be provided, the Consultant shall issue a Contemplated Change Notice to the Contractor to provide a quotation.

1.11.2 The Consultant and Owner will review the quotation and if deemed reasonable will produce a Change Order. The Contractor shall provide itemized breakdown of material, equipment, hourly labour rates, number of hours and number of workers for all scopes of work and the same breakdown for all sub-contractor quotations in their quotations.

1.11.3 The Contractor shall not proceed with any work described in a Contemplated Change Notice until a Change Order signed by the Consultant and Owner for the work is received or unless prior approval is provided by the Owner in writing.

1.12 **COORDINATION DRAWINGS**

1.12.1 Provide information required by Consultant for preparation of coordination drawings.

1.12.2 Review and approve revised drawings for submittal to Consultant.

1.13 **CLOSEOUT PROCEDURES**

1.13.1 Notify Consultant when Work is considered ready for Substantial Performance.

1.13.2 Accompany Consultant on preliminary inspection to determine items listed for completion or correction.

1.13.3 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance and for access to Owner-occupied areas.

1.13.4 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Shop drawings and product data.

1.1.2 Samples.

1.1.3 Certificates and transcripts.

1.2 RELATED SECTIONS

1.2.1 Section 01 78 10 - Closeout Procedures.

1.2.2 Other sections requesting submittals.

1.2.3 This section describes requirements applicable to all Sections and including any specifications on drawings

1.2.4 This section does not cover submissions required for Close-Out, Warranty, and other requirements requested upon completion of the Work.

1.3 ADMINISTRATIVE

1.3.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

1.3.2 Work affected by submittal shall not proceed until review is complete.

1.3.3 Present shop drawings, product data, samples and mock-ups in Imperial and SI Metric units.

1.3.4 Where items or information is not manufactured or produced in Imperial and SI Metric units; convert values for inclusion.

1.3.5 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.

1.3.6 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

1.3.7 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

1.3.8 Verify field measurements and affected adjacent Work are coordinated.

1.3.9 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

1.3.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

1.3.11 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

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

1.4.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

1.4.3 Allow five (5) days for Consultant's review of each submission. Large packages of shop drawings shall be accepted and reviewed in logical stages or parts to accommodate processing of the review for the Consultant within the allowed period.

1.4.4 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

1.4.5 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.

1.4.6 Accompany submissions with duplicate transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

1.4.7 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:
- .1 Subcontractor.
- .2 Supplier.
- .3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:
- .1 Fabrication.
- .2 Layout, showing dimensions, including identified field dimensions, and clearances.
- .3 Setting or erection details.

.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to other parts of the Work.

1.4.8 After Consultant's review, distribute copies.

1.4.9 Submit a digital copy in PDF format of shop drawings for each requirement requested in specification Sections and as consultant may reasonably request.

1.4.10 Submit a digital copy of product data sheets or brochures for requirements requested in specification sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

1.4.11 Delete information not applicable to project.

1.4.12 Supplement standard information to provide details applicable to project.

1.4.13 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, transparency will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and re-submission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.5 **SAMPLES**

1.5.1 Submit for review samples in duplicate as requested in respective specification Sections.

1.5.2 Label samples with origin and intended use.

1.5.3 Deliver samples prepaid to Consultant's business address.

1.5.4 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

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

1.5.6 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

1.5.7 Make changes in samples which Consultant may require, consistent with Contract Documents.

1.5.8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 **CERTIFICATES AND TRANSCRIPTS**

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

1.6.2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Health and safety considerations required to ensure that the contractor shows due diligence towards health and safety on construction sites, and meets the requirements laid out in Occupational Health and Safety standards.

1.2 RELATED SECTIONS

1.2.1 All other sections forming part of the contract documentation.

1.3 REFERENCES

1.3.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

1.3.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3.3 Province of Ontario

.1 Occupational Health and Safety Act, R.S.O. 1990 current version.

1.4 SUBMITTALS

1.4.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

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

.1 Results of site specific safety hazard assessment.

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

1.4.3 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction, daily.

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

1.4.5 Submit copies of incident and accident reports.

1.4.6 Submit WHMIS MSDS - Material Safety Data Sheets for any materials used for this project.

1.4.7 Owner’s representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Owner’s representative within 5 days after receipt of comments from Owner’s representative.

1.4.8 Owner’s representative’s review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

1.4.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of

Work, and submit additional certifications for any new site personnel to Owner's representative.

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

1.5 **FILING OF NOTICE**

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

1.6 **SAFETY ASSESSMENT**

1.6.1 Perform site specific safety hazard assessment related to project.

1.7 **MEETINGS**

1.7.1 Schedule and administer Health and Safety meeting with Owner's representative prior to commencement of Work.

1.8 **REGULATORY REQUIREMENTS**

1.8.1 Do Work in accordance with federal and provincial regulations. Where federal regulations are more stringent, the more stringent regulations shall be followed.

1.9 **GENERAL REQUIREMENTS**

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

1.9.2 Owner's representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.10 **RESPONSIBILITY**

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

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

1.10.3 Facility personnel will provide a list of chemicals contained in the facility. Any work done by the contractor shall maintain the safety of all persons on site and safety of property on site. If the contractor deems that some products are dangerous, the chemical will be moved by facility personnel in order for the facility employees and contractor employees to remain safe during the course of construction for this project.

1.11 **COMPLIANCE REQUIREMENTS**

1.11.1 Comply with Ontario Health and Safety Act, R.S.O.

1.11.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.12 UNFORESEEN HAZARDS

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

1.13 HEALTH AND SAFETY CO-ORDINATOR

1.13.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with construction.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work.

1.14 POSTING OF DOCUMENTS

1.14.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Ontario having jurisdiction, and in consultation with Owner's representative.

1.15 CORRECTION OF NON-COMPLIANCE

1.15.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Owner's representative.

1.15.2 Provide Owner's representative with written report of action taken to correct non-compliance of health and safety issues identified.

1.15.3 Owner's representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 BLASTING

1.16.1 Blasting or other use of explosives is not permitted.

1.17 POWDER ACTUATED DEVICES

1.17.1 Use powder actuated devices is not permitted.

1.18 WORK STOPPAGE

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

2 **PRODUCTS**

2.1 **NOT USED**

2.1.1 Not used.

3 **EXECUTION**

3.1 **NOT USED**

3.1.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Laws, notices, permits and fees.

1.1.2 Discovery of hazardous materials.

1.2 RELATED SECTIONS

1.2.1 This section describes requirements applicable to all Sections and including any specifications on drawings

1.3 LAWS, NOTICES, PERMITS AND FEES

1.3.1 The laws of the Place of the Work shall govern the Work.

1.3.2 The Owner shall obtain and pay for the building permit, permanent easements and rights of servitude. The Contractor shall be responsible for permits, licenses or certificates necessary for the performance of the Work which were in force at the date of executing the Agreement.

1.3.3 Give the required notices and comply with the laws, ordinances, rules, regulations or codes which are or become in force during the performance of the Work and which relate to the Work, to the preservation of the public health and to construction safety.

1.3.4 If the Contractor knowingly performs or allows work to be performed that is contrary to any laws, ordinances, rules, regulations or codes, the Contractor shall be responsible for and shall correct the violations thereof; and shall bear the costs, expenses and damages attributable to the failure to comply with the provisions of such laws, ordinances, rules, regulations or codes. Determine detailed requirements of authorities having jurisdiction.

1.3.5 Pay construction damage deposits levied by municipality in connection with the issuance of a building permit.

1.4 HAZARDOUS MATERIAL DISCOVERY

1.4.1 Asbestos: If material resembling asbestos is encountered in course of demolition work, immediately stop work and notify Consultant.

1.4.2 Asbestos and PCB: Any materials, equipment or fixtures encountered that are suspect as to containing PCB's shall be disposed of according to Ontario Regulation 362 – Waste Management - PCBs.

1.5 PERSONNEL SMOKING

1.5.1 Smoking is not permitted within the work area. Comply with regulatory and Owner-imposed smoking restrictions during execution of the Work within or outside the premises.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

1.1.1 Section 01 45 00 - Quality Control.

1.1.2 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.2 QUALITY ASSURANCE

1.2.1 Provide the services of and co-operate with testing organization services as specified in Section 01 45 00 - Quality Control.

1.2.2 Testing organization: Current member in good standing of their respective professional or industry organization and certified to perform specified services.

1.2.3 Comply with applicable procedures and standards of the certification sponsoring association.

1.2.4 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.2.5 Qualifications:

.1 Provide adequate workforce training through meetings and demonstrations.

.2 Have personnel on site with experience installing infrastructure similar to the infrastructure installed under this project throughout this project for consultation and supervision purposes while work is taking place.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Shop drawings and product data.

1.1.2 Inspection and testing, administrative and enforcement requirements.

1.1.3 Mock-ups.

1.1.4 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

1.2.1 Section 01 43 00 - Quality Assurance.

1.2.2 This section describes requirements applicable to all Sections and including any specifications on drawings

1.3 REFERENCES

1.3.1 ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories.

1.3.2 SCC (Standards Council of Canada).

1.4 INSPECTION BY AUTHORITY

1.4.1 Allow Authorities Having Jurisdiction access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

1.4.2 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the Work.

1.4.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.5 REVIEW BY CONSULTANT

1.5.1 Consultant may order any part of Work to be reviewed if Work is suspected to be not in accordance with Contract Documents.

1.5.2 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay cost of additional review and correction.

1.6 ACCESS TO WORK

1.6.1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.

1.6.2 Co-operate to provide reasonable facilities for such access.

1.7 PROCEDURES

1.7.1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

1.7.2 Submit samples and materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

1.7.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.8 REJECTED WORK

1.8.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

1.8.2 Make good other Contractor's work damaged by such removals or replacements promptly.

1.8.3 Consultant may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.8.4 The Consultant may require testing as part of their examination in accordance with the following requirements:

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

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Consultant. Pay costs for retesting and re-inspection.

1.8.5 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price the difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Consultant.

1.9 REPORTS

1.9.1 Submit four (4) paper copies and one (1) electronic copy of signed inspection and test reports to Consultant.

1.9.2 Provide copies to Subcontractor of work being inspected or tested.

1.10 **EQUIPMENT AND SYSTEMS**

1.10.1 Provide testing and commissioning reports for the luminaires, lighting controls and software provided under this Contract.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.1.1 General Conditions

1.1.2 Ontario Building Code (OBC) current edition, including all amendments up to bid closing date.

1.1.3 Province of Ontario Occupational Health and Safety Act and Regulations for Construction Sites: All work shall be in accordance with the latest edition of the Province Of Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

1.1.4 CSA-0121, Douglas Fir Plywood

1.1.5 CAN/CSA-S269.2, Access Scaffolding for Construction Purposes.

1.1.6 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.2 RELATED SECTIONS

1.2.1 Section 01 43 00 - Quality Assurance.

1.3 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.3.1 Provide construction facilities and temporary controls in order to execute the work expeditiously.

1.4 SITE STORAGE AND LOADING

1.4.1 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with Products.

1.4.2 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.

1.5 SANITARY FACILITIES

1.5.1 The contractor shall provide their own sanitary facilities for the duration of the construction period.

1.6 WATER SUPPLY

1.6.1 The contractor shall provide their water supply for the duration of the construction period.

1.7 CONCEALMENT

1.7.1 Before installation, inform the Consultant if there is a contradictory situation. Install as directed by Consultant.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Product quality, availability, storage, handling, protection, and transportation.

1.1.2 Product substitution procedures.

1.1.3 Manufacturer's instructions.

1.1.4 Quality of Work, coordination and fastenings.

1.2 RELATED SECTIONS

1.2.1 Section 01 62 00 - Product Exchange Procedures.

1.2.2 This section describes requirements applicable to all Sections and including any specifications on drawings

1.3 TERMINOLOGY

1.3.1 New: Produced from new materials.

1.3.2 Re-newed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

1.3.3 Defective: A condition determined exclusively by the Consultant.

1.4 PRODUCT QUALITY

1.4.1 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work: New, or renewed, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

1.4.2 All products shall be CSA-approved, ULC-approved or cUL-approved and labeled as such.

1.4.3 All products shall be CSA-approved, ULC-approved or cUL-approved for the application for which they are to be installed and used on this project and labeled as such.

1.4.4 Where products that are assembled or modified from original use by the Contractor are provided under the Contract, provide the services of a testing company to test and produce a report certifying compliance of the assembled work with CSA requirements. Provide CSA label for the products.

1.4.5 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

1.4.6 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Consultant.

1.4.7 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

1.4.8 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.5 AVAILABILITY

1.5.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.

1.5.2 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.6 STORAGE AND PROTECTION

1.6.1 Store and protect Products in accordance with manufacturers' instructions.

1.6.2 Store with seals and labels intact and legible.

1.6.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

1.6.4 For exterior storage of fabricated Products, place on sloped supports above ground.

1.6.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

1.6.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

1.6.7 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

1.6.8 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.7 TRANSPORTATION AND HANDLING

1.7.1 Transport and handle Products in accordance with manufacturer's instructions.

1.7.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

1.7.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.8 PRODUCT CHANGES

1.8.1 Change in Product(s): Submit request for substitution or alternative in accordance with Section 01 62 00.

1.9 EXISTING UTILITIES

1.9.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and building occupants.

1.9.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.10 MANUFACTURER'S INSTRUCTIONS

1.10.1 Unless otherwise indicated in the specifications, install or erect Products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

1.10.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

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

1.11 QUALITY OF WORK

1.11.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

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

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

1.12 CO-ORDINATION

1.12.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.13 CONCEALMENT

1.13.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

1.13.2 Before installation, and with timely notice, inform Consultant if there is interference. Install as directed by Consultant.

1.14 REMEDIAL WORK

1.14.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

1.14.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.15 LOCATION OF FIXTURES

1.15.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

1.15.2 Inform Consultant of conflicting installation. Install as directed.

1.16 FASTENINGS

1.16.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

1.16.2 Prevent electrolytic action between dissimilar metals and materials.

1.16.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

1.16.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

1.16.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

1.16.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.17 FASTENINGS - EQUIPMENT

1.17.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

1.17.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.

1.17.3 Bolts may not project more than one diameter beyond nuts.

1.17.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.18 PROTECTION OF WORK IN PROGRESS

1.18.1 Prevent overloading of any infrastructure provided under or affected by this Project.

1.18.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Consultant.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Substitutions.

1.1.2 Alternatives or Alternates.

1.2 RELATED SECTIONS

1.2.1 This section describes requirements applicable to all Sections and including any specifications on drawings

1.3 SUBSTITUTIONS/EXCHANGE

1.3.1 The General Conditions specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this Section.

1.3.2 Consultant will consider requests for Substitutions only within fifteen (15) days after date of Owner-Contractor Agreement.

1.3.3 For Specification sections that do not have a 'Base Bid' Products/System or approved alternates and, instead specify performance criteria for the Product or System, the Contractor shall submit their Product or System information in accordance with Section 01 33 00 – Submittal Procedures.

1.3.4 Substitutions may be considered when a specified Product becomes unavailable through no fault of the Contractor.

1.3.5 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.3.6 A request constitutes a representation that the Bidder/Contractor:

.1 Has investigated Product proposed for substitution and determined that it meets or exceeds the performance characteristics of the specified Product.

.2 Will provide the same warranty for the Substitution as for the specified Product.

.3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

.4 Waives claims for additional costs or time extension which may subsequently become apparent.

.5 Will reimburse Owner and Consultant for review or redesign services associated with re-approval by authorities.

1.3.7 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.3.8 Substitution Submittal Procedure:

.1 Submit three (3) copies of request for Substitution for consideration. Limit each request to one (1) proposed Substitution.

.2 Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.

.3 The Consultant will notify Contractor in writing of decision to accept or reject request.

2 PRODUCTS

Nil

3 EXECUTION

Nil

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Submittal requirements associated with connecting to existing facilities.

1.1.2 Execution requirements for all Work.

1.2 RELATED SECTIONS

1.2.1 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.3 SUBMITTALS - ATTACHING TO EXISTING WORK

1.3.1 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight-exposed elements.

.5 Work of Owner or separate contractor.

1.3.2 Include in request:

.1 Identification of Project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed Work, and products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on Work of Owner or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.4 TOLERANCES

1.4.1 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.

1.4.2 Do not permit tolerances to accumulate beyond effective or practical limits.

1.4.3 Comply with manufacturer’s tolerances. In case of conflict between manufacturer's tolerances and Contract Documents, request clarification from Consultant before proceeding.

1.4.4 Adjust Products to appropriate dimensions; position and confirm tolerance acceptability before permanently securing Products in place.

1.5 **EXECUTION**

1.5.1 Execute cutting, fitting, and patching to complete the Work.

1.5.2 Perform all required excavation and fill to complete the Work.

1.5.3 Fit several parts together, to integrate with other Work.

1.5.4 Uncover Work to install ill-timed Work.

1.5.5 Remove and replace defective or non-conforming Work.

1.5.6 Remove samples of installed Work for testing, if not designated in the respective Section as remaining as part of the Work.

1.5.7 Provide openings in non-structural elements of Work for penetrations of mechanical, Work. Limit opening dimensions to minimal sizes required, and performed in a neat and clean fashion.

1.5.8 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

1.5.9 Employ competent workers, or where applicable, original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

1.5.10 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry or concrete work without prior approval.

1.5.11 Restore work with new products in accordance with requirements of Contract Documents.

1.5.12 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

1.5.13 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, for full thickness of the constructed element.

1.5.14 Re-finish surfaces to match adjacent finishes: For continuous surfaces re-finish to nearest intersection; for an assembly, re-finish entire unit.

1.5.15 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

2 **PRODUCTS**

Nil

3 **EXECUTION**

Nil

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Requirements and limitations for cutting and patching of Work.

1.2 RELATED SECTIONS

1.2.1 Section 01 11 00 - Summary of Work.

1.2.2 Section 01 61 00 - Product Requirements.

1.2.3 Section 01 62 00 - Product Exchange Procedures: Product options and substitutions.

1.2.4 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.

.2 Advance notification to other sections of openings required in Work of those sections.

.3 Limitations on cutting structural members.

1.3 SUBMITTALS

1.3.1 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.

.2 Integrity of weather exposed or moisture resistant element.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight exposed elements.

.5 Work of Owner or separate contractor.

1.3.2 Include in request:

.1 Location and description of affected Work.

.2 Necessity for cutting or alteration.

.3 Description of proposed Work and Products to be used.

.4 Alternatives to cutting and patching.

.5 Effect on work of Owner or separate contractor.

.6 Written permission of affected separate contractor.

.7 Date and time work will be executed.

2 PRODUCTS

2.1 MATERIALS

2.1.1 Primary Products: Those required for original installation.

2.1.2 Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 62 00.

3 EXECUTION

3.1 EXAMINATION

3.1.1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

3.1.2 After uncovering existing Work, assess conditions affecting performance of work.

3.1.3 Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

3.2.1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

3.2.2 Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING

3.3.1 Execute cutting and fitting including excavation and fill to complete the Work.

3.3.2 Uncover work to install improperly sequenced work.

3.3.3 Remove and replace defective or non-conforming work.

3.3.4 Remove samples of installed work for testing when requested.

3.3.5 Provide openings in the Work for penetration of mechanical and electrical work.

3.3.6 Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

3.3.7 Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.4 PATCHING

3.4.1 Execute patching to complement adjacent Work.

3.4.2 Fit Products together to integrate with other Work.

3.4.3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

3.4.4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

3.4.5 Restore work with new Products in accordance with requirements of Contract Documents.

3.4.6 Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

3.4.7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

3.4.8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Progressive cleaning.

1.1.2 Cleaning prior to acceptance.

1.2 RELATED SECTIONS

1.2.1 This section describes requirements applicable to all Sections and including any specifications on drawings

2 PRODUCTS

2.1 CLEANING MATERIALS

2.1.1 Cleaning Agents and Materials: Low VOC content.

3 EXECUTION

3.1 SOLID WASTE REDUCTION

3.1.1 The Code of Practice contained in the standard construction document CCA81, "A Best Practices Guide to Solid Waste Reduction" are to be followed.

3.2 PROGRESSIVE CLEANING

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

3.2.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

3.2.3 Clear snow and ice from area of construction, bank or pile snow in designated areas only.

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

3.2.5 Containers:

.1 Provide on-site steel framed, hinged lid containers for collection of waste materials and debris.

.2 Provide and use clearly marked, separate bins for recycling.

3.2.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

3.2.7 Dispose of waste materials and debris.

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

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

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

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

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

3.3 CLEANING PRIOR TO ACCEPTANCE

3.3.1 Prior to applying for Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

3.3.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

3.3.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

3.3.4 Remove waste products and debris other than that caused by Owner or other Contractors.

3.3.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

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

3.3.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

3.3.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors and other exposed surfaces.

3.3.9 Vacuum clean and dust building interiors, ceilings, wall, floors, behind grilles, louvres and screens.

3.3.10 Clean and polish surface finishes, as recommended by manufacturer.

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

3.3.12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

3.3.13 Remove dirt and other disfiguration from exterior surfaces.

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

3.4 FINAL PRODUCT CLEANING

3.4.1 Execute final cleaning prior to final project assessment.

3.4.2 Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

3.4.3 Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

3.4.4 Remove waste and surplus materials, rubbish, and construction facilities from the site.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Inspections and declarations.

1.1.2 Closeout submittals

1.1.3 Operation and maintenance manual format.

1.1.4 Contents each volume.

1.1.5 As-built actual site conditions.

1.1.6 As-built documents and samples.

1.1.7 As-built documents.

1.1.8 Final survey.

1.1.9 Warranties and bonds.

1.2 RELATED SECTIONS

1.2.1 Section 01 33 00 - Submittal Procedures.

1.2.2 Section 01 45 00 - Quality Control.

1.2.3 This section describes requirements applicable to all Sections of the Specifications.

1.3 INSPECTIONS AND DECLARATIONS

1.3.1 Document 100 - OAA/OGCA Take-Over Procedures shall form the basis of Closeout Procedures for this Project unless otherwise amended by Division 01 Sections.

1.3.2 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Consultant's Inspection.

1.3.3 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify defects or deficiencies. Correct defective and deficient Work accordingly.

1.3.4 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and are fully operational.

.4 Certificates required by authorities having jurisdiction have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Work is complete and ready for Final Inspection.

1.3.5 Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant and Contractor. If Work is deemed incomplete by Owner, complete outstanding items and request re-inspection.

1.3.6 Declaration of Substantial Performance: when Owner consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for Substantial Performance of the Work.

1.3.7 Commencement of Warranty Periods: the date of Substantial Performance of the Work shall be the date for commencement of the warranty period.

1.3.8 Commencement of Lien Periods: the date of publication of the certificate of Substantial Performance of the Work shall be the date for commencement of the lien period, unless required otherwise by the lien legislation applicable at the Place of the Work.

1.3.9 Final Payment: When Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.

1.3.10 Payment of Hold-back: After issue of Certificate of Substantial Performance of the Work and advertisement of the Certificate of Substantial Performance of the Work in a publication regularly publishing Certificates of Substantial Performance of the Work visible in the locality in which the work was performed, submit an application for payment of hold-back amount. The accrued holdback shall be eligible for certification of payment sixty (60) days after the advertisement of the Certificate of Substantial Performance of the Work provided there are no liens on the property.

1.4 CLOSEOUT SUBMITTALS

1.4.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

1.4.2 Copy will be returned after final inspection, with Consultant's comments.

1.4.3 Revise content of documents as required prior to final submittal.

1.4.4 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, digital copies of operating and maintenance manuals in Canadian English.

1.4.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

1.4.6 If requested, furnish evidence as to type, source and quality of products provided.

1.4.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.4.8 Pay costs of transportation.

1.5 OPERATION AND MAINTENANCE MANUAL FORMAT

1.5.1 Organize data in the form of an instructional manual.

1.5.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm8.5 x 11 inch with spine and face pockets.

1.5.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

1.5.4 Cover: Identify each binder with type or printed title 'Project As-built Documents'; list title of project and identify subject matter of contents.

1.5.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

1.5.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

1.5.7 Text: Manufacturer's printed data, or typewritten data.

1.5.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.5.9 Provide 1:1 scaled CAD files in AutoCAD format on USB memory stick.

1.6 **CONTENTS - EACH VOLUME**

1.6.1 Table of Contents: provide title of project;

.1 date of submission;

.2 names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties; and

.3 schedule of products and systems, indexed to content of volume.

1.6.2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

1.6.3 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

1.6.4 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.6.5 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including code compliance certificate.

1.6.6 Installation and maintenance manuals for each system and piece of equipment provided under the Contract.

1.7 **PROVISION OF DOCUMENTS SHOWING ACTUAL SITE CONDITIONS**

1.7.1 As-built Drawings: Record information on a set of black line opaque prints of the Contract Drawings issued by the Consultant. Keep the mark-ups for inclusion in the Project Manual.

1.7.2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording information changed on site reflecting the actual installation of the Work.

1.7.3 Record information concurrently with construction progress. Do not conceal Work until as-built conditions are accurately recorded on the as-built drawing mark-ups.

1.7.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

1.7.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

1.7.6 Other Documents: maintain manufacturer's certifications, required by individual specifications sections.

1.8 **AS-BUILT DOCUMENTS AND SAMPLES**

1.8.1 In addition to requirements in General Conditions, maintain at the site for Consultant one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Site Instructions, Change Orders and other modifications to the Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

1.8.2 Store as-built documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

1.8.3 Label as-built documents and file in accordance with section number listings in List of Contents of the Project Manual. Label each document "AS-BUILT DOCUMENTS" in neat, large, printed letters.

1.8.4 Maintain as-built documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.

1.8.5 Keep as-built documents and samples available for inspection by Consultant.

1.8.6 Prior to Substantial Performance of the Work, electronically transfer the marked up information from the as-built documents to a master set of drawing and specification files provided by the Consultant, as follows:

.1 Drawings: AutoCAD and PDF.

.2 Specifications: PDF - Adobe Acrobat.

1.8.7 Employ a competent computer draftsperson to indicate changes on the electronic set of as-built drawings. Provide updated as-built drawings in PDF - Adobe Acrobat along with original hand-marked set.

1.8.8 Submit completed as-built documents to Owner with folder directories for each binder tab on a USB memory stick accompanied by three (3) hard copy sets.

1.9 **WARRANTIES AND BONDS**

1.9.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

1.9.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.9.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of work.

1.9.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

1.9.5 Verify that documents are in proper form, contain full information, and are notarized.

1.9.6 Co-execute submittals when required.

1.9.7 Retain warranties and bonds until time specified for submittals.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Equipment and systems.

1.1.2 Materials and finishes.

1.1.3 Spare parts.

1.1.4 Maintenance manuals.

1.1.5 Special tools.

1.1.6 Storage, handling and protection.

1.2 RELATED SECTIONS

1.2.1 Section 01 45 00 - Quality Control.

1.2.2 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.3 EQUIPMENT AND SYSTEMS

1.3.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

1.3.2 Provide final set of shop drawings for each piece of equipment complete with Consultant’s review comment sheet and review stamps.

1.3.3 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

1.3.4 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

1.3.5 Provide servicing schedule.

1.3.6 Include manufacturer's printed operation and maintenance instructions.

1.3.7 Include sequence of operation by controls manufacturer.

1.3.8 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

1.3.9 Provide Contractor's coordination drawings, with installed colour-coded diagrams.

1.3.10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

1.3.11 Additional requirements: As specified in individual specification sections.

2 PRODUCTS

2.1 MATERIALS AND FINISHES

2.1.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

2.1.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

2.1.3 Additional Requirements: as specified in individual specifications sections.

2.2 SPARE PARTS AND MATERIALS

2.2.1 Provide spare parts or materials, in quantities specified in individual specification sections.

2.2.2 Provide items of same manufacturer and quality as items in Work.

2.2.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

2.2.4 Obtain receipt for delivered products and submit prior to final payment.

2.3 MAINTENANCE MATERIALS

2.3.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

2.3.2 Provide items of same manufacturer and quality as items in Work.

2.3.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

2.3.4 Obtain receipt for delivered products and submit prior to final payment.

2.4 SPECIAL TOOLS

2.4.1 Provide special tools, in quantities specified in individual specification section.

2.4.2 Provide items with tags identifying their associated function and equipment.

2.4.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

3 EXECUTION

3.1 DELIVER TO SITE

3.1.1 Deliver to site; place and store.

3.1.2 Deliver to location as directed, with inventory list; place and store.

3.2 STORAGE, HANDLING AND PROTECTION

3.2.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

3.2.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

3.2.3 Store components subject to damage from weather in weatherproof enclosures.

3.2.4 Store paints and freezable materials in a heated and ventilated room.

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

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Procedures for demonstration and instruction of Products, equipment and systems to Owner's personnel.

1.2 RELATED SECTIONS

1.2.1 This section describes requirements applicable to all Sections and including any specifications on drawings.

1.3 DESCRIPTION

1.3.1 Demonstrate scheduled operation and maintenance of equipment to Owner's personnel two weeks prior to date of final inspection.

1.3.2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.4 COMPONENT DEMONSTRATION

1.4.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.

1.4.2 Instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

1.5.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Consultant's approval.

1.5.2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

1.5.3 Give time and date of each demonstration, with list of persons present.

1.6 CONDITIONS FOR DEMONSTRATIONS

1.6.1 Testing and adjusting and equipment and systems are fully operational.

1.6.2 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

2 PRODUCTS

Not used.

3 EXECUTION

3.1 PREPARATION

3.1.1 Verify that suitable conditions for demonstration and instructions are available.

3.1.2 Verify that designated personnel are present.

3.1.3 Prepare agendas and outlines.

3.1.4 Explain component design, operational philosophy and operational strategy.

3.1.5 Develop equipment presentations.

3.1.6 Present system demonstrations.

3.1.7 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 **PREPARATION OF AGENDAS AND OUTLINES**

3.2.1 Prepare agendas and outlines including the following: Equipment and systems to be included in seminar presentations.

3.2.2 Name of companies and representatives presenting at seminars.

3.2.3 Outline of each seminar's content.

3.2.4 Time and date allocated to each system and item of equipment.

3.2.5 Provide separate agenda for each system

3.3 **EXPLANATION OF DESIGN STRATEGY**

3.3.1 Explain design philosophy of each system. Include following information:

.1 An overview of how system is intended to operate.

.2 Description of design parameters, constraints and operational requirements.

.3 Description of system operation strategies.

.4 Information to help in identifying and troubleshooting system problems.

3.4 **DEMONSTRATION AND INSTRUCTIONS**

3.4.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.

3.4.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

3.4.3 Instruct personnel on control and maintenance of Sensory Equipment associated with maintaining energy efficiency and longevity of service.

3.4.4 Review contents of manual in detail to explain all aspects of operation and maintenance.

3.4.5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during demonstrations to Owner’s personnel.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Comply with the City of Toronto General Conditions, Invitation to Tender and Division 26.

.2 Unless specified otherwise, the following instructions will apply to all sections of Division 26.

.3 Read in conjunction with all details and plans.

1.2 APPLICATION

.1 This Section applies to and is an integral part of all succeeding Sections of this Division of the specification.

1.3 DEFINITIONS

.1 The following are definitions of words found in Sections of this Specification and on associated drawings:

.2 "Concealed" - hidden from normal sight in furred spaces, shafts, crawl spaces, ceiling spaces, walls and partitions;

.3 "Exposed" - all work normally visible to building occupants;

.4 "Provide" (and tenses of "Provide") - supply, install and connect complete.

.5 "Install" (and tenses of "install") - install, and connect complete;

.6 "Supply" - Supply only.

.7 "Work" - all equipment, permits, materials and labour to provide a complete electrical installation as required and detailed in Drawings and Specification.

.8 "Authorities" or "Authorities Having Jurisdiction" - any and all current laws and/or by-laws of any federal, provincial or local authorized agencies having jurisdiction over the sum total or parts of the work including, but not restricted to the Municipal Planning and Building Department, Municipal Fire Department, Labour Canada, The Provincial Fire Marshall, The Local Hydro Supply Authority, The Ontario Building Code, The Construction Safety Act, Municipal Public Works Department, the Canadian Electrical Code with Ontario Supplement, hereinafter referred to as the "Code", the Electrical Safety Authority and all Inspection Bulletins.

.9 "Drawings and Specifications" - "the Contract Drawings and Specifications".

.10 "Consultant" shall mean the firm of Moon Matz Ltd., or other person authorized to act on their behalf.

1.4 WORK INCLUDED

.1 Provide all labour, materials, equipment and services to complete the Work of the Electrical Division as further specified and as shown on the Contract Drawings.

1.5 SCHEDULING OF PRODUCT DELIVERY

.1 Every effort must be made to ensure delivery of all materials and products in the Contract Documents on time. At commencement of Contract, assist Contractor in preparation of schedule of order dates for items requiring long delivery periods.

1.6 EXAMINATION OF SITE

.1 Prior to submitting a bid carefully examine conditions at the site, which may or will affect the work. Refer to and examine all Contract documents.

.2 Ensure that materials and equipment are delivered to the site at the proper time. Be responsible for any cutting and patching involved in getting assemblies into place.

1.7 QUALITY ASSURANCE:

.1 General Codes and Standards:

.1 Comply with the Ontario Building Code and Canada Labour Code, Part 4.

.2 Where provisions of pertinent codes or local by-laws conflict with these Specifications and Drawings or each other, comply with the more stringent provisions.

.3 Operating voltages shall comply with CAN3-C235-83 (R2015).

.4 Ground system shall comply with CSA Standard C22.1.

.5 Abbreviations for electrical terms: to CSA Z85-1983

.2 Provide new materials bearing certification marks or labels acceptable under Ontario Electrical Safety Code.

.1 Equipment must bear, on manufacturer's label, certification mark or label acceptable under Electrical Safety Authority.

.3 Provide units of same manufacture where two or more units of same class or type of equipment are required.

.4 Manufacturer's names are stated in this Specification to establish a definite basis for bid submission and to clearly describe the quality of product that is desired for the work.

.5 Standard Specifications

.1 Ensure that the chemical and physical properties, design, performance characteristics and methods of construction of all products provided comply with latest issue of applicable Standard Specifications issued by authorities having jurisdiction, but such Standard Specifications shall not be applied to decrease the quality of workmanship, products and services required by the Contract Documents.

.6 Electrical Codes and Permits:

.1 The work shall be bid on and shall be carried out in accordance with these Drawings and Specifications and shall comply with the essential requirements of the latest editions of the Canadian Electrical Code C-22.1 and the Electrical Safety Code (together with applicable bulletins issued by the Inspection Department of Electrical Safety Authority). In no instance, however, shall the standards established by the Drawings and Specifications be reduced by any of the codes referred to above. In the

event of conflicting requirements, the codes shall take precedence over these Contract Documents and the Engineer's decision shall be final.

.2 Arrange for and obtain all necessary permits, inspection and approvals from authorities having jurisdiction, and also pay all applicable fees. The Contractor shall conform with all Municipal Codes and By-laws which affect the work.

.3 Applicable Codes

.1 Ontario Electrical Safety Code

.2 Canadian Electrical Code with applicable regional amendments

.3 Ontario Building Code

.4 National Building Code

.5 Ontario Fire Code

.6 National Fire Code and Fire Commissioner Canada requirements

.4 Before starting any work, submit the required number of copies of Drawings and Specifications to the Electrical Safety Authority and the local authority for approval and comments. Comply with any changes requested as part of the Tender, but notify the Engineer immediately of such changes for proper processing of these requirements. Prepare and furnish any additional Drawings, details or information as may be required by the Engineer.

.5 On or before the completion of this Contract, obtain at own expense, the necessary certificate of inspection from the Inspection Branch of the Electrical Safety Authority of Ontario and forward same to the Engineer.

.6 Equipment and material must be acceptable to Electrical Safety Authority.

.7 Where materials are specified which require special inspection and approval, obtain such approval for the particular installation with the co-operation of the material supplier.

.8 Supply and install warning signs, nameplates and glass covered Single Line Diagrams as required by Electrical Safety Authority.

.9 Submit required Documents and shop drawings to authorities having jurisdiction in order to obtain approval for the Work. Copies of Contract Drawings and Specifications may be used for this purpose.

1.8 REQUIREMENTS OF DRAWINGS:

.1 Contract:

.1 The Drawings for electrical work are essentially performance drawings, partly schematic, intended to convey the scope of work and extent of work. They only indicate general arrangement and approximate location of apparatus, fixtures and general typical sizes and locations of equipment and connections. The Drawings do not intend to show architectural, structural or mechanical details.

.2 Do not scale Drawings, but obtain information involving accurate dimensions to structure from those shown on Landscape and Civil Drawings, or by site measurements of existing areas. Follow the Electrical Drawings in laying out the work but consult general Construction Drawings as well as detail Drawings to become familiar with all conditions affecting the work, and verify spaces in which the work will be installed and structures to which it will be attached.

.3 Make, at no additional cost, any changes or additions to materials, and/or equipment necessary to accommodate site conditions. Alter, at no additional cost, the location of materials and/or equipment up to 3m, or as directed, provided that the changes are made before installation and do not necessitate additional material or labour.

.4 Leave space clear and install work to accommodate future materials and/or equipment as indicated and to accommodate equipment and/or material supplied by other trades. Verify all equipment sizes in relation to space allowed and check all clearances.

.5 Confirm on the site, the exact location and mounting elevation of equipment and fixtures as related to Landscape and Civil details. Confirm location of outlets and/or connection points for equipment supplied by other trades.

1.9 SHOP DRAWINGS:

.1 Pay careful attention to all shop drawings and review comments and ensure that all requirements are fully complied with.

.2 Submit prior to commencement of work for review, manufacturer's or vendor's drawings for all products being furnished except cable (up to 1000V), wire and conduit. Include rating, performance, specification sheets, descriptive literature, schematic and wiring diagrams, dimensional layouts and weights of components as well as complete assembly .

.3 Carefully examine Work and Drawings of all related trades and thoroughly plan the Work so as to avoid interferences. Report defects which would adversely affect the Work. Do not commence installation until such defects have been corrected.

.4 Submit prior to commencement of work for review, properly identified shop drawings showing in detail the design and construction of all equipment and materials as requested in sections of the specification governed by this Section.

.5 Obtain and comply with the manufacturer's installation instructions.

.6 Endorse each shop drawing copy "CERTIFIED TO BE IN ACCORDANCE WITH ALL REQUIREMENTS", stamp each copy with your company name, date each copy with the submittal date, and sign each copy. Shop drawings which are received and are not endorsed, dated and signed will be returned for re-submittal.

.7 The Consultant will stamp shop drawings as follows:

.1 Drawing: Reviewed ( )

.2 Reviewed as Modified ( )

.3 Revise and Resubmit ( )

.4 Not Reviewed ( )

.8 If "REVIEWED" is checked-off, the shop drawing is satisfactory. If "REVIEWED AS MODIFIED" is checked-off, the shop drawing is satisfactory subject to requirements of remarks put on shop drawing copies. If "REVISE AND RE-SUBMIT" is checked-off, the shop drawing is entirely unsatisfactory and must be revised in accordance with comments written on shop drawing copies and resubmitted. If "NOT REVIEWED' is checked-off, the shop drawing is in error of submission, not applicable for this project.

.9 This review by the Consultant/Engineer is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Consultant/Engineer approved the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract documents. Be responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co- ordination of the work as well as compliance with codes and inspection authorities such as C.S.A., etc.

.10 Coordinate Work of this Division such that items will properly interface with Work of other Divisions.

1.10 SUBSTITUTIONS

.1 When only one manufacturer's catalogued trade name is specified, provide only that catalogued trade name, material or product.

.2 When more than one manufacturer's trade name is specified for a material or product, the choice is the bidders.

.3 No substitution is allowed upon award of Tender.

1.11 DIMENSIONS AND QUANTITIES

.1 Dimensions shown on Drawings are approximate. Verify dimensions by reference to shop drawings and field measurement.

.2 Quantities or lengths indicated in Contract Documents are approximate only and shall not be held to gauge or limit the Work.

.3 Make necessary changes or additions to routing of conduit, cables, and the like to accommodate structural, civil and landscape conditions.

1.12 EQUIPMENT LOCATIONS

.1 Devices, fixtures and outlets may be relocated, prior to installation, from the location shown on the Contract Drawings, to a maximum distance of 3 m without adjustment to Tender price.

1.13 WORKING DRAWINGS AND DOCUMENTS

.1 Contractor may be required to prepare working detail drawings supplementary to the Contract drawings, when deemed necessary by the Consultant, for all areas where a multiplicity of materials and or apparatus occur, or where work due to architectural and structural considerations involves special study and treatment. Such drawings may be prepared jointly by all trades affected, or by the one (1) trade most affected with due regard for and approval of the other trades, all as the Consultant will direct in each instance. Such drawings must be reviewed by the Consultant before the affected work is installed.

.2 Carry out all alterations in the arrangement of work which has been installed without proper study and approval, even if in accordance with the Contract documents, in order to make such work come within the finished lines of walls, floors and ceilings, or to allow the installation of other work, without additional cost. In addition, make any alterations necessary in other work required by such alterations, without additional cost.

1.14 INSTALLATION DRAWINGS

.1 Prepare installation drawings for equipment, based upon approved Vendor drawings, to check required Code clearances, raceway, busway and cable entries, sizing of housekeeping pads and structure openings. Submit installation drawings to Consultant for review.

1.15 "AS BUILT" RECORD DRAWINGS

.1 Maintain record revisions and furnish record drawings for work of this Division. Obtain for this purpose at least two sets of white prints.

.2 Show on record drawings, all deviations in the work; exact locations for all electrical services buried below pavement and soft landscaping; concealed junction or pull boxes; access panels. Locate exterior buried work by dimension from lighting poles and other fixed objects.

.3 Obtain approvals for all provisions for future extension, and establish verification before these are concealed.

.4 Provide "As Built" Record Drawings (clean marked-up white print) together with other documents required upon completion of the work.

1.16 TEST REPORTS

.1 For each check and test performed prepare and submit a Test Report, signed by the Test engineer, and where witnessed, by the Consultant.

.2 Include record of all tests performed, methods of calculation, date and time of test, ambient conditions, names of testing company, test engineer, witnesses, also calibration record of all test instruments used together with manufacturers name, serial number and model number.

.3 Include calibration record, percentage error and applicable correction factors.

.4 Submit a Certified Test Report from each manufacturer, signed by the certifying inspector, confirming correct installation and operation of each product and part of Work. Include name of certifying inspector, date and times of inspection, ambient conditions.

1.17 MISCELLANEOUS METAL FABRICATIONS

.1 Provide miscellaneous structural supports, platforms, braces, brackets and preformed channel struts necessary for suspension, attachment or support of electrical. All supports, platforms, brackets and channel struts shall be made of stainless steel material.

1.18 SUPERINTENDENCE

.1 Maintain at the job site, at all times, competent personnel and supporting staff, experienced in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

1.19 PATENTS

.1 Pay all royalties and licence fees, and defend all suits or claims for infringement of any patent right, and save the Owner and Consultant harmless of loss or annoyance on account of suit, or claims of any kind for violation of infringement of any letters, patent or patent rights, by this Subcontractor or anyone directly or

indirectly employed by him or by reason of the use by him or them of any part, machine, manufacture or composition of matter on the work, in violation or infringement or such letters, patent or rights.

1.20 RIGHTS RESERVED

.1 Rights are reserved to furnish any additional detail drawings, which in the judgment of the Consultant may be necessary to clarify the work and such drawings shall form a part of this Tender.

1.21 METALS

.1 Steel construction required solely for the work of electrical trades and not shown on landscape or civil drawings shall be provided by this trade in accordance with applicable code requirements.

1.22 WORKMANSHIP

.1 Install equipment, ductwork, conduit and cables in a workmanlike manner to best suit space, to present a neat appearance and to function properly to the satisfaction of the Consultant.

.2 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore.

.3 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers installation instruction.

.4 Replace work unsatisfactory to the Consultant without extra cost.

.5 Make provision to accommodate future plant and equipment indicated on drawings.

.6 Protect from damage all equipment delivered to the site and during installation. Any damage or marking of finished surfaces shall be made good to the satisfaction of the Consultant.

1.23 OWNER RIGHT TO RELOCATE ELECTRICAL ITEMS

.1 The Owner reserves the right to relocate electrical items (light fixtures) during construction, but prior to installation, without cost, assuming that the relocation per item does not exceed 3 m (10'-0") from the original location. No credits shall be anticipated where relocation per item of up to and including 3m reduces materials, products and labour.

.2 Should relocations per item exceed 3m from the original location the Tender price will be adjusted accordingly.

.3 Necessary changes, due to lack of co-ordination, and as required and when approved, shall be made at no additional cost, to accommodate structural and building conditions. The location of pipes and other equipment shall be altered without charge to the Owner, if approved, provided the change is made before installation.

1.24 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

.1 Each copy of the manual shall include:

.1 A set of as-built prints;

.2 Letters of Owners Instructions;
.3 Final Electrical Safety Authority Certificate of Inspection;
.4 Verification Certificates for all systems as specified hereinafter;
.5 A copy of "reviewed" shop drawings;
.6 Complete explanation of operation principles and sequences;
.7 Complete part lists with numbers;
.8 Recommended maintenance practices and precautions;
.9 Parts manual and repair manuals
.10 Complete wiring and connections diagrams;
.11 Certificates of guarantee;
.12 Single Line Diagram

.2 Ensure that operating and maintenance instructions are specific and apply to the models and types of equipment provided.

1.25 TRIAL USAGE

.1 The Consultant/Engineer reserves the right to use any system, piece of equipment, device, or material for such reasonable lengths of time and at such times as may be required to make a complete and thorough test of the same, or for the purpose of learning operational procedures, before the final completion and acceptance of the work. Such tests shall not be construed as evidence of acceptance of the work, and it is agreed and understood that no claim for damage will be made for injury or breakage to any part or parts of the above due to the aforementioned tests, where such injuries or breakage are caused by a weakness or inaccuracy of parts, or by defective materials or workmanship of any kind. Supply all labour and equipment required for such tests.

.2 Perform and pay for all costs associated with any testing required on the system components where, in the opinion of the Consultant/ Engineer the equipment manufacturer's ratings or specified performance is not being achieved.

1.26 INSTRUCTION TO OWNERS

.1 Instruct the Owner's designated representatives in all aspects of the operation and maintenance of all systems and equipment.

.2 Arrange for, and pay for services of service engineers and other manufacturer's representatives required for instruction in the operation of systems and equipment.

.3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:

.1 Date instruction were given to the Owner's staff.
.2 Duration of instruction.
.3 Name of persons instructed.
.4 Other parties present (manufacturer's representative, consultants, etc.)

.4 Obtain the signature of the Owner's staff verifying that they properly understood the system installation, operation and maintenance requirements, and that they have received the specified manuals and "as-built" drawings.

1.27 SYSTEM ACCEPTANCE

.1 Submit original copies of letters from the manufacturers of all systems indicating that their technical representatives have inspected and tested the respective systems and are satisfied with the method of installation, connection and operation.

.2 These letters shall state the names of persons present at testing, the methods used, and a list of functions performed with location and room numbers where applicable.

1.28 CLEANING

.1 Before energizing any systems, inspect and clean the inside of panel boards, switchgear, and cabinets to ensure that they are completely free from dust and debris.

.2 Clean all polished, painted and plated work bright.

.3 Remove all debris, surplus material and all tools

.4 Carry out additional cleaning operating of systems as specified in other sections of this Division.

1.29 PAINTING WORK SUPPLIED UNDER DIVISION 26

.1 Touch up minor chips or damage to electrical equipment, installed in this Division, with standard, factory supplied, enamel finish.

.2 Colour code, as specified herein, outlet boxes, pull boxes, junction boxes by applying a small dab of paint to inside of each item during installation.

1.30 INSPECTION AND TESTING

.1 Systems, equipment, and all major items of material will be tested to the satisfaction of the owner's representative and as required to establish compliance with plans and specifications, and with the requirements for the Supply and Inspection Authorities.

.2 Faulty and defective equipment will be replaced with new materials. Conductors which are found to be shorted or grounded, or have less than proper insulation resistance, will be replaced with new conductors.

.3 Tests will include, but are not limited to, the following:

.1 Test of secondary voltage cables will include megger tests to establish proper insulation resistance, and phase-to-ground resistance of cables.

.2 Test of all adjustable overload and overcurrent protective devices of secondary switchgear to establish calibration and operation in accordance with specifications and approved co-ordination curves.

.3 Visual examination of switchgear to determine adherence to allowable manufacturing tolerance and compliance with manufacturer's recommended installation requirements.

.4 Proper functioning of all systems.

.5 Polarity tests - to establish proper polarity connections to all sockets and receptacles.

.6 Test of system neutral to establish proper insulation resistance and isolation of neutral from ground except for required ground connection a Service.

1.31 REMOVALS

.1 Co-ordination between New and Existing Installations

.1 Provide interfacing components between new and existing systems as necessary for proper performance and operation.

.2 Existing Services

.1 Ensure existing services remain undisturbed and energized except where indicated.

.2 Disconnect and remove abandoned wiring materials and devices.

.3 Interruption of Services

.1 Maintain existing systems in existing school at all times during construction.

.2 Obtain Consultant's written approval before interrupting any service. Long outages are not acceptable.

.4 Premium Time

.1 Power shutdowns to the site will only be allowed on weekends between the hours of Friday 12.00 midnight to Sunday 12.00 midnight. Include all costs for this overtime work in the contractor’s bid.

.2 Include cost of premium time in bid price for work during nights, weekends or other time outside normal working hours necessary to do the work and maintain electrical services in operation.

.3 Premium time is to include work by local hydro authority, ESA and any other authorities having jurisdiction as required.

.5 Use of Existing Material and Equipment

.1 Unless noted otherwise, do not use any existing panels, boxes and wiring materials unless shown on drawings.

.6 Demolition

.1 Demolish existing work, where indicated, and remove from site.

.2 Execute all demolition work so as to create minimum vibration or dust within and outside the building. Obtain Consultant's approval of methods before proceeding.

1.32 HYDRO CHARGES

.1 The Owner will pay the Toronto Hydro connection charges related to this project.

.2 The electrical contractor will provide the co-ordination with Toronto Hydro to ensure prompt service connection.

Part 2 Products

2.1 Not Used

.1 Not Used

Part 3 Execution

3.1 Not Used

.1 Not Used

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Conform to all applicable Sections of Division 1.

1.2 REFERENCES

.1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables

.2 CSA C22.2 No.38-05, Thermoset-Insulated Wires and Cables

.3 CSA C22.2 No.75-03, Thermoplastic-Insulated Wires and Cables

.4 CSA-C22.2 No.131-M89 (R1994), Type TECK 90 Cable

.5 ASTM B800 - Standard Specification for 8000 Series Aluminium Alloy Wire for Electrical Purposes – Annealed and Intermediate Tempers

.6 CSA 2.2.1 – Canadian Electrical Code - Part 1

.7 CAN/CSA C22.2 No.18 – Outlet Boxes, Conduit Boxes, and Fittings

.8 CSA C22.2 No.45 – Rigid Metal Conduit

.9 CSA C22.2 No.56 – Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit

.10 CSA C22.2 No.83 – Electrical Metallic Tubing

.11 CSA C22.2 No.211.2 – Rigid PVC (Unplasticized) Conduit

.12 CAN/CSA C22.2 No.227.3 – Flexible Non-Metallic Tubing

.13 CSA C22.2 No.227.1 – Electrical Non-Metallic Tubing

.14 ANSI/NFPA 70 – National Electrical Code

.15 CSA-C22.1 – Canadian Electrical Code

.16 ASTM B 633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel

.17 ASTM A 653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process

.18 ASTM A 123 – Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel

.19 ASTM A 510 – Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

.20 ASTM A 641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.21 ASTM A 580 – Standard Specification for Stainless Steel Wire

.22 ASTM D 769 – Standard Specification for Black Oxide Coatings

1.3 SHOP DRAWINGS

.1 Unless otherwise noted, shop drawings need not be submitted for standard manufactured items and materials provided they are as specified.

1.4 Submittals

.1 Submit the following to the Consultant for review:

.1 Location drawings for all required sleeves and formed openings in poured concrete construction.

.2 Location drawings for all required openings. These locations must be reviewed and accepted by the Consultant prior to the Contractor drilling or core drilling.

.3 A sample of lamacoid nameplates and list of proposed nameplate legends.

.4 Samples of wiring devices and cover plates.

1.5 QUALITY ASSURANCE

.1 All components shall be CSA or ULC approved listed and labelled.

Part 2 Products

2.1 CONDUITS AND RACEWAYS

.1 Conduits and Fittings:

.1 Rigid Galvanized Steel Conduit (RGS):

.1 CAN/CSA C22.2 Number 45-M.

.2 Rigid thickwall galvanized steel threaded conduit.

.2 Rigid PVC Conduit (RPVC):

.1 CSA C22.2 Number 211.2-M.

.2 Rigid PVC conduit.

.3 Non-Metallic Flexible Conduit:

.1 Non-metallic extra flexible PVC conduit.

.4 Rigid Steel Conduit Fittings:

.1 CAN/CSA C22.2 Number 18.

.2 Galvanized or polymer coated cast steel fittings.

.3 Expansion fittings, watertight with integral bonding jumper suitable for linear expansion and 19mm deflection in all directions.

.4 Sealing condulets for hazardous areas.

.5 Corrosive resistant coated cast steel fittings for corrosive resistant conduit.

.5 Rigid PVC Conduit Fittings:

.1 CSA C22.2 Number 85-M.

.2 Rigid PVC fittings of same manufacture as rigid PVC conduit.

.6 Minimum size conduit will be 21mm diameter.

.7 All conduit shall contain a ground conductor.

.8 All conduit must have adequate support systems complete with approved fittings, outlet boxes, junction boxes, sealing fittings and drains as indicated or as required. Provide hot dipped galvanized steel beam clamps, hot dipped galvanized steel channel type supports where required. Provide 6mm threaded galvanized steel rods to support

suspended channels and provide all necessary galvanized steel spring loaded bolts, nuts, washers and lock washers. Support systems shall be Thomas and Betts Superstrut or approved equal.

.9 Provide all conduit, fittings and ducts necessary to complete the distribution of all power, lighting and control conductors to electrical equipment specified under the corresponding Section. Include that necessary for connecting to mechanical heating and ventilating equipment, also equipment specified under other Divisions.

.10 Fasten conduit with malleable PVC coated galvanized steel two-hole straps at intervals to suit code requirements and job conditions.

2.2 FASTENINGS, SUPPORTS AND SLEEVES

.1 Galvanized steel, size and load rating to suit application.

.2 One hole steel straps to secure surface mounted conduits or surface mounted cables 50mm diameter and smaller. Two hole steel straps for conduits and cables larger than 50mm.

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

.4 Channel type supports for two or more conduits.

.5 6mm minimum diameter threaded rods to support suspended channels.

.6 6mm minimum diameter U-bolts.

.7 Sleeves: Schedule-40 steel pipe minimum I.D. 13mm larger than O.D. of conduit or cable passing through.

2.3 JUNCTION BOXES

.1 Code gauge (galvanized) sheet steel EEMAC Type-3R size as required by code for number and size of conduits, conductors and devices, complete with covers, corrosion resistant screws, terminals and mounting channels.

.2 Screw-on sheet steel covers to match enclosure for surface mounting boxes.

.3 Covers with 25mm minimum extension around for flush-mounted junction boxes.

2.4 CONDUIT BOXES – GENERAL

.1 Size boxes in accordance with latest edition of Electrical Safety Authority (ESA) Electrical Safety Code.

.2 Galvanized cast or pressed steel, for rigid thickwall threaded conduit.

.3 200mm square or larger outlet boxes as required for special devices.

.4 50mm x 100mm outlet boxes for devices, ganged for grouped devices, barriers where required by code.

.5 Rigid PVC boxes for rigid PVC conduit.

2.5 PULL BOXES

.1 Code gauge galvanized sheet steel welded construction, EEMAC Type-3R.

.2 Screw-on galvanized sheet steel covers for surface mounting boxes.

.3 Covers with 25mm minimum extension around, for flush mounted pull boxes.

2.6 RIGID CONDUIT BOXES

.1 Zinc electroplate and polymer enamelled cast, single cast-iron, ferroloy shallow (FS) boxes with factory-threaded hubs and mounting feet for surface mounted switches and receptacles, with gasketed coverplate for exterior work and wet areas.

2.7 BRANCH CIRCUIT CONDUCTORS

.1 Conductors:

.1 ASTM Class-B, soft drawn, electrolytic copper.

.2 Stranded.

.2 Insulation:

.1 CSA Type RWU90 XLPE (-40°C):

.1 Heat and moisture resistant.

.2 Low temperature, chemically cross-linked thermosetting polyethylene material.

.3 1000V rated.

.4 For maximum 90°C conductor temperature.

.5 For installation at minimum -40°C.

.6 CSA C22.2 Number 38.

.3 Branch circuit conductors to maximum and including number 3.31mm² (12AWG) shall be solid. Branch circuit conductors in sizes larger than number 3.31mm² (12AWG) shall be stranded. All branch circuit conductors shall be constructed of 90 per cent conductive copper, unless otherwise noted, and shall be approved for 600V.

.4 Electric service, distribution and special conductors are specified in this Section or on the Contract Drawings.

.5 Aluminum conductors shall not be used for any services on this Project. All cables/wiring shall be of copper only throughout this Project. No exceptions will be permitted.

2.8 WIRE AND CABLE CONNECTORS

.1 Copper compression type wire and cable terminations for number 3.31mm² (12AWG) and larger conductors, colour keyed, sized to suit. Long barrel NEMA two hole lugs for sizes number 53.48mm2 (1/0 AWG) and larger.

.2 Twist type splicing connectors shall not be used on this Project.

.3 Conductor compression splice for number 5.26mm² (10AWG) or smaller.

2.9 HEAT SHRINKABLE TUBING INSULATION, HEAVY WALL

.1 Acceptable Manufacturers: Thomas and Betts, Shrink-Kon series, Ideal Thermo-Shrink, TS-46, Raychem tubing WCSM, 3M cable sleeve ITCSN.

Part 3 Execution

3.1 GENERAL CONDUIT AND CONDUCTOR INSTALLATION REQUIREMENTS

.1 Install conduit and conductors concealed in all finished areas (no exceptions), and concealed to the degree made possible by finishes in partially finished and unfinished areas. All conduits must be concealed in walls (no exceptions) in all areas; conduit may be exposed where run on unfinished ceilings (unless concealment is possible).

.2 Where conduits are exposed, arrange same to avoid interference with other work and parallel to the building lines, horizontal conduits can only be exposed where run on exposed ceilings and shall be installed as high as possible. Do not install conduit or conductors within 150mm of flue or heating pipes or equipment.

.3 All conduits must be concealed no exceptions. Conduits to have own support system and are to be supported independently of the ceiling grid or ceiling support system.

.4 Where vertically run conduit passes through a slab, Contractor to provide a 100mm high concrete pad with the pad extending 100mm on all sides of the conduit.

.5 Use rigid galvanized steel threaded conduit where conduit is subject to mechanical injury.

.6 Use rigid PVC conduit underground.

.7 Minimum conduit size for lighting and power circuits: 27mm.

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

.9 Mechanically bend steel conduit over 21mm diameter.

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

.11 Install fish cord in empty conduits.

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

.13 Dry conduits out before installing wire.

3.2 CONDUIT – GENERAL

.1 Run parallel or perpendicular to building lines.

.2 Group raceways wherever possible. Support on channels.

.3 Install expansion joints as required.

.4 Use metallic raceway where temperatures exceed 75°C or where enclosed in thermal insulation.

.5 All conduits to contain insulated green ground wire.

.6 Install 6mm diameter nylon pull cord in empty raceways.

.7 All un-dimensioned conduits on the Contract Drawings are 21mm (3/4”) minimum.

3.3 CONDUIT AND FITTINGS

.1 Minimum Conduit Sizes:

.1 Directly buried 53mm trade size conduit.

.2 Conduit Application and Type:

.1 Outdoor Areas: Rigid steel conduit.

.2 Underground or embedded in Concrete:

.1 Other than grade slab: Rigid (PVC).

.2 In or below grade slab: Rigid (PVC).

.3 Use field threads on rigid conduit of sufficient length to draw conduits up tight.

.4 Do not bend coated steel conduit. Use elbows for deflections.

.5 Use factory "ells" where 90 degree bends are required for 27mm trade size and larger conduits.

.6 Where conduit joints occur in damp or wet locations, make joints watertight by applying an approved compound on the entire thread area before assembling. Draw up all conduit joints as tightly as possible.

.7 Cap empty conduits which do not terminate in outlets, panels, cabinets and suchlike, with standard galvanized plumber’s pipe caps.

.8 Plug empty conduits.

.9 Install double locknuts and bushings on all rigid conduit terminations into threadless openings. Increase length of conduit threads at terminations sufficiently to permit bushing to be fully seated against end of conduit.

.10 Mechanically bend steel conduit.

3.4 JUNCTION BOXES

.1 Install junction boxes in inconspicuous but accessible locations. Secure to structure.

.2 Install terminal blocks on mounting rails, for termination of each wire and cable regardless of size.

.3 Only one voltage source is permitted in a junction box.

.4 Install barriers to separate different auxiliary systems.

3.5 PULL BOXES

.1 Install pull boxes in inconspicuous but accessible locations. Secure to structure.

.2 Install pull boxes so as not to exceed 30 metres of conduit run between pull boxes.

.3 Only one voltage source is permitted in a pull box.

.4 Install barriers to separate different auxiliary systems.

3.6 CONDUIT BOXES

.1 Install conduit outlet boxes for conduit to maximum 32mm and pull boxes for larger conduits.

.2 Support boxes independently of connecting conduits.

.3 Seal boxes during construction to prevent entry of debris, dust and dirt.

3.7 INSTALLATION OF BRANCH CIRCUIT CONDUCTORS

.1 Install wiring in raceways unless noted otherwise. All wiring to be copper, no exceptions.

.2 Minimum Wire Sizes:

.1	Power and Lighting	Number 3.3mm² (12AWG)
.2	Control	Number 2.1mm² (14AWG)

.3 Wire and Cable Application and Type:

.1 All wiring shall be RWU90

.4 Use lubricant when pulling wires into conduit. Ensure that wires are kept straight and are not twisted or abraded.

.5 Neatly secure exposed wire in apparatus enclosures with approved supports or ties.

.6 Provide a minimum of one grounding wire for each three ungrounded conductors on all cable runs. Size grounding to Table 16 of the Ontario Electrical Code. Provide separate ground conductors for ground fault circuit interrupter circuits. All ground conductors to be copper and insulated with a green coloured insulation.

.7 All equipment to be grounded through ground wires.

.8 Provide separate neutral conductor for each 120V circuit for all circuits feeding receptacles and power outlets.

.9 All cable terminations to be compression type fittings for wire sizes greater than 8.36mm² (8AWG). All compression type fittings to be two-hole long barrel type. Where mechanical screw type lugs are allowed by the Consultant, they will be suitable for quantity of parallel runs of wire that are to be terminated under.

.10 Wire Splicing:

.1 Splice up to and including 13.29mm² (6AWG) with nylon insulated expandable spring type connectors.

.2 Splice larger conductors using compression type connectors wrapped in PVC insulation rated at the respective voltage.

.11 Maximum voltage drop for 12VDC wiring to remote lighting heads shall be five per cent max at the farthest remote head. Size conductors accordingly.

3.8 CONNECTORS

.1 Install compression terminations and splices in accordance with manufacturer's written instructions.

.2 Make splices in junction boxes.

.3 Make connections in lighting circuits with twist type splicing connectors.

.4 Terminate and splice conductors Number-8 and larger at terminal blocks in junction boxes.

.5 Seal terminations and splices exposed to moisture, corrosive conditions or mechanical abrasions with heavy wall heat shrinkable insulation.

.6 Install fixture type connectors and tighten. Replace insulating cap.

3.9 INSTALLATION OF CONTROL CABLES

.1 Install all control cables recessed in conduit.

.2 Ground control cable shield.

3.10 PAINTING AND FINISHES

.1 Provide all painting and patching as required.

.2 In general, equipment will be galvanized or painted in the factory before being shipped to site. Where painting is required, the material will be sanded and cleaned. The metal will have an approved prime rust resistant coat and will be finished in two coats of an approved exterior gloss enamel paint.

.3 After installation, touch up all scratches, chips, other damage and defects in paint, using zinc chromate primer or paint or special enamels as necessary to match the original.

.4 Finish and colour of all equipment will be co-ordinated to provide uniform appearance.

.5 Painting of conduits and supports and other exposed surface work will be done under Painting Section except as noted.

.6 Install material in time to be painted together with mounting surfaces.

.7 Do not paint over nameplates.

.8 Refer to other Sections for special paint finishes of equipment.

3.11 STANDARD IDENTIFICATION

.1 Identify electrical work as specified below:

.2 For each piece of electrical equipment from the panelboard to maximum and including battery packs and for any other piece of equipment where specified in this Section, provide engraved lamacoid identification nameplates. Nameplates shall be lamacoid black with white letters and with bevelled edges, secured to apparatus with stainless steel screws. Warning signs, if and when required, shall be red with white lettering.

.3 Exact nameplate wording and sizes must be approved by and confirmed by the Consultant prior to manufacture.

.4 Clearly identify main pull or junction boxes (excluding obvious outlet boxes) by painting the outside of the covers.

.5 Colour code conductors, throughout to identify phases, neutrals and grounds by means of self-laminating coloured tape, coloured conductor insulation, or properly secured coloured plastic discs. Colours shall be as follows:

.1	Phase A:	Red
.2	Phase B:	Black
.3	Ground:	Green
.4	Neutral:	White

3.12 FIELD FABRICATED METAL WORK

.1 Clean and prime paint field fabricated metal work.

.2 After fabrication deburr, scrape, grind smooth, wire brush with power brush and degrease metal work.

.3 Prime paint steel with one (1) coat of CISC/CPMA 2.75 oil alkyd primer.

.4 Prime paint aluminum as follows: Wash with detergent solution and wipe down with SSPC-SP1 solvent. Apply Glidden number Y-5229 primer to 1.5 mils DFT.

.5 For brass and bronze alloy materials, prepare as for aluminum but apply one (1) coat of CAN/CGSB-1.40-M zinc chromate primer.

3.13 TESTS

.1 Branch circuit balancing: Connect all branch power circuits to panel boards so as to balance the actual loads (wattage) within five (5) per cent. Connect loads to circuits as indicated on the Contract Drawings.

.2 Carry out insulation resistance (Megger) tests, ground continuity and resistance tests, satisfactory to the Consultant.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1	Submittal Procedures	Section 01 33 00
.2	General Instructions for Electrical	Section 26 05 00
.3	Electrical Basic Materials	Section 26 05 10

1.2 SUBMITTALS

.1 Submit required documents to authorities having jurisdiction to obtain approval for design.

.2 Calculations to include ground potential rise, step voltage and touch voltage tolerable levels in accordance with specified reference standards.

1.3 QUALITY ASSURANCE

.1 Building grounding system shall conform to requirements of Ontario Electrical Safety Code and Canadian Electrical Code C22.3, C22.2 No. 41-13 and meet approval of inspection department of the authority having jurisdiction.

Part 2 Products

2.1 EQUIPMENT

.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

.2 Rod electrodes: copper clad steel 19 mm dia. by 3 m long.

.3 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.4 Insulated grounding conductors: green, type RWU

.5 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where rigid PVC is used, run ground wire in conduit.

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

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process.

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

.6 Soldered joints not permitted.

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

.8 Install separate ground conductor to outdoor lighting standards.

.9 Connect metal Work to ground by welding copper to steel.

.10 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.11 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

.12 Step and Touch voltage levels to meet OESC code requirements.

3.2 ELECTRODES

.1 Install rod electrodes and make grounding connections.

.2 Bond separate, multiple electrodes together.

.3 Use size 4/0 AWG copper conductors for connections to electrodes unless otherwise indicated.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 CABLES

.1 Bond single conductor cable armour to equipment enclosure at (supply end) and (load end).

.2 Bond multiconductor cable armour to equipment enclosures.

.3 Bond grounding conductor of multiconductor armoured and non-armoured cable to ground bus or lug in equipment enclosures.

3.4 RACEWAYS

.1 On raceways, lock-up tight all couplers and connections to boxes and enclosures. Install bonding jumpers at expansion joints, and where necessary. Maintain ground continuity throughout run of raceway.

.2 Install bonding jumpers on both ends of flexible conduit. Use grounding bushing, solderless lug, clamp or cup washer and screw connection. Install grounding conductor inside flexible conduit.

.3 Non-metallic raceways: install insulated grounding conductor in raceway.

.4 Branch and feeder circuits in rigid conduit: use raceway as bonding conductor.

3.5 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: Service equipment, duct systems, building steel Work, distribution panels, outdoor lighting equipment.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with section 26 05 00 General Instruction for Electrical.

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

.3 Perform tests before energizing electrical system.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Section 26 05 00 – General Instructions for Electrical also applies to and is a part of this Section of the Specification.

.2 Conform to latest issues, amendments and supplements of following standards:

.1 NFPA 70E Electrical Safety in the Workplace

.2 ANSI Z535.4 Product Safety Signs and Labels

.3 CSA Z462 Workplace Electrical Safety

.3 Conform to latest issues, amendments and supplements of following standards:

.1 CSA C22.2 Number 5.1 – Moulded Case Circuit Breakers

.2 CSA C22.2 No.29 – Panelboards and Enclosed Panelboards

.3 CSA C22.2 Number 39 – Fuseholder Assemblies

.4 CSA C22.2 Number 106-M – HRC Fuses

.5 UL 60950 – Standard for Information Technology Equipment

.6 NFPA 75 – Standard for the Protection of Information Technology Equipment

.7 NFPA 70E – Electrical Safety in the Workplace

.8 ANSI Z535.4 – Product Safety Signs and Labels

.9 IEEE 1584 – Guide for Performing Arc Flash Hazard Calculation

.10 IEEE 141 – Recommended Practice for Electric Power Distribution in Industrial Plants

.11 CSA Z462 – Workplace Electrical Safety

1.2 STANDARDS

.1 Provide all products and services in accordance with the following codes and standards:

.1 OESC - Ontario Electrical Safety Code

.2 CSA - Canadian Standard Association

.3 EEMAC - Electrical and Electronics Manufacturers Association of Canada

1.3 SCOPE OF WORK

.1 Supply all labour, tools, services and equipment and provide all materials and equipment required to complete service and distribution work in accordance with this section of the specification and the drawings.

1.4 QUALITY ASSURANCE

.1 All low voltage distribution work shall be executed by skilled tradesperson fully experienced in the installation of electrical power systems.

.2 All equipment shall be constructed to EEMAC standard and shall carry the CSA label or the contractor shall obtain Electrical Safety Authority approval.

.3 All equipment shall be suitably noted for the system available fault and HRC fuses shall comply with CSA C22.2 No. 106.

1.5 SUBMITTALS

.1 Refer to Division 1 General Requirements and submit shop drawings for the following:

- .1 Breakers
- .2 Distribution Panel
- .3 Surge Protector (SPD)
- .4 Lightning Arrestor
- .5 Power pedestals
- .6 Lighting controls
- .7 Lighting Fixtures and poles (Section 26 51 13 and Lighting Fixture Schedule on Drawing)

Part 2 Products

2.1 REFERENCES

.1 Refer to Section 26 05 10 Electrical Basic Materials. This Section also applies to and is part of this section of the specifications.

2.2 SECONDARY DUCT

.1 Provide secondary service ductwork (103mm red Rigid PVC conduit) as indicated and to Toronto Hydro and ESA requirements.

2.3 SECONDARY SERVICE CABLES

.1 Toronto Hydro to provide 3-1/0 Aluminum cables in contractor supplied duct generally as shown on the drawings.

2.4 SERVICE CONNECTION

.1 Co-ordinate service connections requirements with Toronto Hydro.

2.5 METERING BASE

.1 Provide hydro meter base to Toronto Hydro requirements.

2.6 LIGHTNING ARRESTERS

.1 Lightning arresters shall be provided on the line side of the main incoming breaker. The lightning arrester shall be 600 volt rated equal to CGE or McGraw Edison.

2.7 MAIN CIRCUIT BREAKER

.1 Service entrance rated circuit breaker, moulded case, 100A, 2 pole, quick make, quick break, trip free, provision for padlocking in off position.

.2 Circuit breaker to be part of service entrance distribution panel.

.3 Main breaker to be service entrance rated.

.4 Breakers shall be rated for 22,000 amps sym. short circuit at 240V.

.5 Acceptable Manufacturers for Moulded Case Type Circuit Breakers are FPE, Eaton, Square D or Siemens.

2.8 DISTRIBUTION LOAD CENTRE

.1 Load Centres for 120/240, 1 phase 3W shall be as follows:

.1 The load centres for distribution of power circuits shall be suitable for, 120/240V, 1 phase 3W operation as indicated, with ampacity and circuits as shown and with molded case circuit breakers having an interrupting capacity 22KA at rated voltage to meet available fault current.

.2 Cabinets shall "Code" quality, galvanized steel with all required knock-outs, minimum 290mm deep (for wire bending and gutter space), and removable box ends. Trims shall include adjustable concealed fasteners, concealed, hinged, lockable doors and suitable directory. Trim requirements shall suit the panel location. Panels shall be EEMAC3R enclosure.

.3 Load centre bussing shall be copper flat bars.

.4 The load centre shall be selected so that it can fit into the space available in the outdoor panel and shall meet the requirements of the Ontario Electrical Safety Code.

.5 Acceptable manufacturers are Schneider Group (FPE Ltd., Square D), Eaton Electrical and Siemens Ltd.

2.9 LOW VOLTAGE SERVICES

.1 Provide all low voltage service feeders and branch circuits and connect all equipment indicated on the drawings.

.2 All wiring shall be rated 600 volt unless otherwise noted, and shall comply with the general requirements specified in Section 26 05 00 and 26 05 10.

2.10 SURGE PROTECTOR (SPD)

.1 Provide surge protection for the main service, UL 1449, UL1283 and C.S.A. certified unit. The unit shall have 160kAmps surge current capacity per phase intended for high exposure environments. The unit shall be ANSI/IEEE C62.11, C62.41, C62.45 Categories A, B and C3 tested. The unit shall be life cycle tested to survive repeated surge currents. The enclosure shall be EEMAC12 mounted beside main breaker. Standard of acceptance equal to Total Protection Solutions model TK-ST160-1S/240-L for 120/240 Volt (3W+G) volt panels or approved equal.

2.11 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker, quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common trip breakers with single handle for multipole applications.

.3 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 3 -10 times current rating.

.4 Circuit breakers with interchangeable trips as indicated.

.5 Short circuit rating of 120V breakers to be 22kA rms. sym.

.6 Manufacturers:

- .1 Schneider Electric
- .2 Eaton Cutler-Hammer
- .3 Siemens
- .4 Or approved equal

2.12 TIMERS

.1 Enclosure: Steel, EEMAC 12.

.2 (Astronomic dial with 3-NO/3-NC 5 amp 120 volt contacts, adjustable settings with 1-"ON", 1-"OFF" per day).

.3 Manual bypass switch.

.4 120 volt motor with spring reserve.

.5 Acceptable Manufacturers:

- .1 Tork
- .2 Intermatic
- .3 Paragon

2.13 PHOTOELECTRIC RELAYS

.1 Weatherproof enclosure for conduit mounting, with adjustable light shield.

.2 Temperature range -40°C to +70°C.

.3 Switching time delay adjustable up to 30 seconds.

.4 Acceptable Manufacturers

- .1 Intermatic
- .2 Tork
- .3 Paragon

2.14 A.C. LIGHTING CONTACTORS

.1 Provide magnetic full voltage lighting contactors, non-reversing type for power and motor loads or lighting loads suitable in all respects for the application.

.2 Mount each contactor in a suitable EEMAC 3R enclosure, complete with the necessary accessories including pilot light in cover, and remote emergency trip where indicated.

.3 The current rating, number of poles etc., for contactors shall be as noted on the drawings.

.4 The Contractors shall be selected so that they can fit into the space available in the enclosure and shall meet the requirements of the Ontario Electrical Safety Code.

.5 Lighting contactors shall be provided with control transformer for 120V control operation. Include H-O-A switch on front face of the enclosure. Contactor shall be suitable for HID switching. For ampacities see drawings.

.6 Acceptable manufacturers are: Allen-Bradley, Siemens, Eaton Electrical and Schneider Group (Square D).

2.15 LIGHTING CONTROL

.1 A complete lighting control system shall be included in the contract as indicated on the drawings. The Contactor shall provide all the necessary relays and lighting contactors.

.2 Contactors shall be rated for a heavy duty, long life operation and require a minimum of maintenance.

.3 Control Relays - All control, time delay or double voltage relays shall be supplied and connected into their respective control circuits as indicated on the drawings. All relays shall be of robust construction, heavy duty hardened steel magnet faces for long life, silver to silver contracts, and shall have readily reversible contact arrangements, time delay and current ratings to suit the control requirements. The Contractor shall submit for approval a list showing manufacturer and type of all relays he intends to use.

Part 3 Execution

3.1 GENERAL

.1 Protect equipment from dust, debris, moisture, and physical damage, with sealed envelope of plastic or other impervious material until building is enclosed and cleaned and equipment is energized.

.2 Protect from condensation by maintaining at suitable temperature above 0°C.

.3 Finish equipment enclosures to ANSI 49 or ANSI 61, baked grey enamel.

3.2 POWER SERVICE

.1 Work by Toronto Hydro.

.1 The provision of metering transformers and hydro meters.

.2 Provision of secondary cables.

.2 Work by Division 26 for the power service.

.1 The secondary duct.

.2 The service entrance facilities.

.3 Metering enclosures as required.

.3 Be responsible for ensuring that the Supply Authority is informed a minimum of 24 hours (1 working day) prior to their required inspection and work.

3.3 INSTALLATION OF UNDERGROUND DUCT AND SECONDARY CABLES

.1 The contractor shall install approved ducts as detailed on the drawings.

.2 The contractor shall apply to ESA and Toronto Hydro Construction Department 48 hours before digging the trench. The contractor will then schedule construction and pouring inspections with the Construction Department.

.3 When complete, the ducts shall be clean waterproof and free from obstructions and the ends plugged with standard plastic duct plugs to prevent the ingress of moisture and dirt. The ducts shall be tested for clearance with a 95mm mandrel in the presence of a ESA and Toronto Hydro representative. A non-metallic, non-deteriorating rope of minimum five hundred pound breaking strength shall be installed in each duct (e.g. 5mm polypropylene rope).

3.4 INSTALLATION OF SECONDARY SERVICE CABLES

.1 Toronto Hydro shall supply and install the Secondary Service cables from the hydro pole to the secondary service entrance main breaker.

3.5 INSTALLATION OF METERING SOCKET

.1 Install metering socket where shown.

.2 Connect the metering socket as required with conduit.

.3 The provision of meters, wiring and connections will be carried out by Toronto Hydro.

3.6 INSTALLATION OF SERVICE ENTRANCE

.1 Install main breaker as indicated on the drawings.

.2 Provide grounding conductor #4/0 bare copper in 25mm ∅ conduit from the main ground to the grounding system as required by the Supply Authority.

3.7 PANELBOARDS

.1 Locate panelboards, secure, plumb true and square to structure.

.2 Identify load circuits on panel directory complete with name and location.

3.8 INSTALLATION OF BREAKERS

.1 Install breakers per the manufacturer’s recommendations and the Contract Drawings.

3.9 Field Quality Control

.1 Perform tests in accordance with section 26 05 00 – General Instructions for Electrical.

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

.3 Perform tests before energizing electrical system.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1	Shop Drawings and Other Submittals	Section 01 33 00
.2	General Instruction for Electrical	Section 26 05 00

1.2 REFERENCES

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

.1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.

.2 CISPR: International Special Committee on Radio Interference

.3 CSA C22.2 No. 9.0-96 (R2016) - Luminaires

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit Shop Drawings in accordance with section 01 33 00 Submittal Procedures.

.2 Submit certified copies of photometric test data, for each luminaire type, prepared by independent testing laboratory. Photometric data to include total input watts, candlepower summary, candlepower distribution, zonal lumen summary, luminaire efficiency, coefficient of utilization table and manufacturer, and lumen rating in accordance with IESNA testing procedures.

.3 Photometric data to include spacing criterion.

.4 Provide photometric calculations for all areas with proposed fixtures with the shop drawing submission.

1.4 SUBMITTALS

.1 Provide to Consultant a copy of all fixture cut sheets.

Part 2 Products

2.1 PATHWAY LIGHTING LUMINAIRES

.1 Work for this item shall be completed in compliance with OPSS.MUNI 617 and the following Specifications.

.2 The Contractor shall supply and install new luminaires at locations indicated on the contract drawings. Luminaires shall be mounted on poles as indicated on the contract drawings.

.3 Luminaires supplied shall be as follows:

.1 Size: 36.4W Type: LED Colour / Finish: Black, Manufacturer: Rab Design series Cat. No.: SKY-LED35-B-3K-T2-BLK-DIM-PT1A-7PIN-HC c/w house side shield and shorting cap.

.4 Fusing to be located in pole as follows:

.1 Fused connector kit: Gould GEB-11-11 c/w waterproof insulating boots or approved equal.

.2 Fuse: 10 amp midget ferrule fuse, Buss Type “KTK” or approved equal

.5 The luminaire is to be wired with #12AWG RWU stranded copper wiring from the pole handhole.

2.2 CONCRETE LIGHTING POLE

.1 The Contractor shall supply and install concrete poles as shown on the Contract Drawings, meeting City of Toronto Standards.

.2 The concrete pole shall be:

.1 Type A: 6.858m (22.5 ft.) direct buried precast concrete pole octagonal tapered, spun concrete pole. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole length, date of manufacture and a C.S.A. stamp.

.1 Cross Section: Tapered octagonal

.2 Finish: Etched

.3 Colour: Eclipse Black

.4 StressCrete Model # E225-APO-G-E11or approved equal

.3 The concrete pole shall have a copper ground wire at the handhole in accordance with CSA standards, the City encourages the use of non-conductive handhole materials as an alternate, the cable raceway/runway in the pole shall be sufficient diameter to accommodate a double run of lighting conductors.

.4 The Contractor shall install the poles at the minimum 0.6m clearance between the pathway and edge of the pole and use the hydro-vac excavation method to avoid damage to existing utilities.

Part 3 Execution

3.1 POLE INSTALLATION

.1 Refer to Contract Drawings for direct buried pole installation.

3.2 INSTALLATION OUTDOOR LIGHTING POLES

.1 Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.

.2 Install luminaires on pole and install lamps.

.3 Identify poles with lamicoid nameplates according to designation on the layout Drawing (e.g. P25)

.4 Check luminaire orientation, level and tilt.

.5 Connect luminaire to lighting circuits and associated lighting controls.

.6 Perform tests in accordance with section 20 05 00 General Instructions for Electrical.

END OF SECTION