ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
THIS LEGEND IS GENERIC. ALL SYMBOLS LISTED MAY NOT BE APPLICABLE FOR THIS PROJECT, REFER TO FLOOR PLANS TO DETERMINE USED DEVICES AND EQUIPMENT.	
LINETYPES	
———	NEW WORK
- - - - - - - - - -	WORK TO BE DEMOLISHED, OR REMOVED
———	EXISTING MATERIAL/EQUIPMENT/SERVICES TO REMAIN
———	FUTURE WORK (NOT IN SCOPE)
▬ ▬ ▬ ▬ ▬	EXTENTS OF FIRE ALARM ZONE, WET LOCATION, OR OTHER AREA AS NOTED ON PLANS
DETAIL REFERENCES	
1	SHEET KEYNOTE
1 / E101	REFER TO DETAIL. EXAMPLE SHOWN INDICATES REFERENCE TO DETAIL 1 ON DRAWING E101
1	REVISION NUMBER
ABBREVIATIONS	
E	EXISTING TO REMAIN
R	EXISTING TO BE DEMOLISHED/REMOVED
ER	EXISTING IN RELOCATED POSITION
RR	REMOVE AND RELOCATE
C	CEILING MOUNTED CONNECTION
W	WALL MOUNTED CONNECTION
F	FLOOR MOUNTED CONNECTION
℄	CENTRE LINE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
O/C	OVER COUNTER
U/C	UNDER CABINET
U/F	UNDER RAISED FLOOR
CKT	CIRCUIT
CTE	CONNECT TO EXISTING
AFCI	ARC FAULT CIRCUIT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
IG	ISOLATED GROUND
TL	TWIST LOCK
TR	TAMPER RESISTANT
WG	WIRE GUARD
WP	WEATHER PROOF
XP	EXPLOSION PROOF
HL	HAZARDOUS LOCATION
R/I	ROUGH-IN ONLY
NIC	NOT IN CONTRACT
SIM.	SIMILAR TO
TYP.	TYPICAL
ABBREVIATIONS - CODES AND STANDARDS	
OBC	ONTARIO BUILDING CODE
OESC	ONTARIO ELECTRICAL SAFETY CODE
OFC	ONTARIO FIRE CODE
ABBREVIATIONS - CEILING TYPES	
ACT	ACOUSTIC CEILING TILE (T-BAR)
EXP	EXPOSED CEILING
GWB	GYPSUM BOARD CEILING
OWSJ	OPEN WEB STEEL JOISTS
PCC	PAINTED OR POPCORN CEILING ON EXPOSED CONCRETE
WD	WOOD CEILING
ANNOTATIONS	
CL	CLOSET
WR	WASHROOM
CONDUIT AND BOXES	
	CONDUIT WITH END BUSHING
	CONDUIT UP
	CONDUIT DOWN
	CONDUIT CONTINUES
JB	JUNCTION BOX
PB	PULL BOX
HH	HAND HOLE
CONNECTIONS TO EQUIPMENT	
	1-PHASE DIRECT CONNECTION OUTLET AS NOTED
	3-PHASE DIRECT CONNECTION OUTLET AS NOTED.
	SYSTEM FURNITURE WALL FEED FOR POWER AND TELECOMMUNICATIONS UNLESS NOTED OTHERWISE.
	CONNECTION TO SINGLE PHASE MOTOR, HP (KW) AS NOTED, PROVIDE LOCAL DISCONNECT.
	THREE PHASE MOTOR, HP (KW) AS NOTED. PROVIDE LOCAL DISCONNECT.
LIGHTING CONTROLS REFER TO SPECIFICATIONS AND RESPECTIVE SCHEDULES FOR EXACT REQUIREMENTS	
	SWITCH OR OTHER USER INTERFACE DEVICE AS DESCRIBED ON LIGHTING CONTROLS SCHEDULE.
3	3-WAY SWITCH
DIM	ADJACENT TO SWITCH, DENOTES DIMMING SWITCH.
K	ADJACENT TO SWITCH, DENOTES KEY SWITCH.
T	ADJACENT TO SWITCH, DENOTES COUNTDOWN TIMER SWITCH
AT	ADJACENT TO SWITCH, DENOTES ASTRONOMICAL TIMER SWITCH
DS	ADJACENT TO SWITCH, DENOTES DOOR SWITCH
PIR	PASSIVE INFRARED SENSOR
DT	DUAL TECHNOLOGY SENSOR
UT	ULTRASONIC SENSOR
OS	OCCUPANCY SENSOR
M	ADJACENT TO SWITCH, DENOTES MAIN CONTROL FOR ALL LUMINAIRES IN A ROOM OR SPACE, OR AS NOTED.
OS PIR DT	WALL MOUNTED SWITCH/OCCUPANCY SENSOR. PIR DENOTES 'PASSIVE INFRARED', DT DENOTES 'DUAL PASSIVE INFRARED/ULTRASONIC', LINE VOLTAGE TO SUIT CONTROLLED CIRCUIT, OR AS NOTED.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
RP	RELAY PANEL
PP	POWER PACK
SC	SCENE CONTROLLER.
PC PO	PHOTOCELL SENSOR. 'PC' DENOTES CLOSED LOOP PHOTOCELL CONTROL, 'PO' DENOTES OPEN LOOP PHOTOCELL CONTROL
OS DT PIR	CEILING MOUNTED OCCUPANCY SENSOR, PIR DENOTES 'PASSIVE INFRARED', UT DENOTES 'ULTRASONIC' (OR MICROPHONIC), DT DENOTES 'DUAL TECHNOLOGY', 'OS' DENOTES UNKNOWN TECHNOLOGY.
UT	
OS DT	WALL MOUNTED OCCUPANCY SENSOR, PIR DENOTES 'PASSIVE INFRARED', UT DENOTES 'ULTRASONIC' (OR MICROPHONIC), DT DENOTES 'DUAL TECHNOLOGY', 'OS' DENOTES UNKNOWN TECHNOLOGY.
PIR UT	
DISTRIBUTION EQUIPMENT	
	TRANSFORMER, PLAN VIEW
	SURFACE MOUNTED LIGHTING AND RECEPTACLE PANELBOARD
	RECESSED RECEPTACLE AND LIGHTING PANELBOARD
	DISTRIBUTION PANELBOARD
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
C	CONTACTOR
	LOOSE STARTER, COORDINATE STARTING CHARACTERISTIC WITH EQUIPMENT REQUIREMENTS
	COMBINATION STARTER
VFD	ADJACENT TO STARTER, DENOTES VARIABLE FREQUENCY DRIVE
POWER RECEPTACLES AND BOXES	
	120V DUPLEX RECEPTACLE (5-15R)
	120V DUPLEX RECEPTACLE (5-15R) MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE
	120V DUPLEX RECEPTACLE (5-20R)
	120V DUPLEX RECEPTACLE (5-20R) MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE
	120V DUPLEX RECEPTACLE (5-15R) - AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2)
	120V DUPLEX RECEPTACLE (5-20R) - AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2)
	120V DUPLEX RECEPTACLE (5-15R) - HALF OF RECEPTACLE AUTOMATICALLY CONTROLLED (ASHRAE 90.1-2013, 8.4.2)
	SPLIT RECEPTACLE (5-20R), IF MANUALLY CONTROLLED, SHOWN CONNECTED TO SWITCH
	SPLIT RECEPTACLE (5-20R) MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE
	120V QUAD RECEPTACLE (5-15R)
	INDICATES RECEPTACLE (5-15R) COMPLETE WITH ONE TYPE A AND ONE TYPE C USB CHARGING PORTS.
	RECEPTACLE (14-30R) FOR LAUNDRY DRYER, OR OTHER RECEPTACLE AS NOTED.
	RECEPTACLE (14-50R) FOR ELECTRIC RANGE, OR OTHER RECEPTACLE AS NOTED. PROVIDE 40A/2P BREAKER TO SUIT. MOUNT AT 130 mm AFF.
	SPECIAL RECEPTACLE. VERIFY OUTLET REQUIREMENTS PRIOR TO ROUGH-IN.
	SPECIAL RECEPTACLE. VERIFY OUTLET REQUIREMENTS PRIOR TO ROUGH-IN.
	SERVICE POLE. PROVIDE POWER TO JUNCTION BOX IN CEILING SPACE ABOVE. DEVICES ON POLE AS NOTED ON PLANS.
•	ADJACENT TO RECEPTACLE. DENOTES DEVICE CONNECTED TO EMERGENCY POWER
FLOOR BOXES	
FB1	ADJACENT TO FLOOR RECEPTACLE, DENOTES FLOOR BOX TYPE
	ONE RECEPTACLE IN CONCRETE FLOOR BOX
	ONE RECEPTACLE IN SURFACE FLOOR BOX
	ONE RECEPTACLE IN RAISED FLOOR BOX
	ONE RECEPTACLE IN POKE THRU FLOOR BOX
LIGHTING FIXTURES REFER TO LIGHTING FIXTURE SCHEDULE FOR FURTHER DETAILS AND EXACT FIXTURE REQUIREMENTS.	
	LINEAR LUMINAIRE, SURFACE MOUNTED TO CEILING
	LINEAR LUMINAIRE, RECESSED IN CEILING
	LINEAR LUMINAIRE, SUSPENDED: PENDANT, CHAIN, STEM, OR AIRCRAFT CABLE HUNG TO SUIT APPLICATION, OR AS NOTED IN SCHEDULE. "X", WHEN USED DENOTES POWER FEED LOCATION.
	LINEAR LUMINAIRE, WALL MOUNTED
	AS ABOVE, CONNECTED TO EMERGENCY OR NIGHT LIGHTING CIRCUIT AS INDICATED.
	ROUND OR SQUARE RECESSED DOWNLIGHT
	RECESSED DOWNLIGHTS, CONNECTED TO EMERGENCY OR NIGHT LIGHT CIRCUIT
	ROUND OR SQUARE RECESSED DOWNLIGHT WITH WALL WASHER
	ROUND SUSPENDED LUMINAIRE
	SINGLE GIMBAL RECESSED DOWNLIGHT
	SINGLE GIMBAL RECESSED DOWNLIGHT, CONNECTED TO EMERGENCY OR NIGHT LIGHT CIRCUIT
	2X2 GIMBAL RECESSED FIXTURE
	2X2 GIMBAL RECESSED DOWNLIGHT, CONNECTED TO EMERGENCY OR NIGHT LIGHT CIRCUIT
	WALL SCONCE OR OTHER WALL MOUNTED LUMINAIRES.
EM	CONNECTED TO EMERGENCY NIGHT LIGHT CIRCUIT (24 HOUR)

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
CE	CONNECTED TO EMERGENCY CIRCUIT. PROVIDE CUL 924 LISTED SHUNT TRIP RELAY OR EQUAL TO PERMIT CONTROL OF LUMINAIRE WITH ZONING BASED ON LOCAL LIGHTING CONTROLS.
NL	LUMINAIRE CONNECTED TO NON-EMERGENCY NIGHT LIGHT CIRCUIT (24 HOUR)
A, B, Z1, Z2, ETC.	DENOTES ZONING/CIRCUITING ASSIGNMENTS FOR LUMINAIRES AND CONTROLS IN THE SAME SPACE.
EMERGENCY LIGHTING REFER TO EMERGENCY LIGHTING FIXTURE SCHEDULE FOR EXACT FIXTURE REQUIREMENTS.	
	CEILING OR WALL MOUNTED SINGLE FACE ILLUMINATED EXIT SIGN. SHADED AREA INDICATES ILLUMINATED FACE. PROVIDE DIRECTIONAL ARROWS AS INDICATED ON PLANS.
	CEILING OR WALL MOUNTED DUAL FACE ILLUMINATED EXIT SIGN. SHADED AREA INDICATES ILLUMINATED FACE. PROVIDE DIRECTIONAL ARROWS AS INDICATED ON PLANS.
	CEILING OR WALL MOUNTED COMBINATION EXIT SIGN AND EMERGENCY LIGHTING BATTERY AND LAMPHEAD UNIT. SHADED AREA INDICATES ILLUMINATED FACE.
SL	DENOTES 'SELF-LUMINOUS' EXIT SIGN
PL	PHOTOLUMINOUS EXIT SIGN
	EMERGENCY LIGHTING BATTERY UNIT, WITH AND WITHOUT HEADS.
	ONE, TWO, AND THREE HEAD WALL MOUNTED EMERGENCY LIGHTING REMOTE UNITS.
	ONE, TWO, AND THREE HEAD CEILING MOUNTED EMERGENCY LIGHTING REMOTE UNITS.
	RECESSED EMERGENCY REMOTE HEAD.
EM	DENOTES "EMERGENCY"
CCT	CORRELATED COLOUR TEMPERATURE
CRI	COLOUR RENDERING INDEX
EXTERIOR LIGHTING	
	ARM MOUNTED LUMINAIRE ON POLE, DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	POST TOP LUMINAIRE ON POLE, DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	LIGHTING BOLLARD, DIRECTIONAL ARROW, WHERE INDICATED DENOTES PRIMARY LUMEN ORIENTATION.
	GROUND MOUNTED FLOOD LIGHT
TELECOMMUNICATIONS	
	SYSTEM FURNITURE FEED.
	CABLE TRAY (LADDER TYPE)
	CABLE TRAY (BASKET TYPE)
	WALL MOUNTED DATA (D) OR VOICE (V) OUTLET, PROVIDE 1V AND 1D UNLESS NOTED OTHERWISE.
	WALL MOUNTED VOICE (TELEPHONE) OUTLET, PROVIDE 1V UNLESS NOTED OTHERWISE.
	WALL MOUNTED DATA OUTLET, PROVIDE 1D UNLESS NOTED OTHERWISE.
	WALL MOUNTED TELEVISION OUTLET.
	VOICE, DATA, OR TV OUTLET AS DESCRIBED ABOVE. MOUNTED ABOVE COUNTER TOP OR AS INSTRUCTED ON SITE.
B	ADJACENT TO COMMUNICATIONS OUTLET, INDICATES BLANK-OFF PLATE.
HDMI	HDMI OUTLET.
AV	AUDIO VIDEO GANG. AS NOTED.
WAP	WIRELESS ACCESS POINT (WIFI)
S	AUDIO VISUAL SYSTEM SPEAKER, CEILING MOUNTED.
S	AUDIO/VISUAL SYSTEM SPEAKER, WALL MOUNTED.
PA	PUBLIC ADDRESS SYSTEM SPEAKER, CEILING MOUNTED.
PA	PUBLIC ADDRESS SYSTEM SPEAKER, WALL MOUNTED.
	PUBLIC ADDRESS HORN SPEAKER WALL MOUNTED.
HS	PUBLIC ADDRESS SYSTEM HANDSET
ACC	PUBLIC ADDRESS SYSTEM ADMIN CONTROL CONSOLE
VOL	PUBLIC ADDRESS SPEAKER VOLUME CONTROL SWITCH.
	INTERCOM
IDS	VIDEO INTERCOM SYSTEM DOOR CALL STATION
IMS	VIDEO INTERCOM SYSTEM MASTER STATION
IDC	INSULATION DISPLACEMENT CONNECTION
	CLOCK
MTX	GPS CLOCK SYSTEM MAIN TRANSMITTER
GC	GPS CLOCK SYSTEM GPS RECEIVER
RTX	GPS CLOCK SYSTEM SATELLITE TRANSMITTER (REPEATER)
GRX	GPS CLOCK SYSTEM RECEIVER SWITCH
ACCESS CONTROL AND DOOR HARDWARE	
CR	CARD READER
DA	DOOR ALARM SOUNDER
DC	DOOR CONTACT
OHD	OVERHEAD DOOR CONTACT
EL	ELECTRIC LATCH
ES	ELECTRIC STRIKE
PTC	ELECTRIC POWER TRANSFER CABLE
PTH	POWER TRANSFER HINGE
KS	KEY SWITCH
ML	ELECTROMAGNETIC LOCK
MLR	MOTORIZED LATCH RETRACTION, PROVIDE 120 V.
REX	REQUEST TO EXIT SENSOR
	MUSHROOM HEAD PUSH BUTTON FOR 'REQUEST TO EXIT' MAGLOCK RELEASE, OR OTHER PUSH BUTTON AS INDICATED
DR	DOOR RELEASE ADJACENT TO THE ABOVE, PUSHBUTTON INTEGRATED WITH ELECTRIFIED DOOR HARDWARE DEVICE.
	BARRIER FREE DOOR OPERATOR PUSH BUTTON
WS	TOUCHLESS "WAVE SWITCH" FOR DOOR OPERATOR CONTROL
	SOUNDER AND STROBE
	SOUNDER ONLY
	DOORBELL
	UNIVERSAL WASHROOM EXTERIOR ASSISTANCE DOME LIGHT AND SOUNDER
UNV	UNIVERSAL WASHROOM SIGN
OWL	OCCUPIED WHEN LIT INDICATOR
	UNIVERSAL WASHROOM INTERNAL LED ANNUNICATOR AND SOUNDER

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
PTL	PUSH TO LOCK
INTRUSION DETECTION	
GB	GLASS BREAK (GB)
MD	MOTION DETECTOR (MD)
KP	KEYPAD (KP)
VIDEO SURVEILLANCE	
	CCTV CAMERA
C/P	CCTV CAMERA, CEILING OR POLE MOUNTED
	CCTV CAMERA, WALL MOUNTED
PTZ	PAN-TILT-ZOOM
DURESS SYSTEM	
DB	DURESS BUTTON (MOUNTED ON UNDERSIDE OF TABLETOP)
DB-W	WALL MOUNTED DURESS BUTTON WITH POLYCARBONATE ANTI-TAMPER COVER
	DURESS SYSTEM STROBE LIGHT
SINGLE LINE DIAGRAM	
	MOLDED CASE CIRCUIT BREAKER
	METERING CABINET
	TRANSFORMER
	GROUND POINT
	BATTERY
VFD	VARIABLE FREQUENCY DRIVE
	CURRENT TRANSFORMER
DMS	DIGITAL METERING SYSTEM
ATS	AUTOMATIC TRANSFER SWITCH
C	CONTACTOR
DP	DISTRIBUTION PANELBOARD
FTL	FEED THROUGH LUGS
LP	LIGHTING PANELBOARD
LSI	LONG TIME / SHORT TIME / INSTANTANEOUS
LSIG	LONG TIME / SHORT TIME / INSTANTANEOUS / GROUND FAULT
MCB	MOBILE CONNECTION BOX
MCC	MOTOR CONTROL CENTRE
MTS	MANUAL TRANSFER SWITCH
PP	POWER PANELBOARD
RP	RECEPTACLE PANELBOARD
SPD	SURGE PROTECTIVE DEVICE
STS	STATIC TRANSFER SWITCH
SWB	SWITCHBOARD
SWG	SWITCHGEAR
TX	TRANSFORMER
UPS	UNINTERRUPTIBLE POWER SUPPLY

ELECTRICAL DRAWING LIST

DRAWING #	DRAWING NAME
E-001	ELECTRICAL LEGEND AND DRAWING LIST
E-002	ELECTRICAL SPECIFICATIONS I
E-003	ELECTRICAL SPECIFICATIONS II
E-200	LIGHTING LAYOUT
E-300	POWER AND SYSTEMS LAYOUT

PRELIMINARY NOT FOR CONSTRUCTION

No.	Description	Date
1	ISSUED FOR 90% CLIENT REVIEW	2026-03-12
2	ISSUED FOR CLASS B COSTING	2026-03-20

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CANADORE COLLEGE ACTIVE TRANSPORTATION HUB

CANADORE COLLEGE

ELECTRICAL LEGEND AND DRAWING LIST

Project number 5436

E-001

Scale AS SHOWN

00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 30 00 - AVAILABLE INFORMATION

1.0 EXISTING CONDITION INFORMATION

1.1 Review with Owner if existing drawings are available for review. The Consultant does not warrant them for accuracy nor for completeness, and it remains the Contractor's responsibility to verify field conditions inferred from such materials.

2.0 EXISTING HAZARDOUS MATERIAL INFORMATION

2.1 Review with Owner if existing Designated Substance Survey (DSS) report is available for review.

00 70 00 - GENERAL CONDITIONS

1.0 INTENT

1.1 Include all material, labour, equipment, and plant construction as necessary to make a complete installation as shown and specified hereinafter.

1.2 The organizational structure of the Specifications does not imply how the work is assigned to various design disciplines, trades, or subcontractors. The MasterFormat numbering system is not intended to determine which particular elements of the project manual are prepared by a particular discipline. Similarly, it is not intended to determine what particular work required by the project manual is the responsibility of a particular trade. It shall be the Contractor's responsibility to ensure that the systems specified hereafter are complete and operative.

2.0 DRAWINGS AND SPECIFICATIONS

2.1 The drawings and specifications are complementary each to the other, and what is called for by one, is to be binding as if called for by both.

2.2 Should any discrepancy appear between the drawings and specifications which leaves the Contractor in doubt as to the true intent and meaning, a ruling is to be obtained from the Consultant in writing before submitting Tender. If this is not done, the maximum, the most expensive alternate or option, will be provided in Base Tender Bid.

2.3 The drawings provide design intent, and are not to be used to measure or quantify material. Contractor is to coordinate installation of work so as to meet the design intent.

00 73 00 - SUPPLEMENTARY CONDITIONS

1.0 GENERAL

1.1 The requirements of the Supplementary General Conditions apply to this Specification as though written in full herein.

1.2 Refer to Architectural drawings for exact location of dimensioned equipment and devices.

1.3 Refer to Architectural drawings for additional notes which complement these specifications.

2.0 HEALTH AND SAFETY REQUIREMENTS

2.1 Be responsible for the safety of workers and the equipment on the project in accordance with all applicable safety legislation passed by federal, provincial, and local authorities governing construction safety. The more stringent regulations prevail.

01 GENERAL REQUIREMENTS

01 10 00 - SUMMARY

1.0 SPECIFICATIONS LANGUAGE AND STYLE

1.1 These specifications are written in the imperative mood and in streamlined form. The imperative language is directed to Contractor, unless stated otherwise.

1.2 Complete sentences by reading "shall", "Contractor shall", "shall be", and similar phrases by inference. Where a colon (:) is used within sentences and phrases, read the words "shall be" by inference.

1.3 Fulfill and perform all indicated requirements whether stated imperatively or otherwise.

1.4 When used in the context of a Product, read the word "provide" to mean "supply and install to result in a complete installation ready for its intended use".

01 31 00 - PROJECT MANAGEMENT AND COORDINATION

1.0 PROJECT COORDINATION

1.1 Read specifications and drawings of other trades, and conform with their requirements before proceeding with any work specified here as related to other trades. Cooperate with all other trades on the job, so that all equipment can be satisfactorily installed, and so that no delay is caused to any other trades.

1.2 Prior to fabrication and installation of equipment, ensure that such items can be installed as indicated without interference with the structure, or the work of other trades. If any materials are fabricated or installed prior to the investigation and reaching of a solution to the possible interference problems, necessary changes shall be made at the Contractor's expense.

1.3 Provide code or manufacturer required clear space for servicing, disassembly, and removal of equipment and components.

2.0 FACILITY SERVICES COORDINATION

2.1 Maintain all operational building services; shutdown of services shall only take place as authorized by base building and request to be in writing.

2.2 Co-ordinate with Property Management for scheduling of all work required to be done after office hours and weekends, i.e., drilling through slab, power shutdowns, interfacing to life safety systems, etc. all costs involved, including work to be done by the Property Management's approved fire alarm and life safety systems contractor, etc., shall be at Tenant Contractor's expense.

01 33 00 - SUBMITTAL PROCEDURES

1.1 Before delivery to site of any item of equipment, submit shop drawings complete with all data, pre-checked by the Contractor and stamped accordingly, for review by the Consultant. Indicate project name on each brochure or sheet, make reference to the number and title of the appropriate specification section, and provide adequate space to accommodate the Consultant's review stamp(s).

1.2 Submit shop drawings to the Consultant in electronic (PDF) format, as coordinated after award of contract. Where submittals are derived from digital originals, to ensure maximum quality and legibility, do not print and rescan documents; submittals made as such will be immediately rejected.

1.3 Submit a schedule of shop drawings within one week after award of contract. Group submittals by specification division as appropriate.

1.4 Submit Material Safety Data Sheet (MSDS) for all applicable products.

01 40 00 - QUALITY REQUIREMENTS

1.0 PERMITS AND FEES

1.1 Obtain and pay for all Permits and fees required for the execution and inspection of the Work and pay all charges incidental to such Permits. Submit to the Authority Having Jurisdiction the necessary number of drawings and specifications for examination and approval prior to commencement of work.

1.2 Arrange and pay for any special inspection of equipment specified if and when required.

2.0 CODES AND STANDARDS

2.1 Comply with current regulations of all applicable provincial and municipal codes and regulations, including, but not limited to, the Ontario Building Code, and the requirements of any Authorities Having Jurisdiction (AHJ).

2.2 Comply with other standards as related to each trade.

3.0 REFERENCES

3.1 Health Canada / Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).

3.2 Ontario Building Code.

4.0 QUALITY ASSURANCE

4.1 Qualifications: Work to be carried out by qualified, licensed tradespersons or apprentices in accordance with Authorities Having Jurisdiction.

4.2 Only first class workmanship will be accepted, not only in regards to durability, efficiency and safety, but also in regards to neatness of detail. Present a neat and clean appearance on completion. Any unsatisfactory workmanship will be replaced at no extra cost.

4.3 Conform to the best practices applicable to the type of work. Install all equipment and systems in accordance with manufacturers' recommendations, and consistent with the general requirements of the specification.

5.0 FIELD QUALITY CONTROL

5.1 Carry out tests in presence of Owner, or designated representative.

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

5.3 Manufacturer's Field Services

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting, and cleaning of product and submit Manufacturer's Field Reports.

6.0 INSPECTIONS

6.1 Furnish a Certificate of Acceptance from Inspection Department on completion of work.

6.2 The Consultant will carry out inspections and prepare deficiency lists for action by the Contractor, during, and on completion of the Project.

01 50 00 - TEMPORARY FACILITIES AND CONTROLS

1.1 Contractor shall assume responsibility for any disruption caused by his forces to operational building services. Should temporary connections be required to maintain services during the work, supply and install all necessary equipment. Repair any system damaged during the execution of the work.

01 60 00 - PRODUCT REQUIREMENTS

1.0 GENERAL

1.1 Products certified by a recognized testing agency accredited by the Standards Council of Canada, and bear a certification mark from that agency, for example the CSA certification mark, cUL listing, or ULC listing. Where certified or listed material and equipment is not available, obtain special approval from Authority Having Jurisdiction before delivery to project site, and submit the approval to the Consultant.

1.2 Products described in this specification are considered to be the minimum standard of acceptance.

1.3 All materials to meet flame spread rating requirements of all Authorities Having Jurisdiction.

2.0 SUBSTITUTION OF SPECIFIED EQUIPMENT

2.1 "Approved equal" shall be defined as an alternate approved by the Consultant.

2.2 If during the Tender bid process, the bidding Contractor wishes to substitute the specified equipment for an "approved equal", the bidding Contractor must submit Shop Drawings to the Consultant before the Tender close, for approval. If no substitution request is made, the as-specified equipment is that to be provided.

3.0 PRODUCT STORAGE AND HANDLING REQUIREMENTS

3.1 Store all equipment and materials in dry locations.

01 70 00 - EXECUTION REQUIREMENTS

1.0 EXAMINATION AND PREPARATION

1.1 Prior to submitting Tender, the Contractor shall carefully examine the Site and ascertain all conditions which affect the Work.

1.2 No extras will be allowed for work resulting from conditions that would have been evident upon a thorough examination of electrical closets, rooms and ceiling spaces, whether exposed or not.

1.3 Verify location and sizes of existing services prior to making new connections to ensure that the existing systems have adequate capacities to accommodate new loads.

2.0 CUTTING AND PATCHING

2.1 The Contractor will be responsible for all cutting and patching required for the installation.

2.2 Structural members are not to be cut without the consent of the Consultant.

2.3 Restore finishes to match existing surroundings.

3.0 CLEANING AND WASTE MANAGEMENT

3.1 The Contractor and associated sub trades, at all times during construction, is to keep the site free of all debris, boxes, packing, etc., resulting from performance of the Work.

3.2 At the completion of this Work, the installation is to be left in a clean and finished condition.

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

3.4 Remove and dispose off-site, all materials removed, abandoned, and not to remain, designated for salvage, or be re-used in an appropriate manner acceptable to local authorities having jurisdiction, specifically equipment and materials considered hazardous to the environment, unless otherwise noted to be turned over to the Owner or to the Landlord.

4.0 STARTING AND ADJUSTING

4.1 Conduct acceptance tests to demonstrate that the equipment and systems meet the specified requirements. Tests may be conducted as soon as conditions permit, and consequently the Contractor is to make all changes, adjustments, or replacements required as the preliminary tests may indicate prior to the final tests. Tests are as specified in various sections of the specifications.

4.2 Carry out tests in the presence of the Consultant. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of Project. The Contractor shall be in charge of the plant during tests. The Contractor shall assume responsibility for damages in the event of injury to the personnel, building, equipment, and shall bear all costs for liability, repairs, and restoration in this connection. Submit test results.

4.3 Test new and interfaced systems for proper operation to ensure that the quality and reliability of the base building system is not altered or reduced.

01 77 00 - CLOSEOUT PROCEDURES

1.0 BUILDING PERMIT COMPLIANCE

1.1 Prior to requesting the Consultant's letter "Review of General Conformance" for submission to the municipal building department to allow occupancy, the following items must be complete and submitted to the Consultant, as applicable:

.1 General

.1 Submit all applicable inspection reports from Authorities Having Jurisdiction.

.2 Continuity of fire separations at service penetrations must be complete.

.3 All seismic restraint requirements must be complete.

.2 Plumbing

.1 Confirmation that municipal plumbing inspector has reviewed the work and notes no deficiencies.

1.2 If any of the above items have not been completed at the time of Consultant's Inspection, and the letter of "assurance of professional field review and compliance" cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

2.0 SUBSTANTIAL PERFORMANCE

2.1 Prior to requesting Substantial Performance Inspection, the following items must be complete and submitted to the Consultant, as applicable:

.1 General

.1 Project record drawings must be submitted to Consultant for review.

.2 Maintenance manuals must be submitted to Consultant for review.

2.2 If any of the above items have not been completed at the time of the Substantial Performance Inspection, and the Substantial Performance certificate cannot be issued, any costs for subsequent Inspections will be charged to the Contractor.

3.0 PROJECT RECORD DOCUMENTS

3.1 Record Drawings

.1 Maintain a drawing on Site, complete with red-line record of all revisions. Provide exact dimensions and routing of below-grade or below-slab services. Indicate the following:

.1 HVAC and Plumbing

.1 All pipe routing.

.2 Complete record drawings accurately marked up in red ink must be submitted for review. Once reviewed, prepare as-built drawings in a neat manner, showing all deviations in work as per site red-line drawing.

4.0 WARRANTIES

4.1 Submit a written guarantee to the Owner for one year from the date of acceptance. This guarantee shall bind the Contractor to correct, replace or repair promptly any defective equipment workmanship without cost to the Owner.

4.2 Provide extended warranties as specified.

26 ELECTRICAL

26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

1.0 REFERENCES

1.1 Canadian Standards Association (CSA)

.1 CSA C22.1:24, Canadian Electrical Code, Part 1 (26th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (OESC) 29th Edition, 2024.

.3 CSA C235:19, Preferred voltage levels for AC Systems up to 50 000 V.

.4 CSA C22.3 No. 1-15, Overhead Systems.

.5 Do underground systems in accordance with CSA C22.3 No. 7-15, Underground systems, except where specified otherwise.

1.2 Ontario Building Code.

2.0 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

2.1 Conductors: minimum #12 AWG solid, and stranded for #8 AWG and larger.

2.2 RWU90 for any conductors used underground.

2.3 All conductors used outdoor or in wet locations: RWU90 copper.

2.4 Wire and Box Connectors:

.1 Wire connectors: PVC insulation, steel shall be spring pressure type, current carrying parts copper or copper alloy sized to suit copper conductors as indicated to CSA C22.2 No. 65-13.

.2 Splicing connectors: fixture type current carrying parts copper or copper alloy sized to fit copper conductors #12 AWG with insulating materials of thermoplastic material to CSA C22.2 No.75-17.

.3 Clamps to connectors for flexible circuits to CSA C22.2 No.18.3-12 (R2017).

.4 Lugs, terminals, or screws used for termination of wiring to be suitable for copper conductors.

2.4 Voltage Drop:

.1 Feeder conductors: maximum voltage drop of 2%.

.2 Branch circuit conductors: maximum voltage drop of 3%.

3.0 CONDUIT FOR ELECTRICAL SYSTEMS

3.1 Rigid metal conduit: to CSA C22.2 No. 45.1-07 (R2017).

3.2 Rigid PVC conduit: to CSA C22.2 No. 211.2-06 (R2011).

3.3 Flexible metal conduit and liquid-tight flexible metal conduit: to CSA C22.2 No. 56-17.

3.4 Conduit Fastenings:

.1 One hole steel strap to secure surface conduits 50 mm (2 in) and smaller. Use two hole steel straps for conduits larger than 50 mm (2 in).

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

.3 Channel type supports for two or more conduits at 1.5 m (5 feet) on centre.

3.5 Conduit Fittings:

.1 Fittings for raceways to CSA C22.2 No. 18.3-12 (R2017). Fittings manufactured for use with conduit specified. Factory elbows where 90% bends are required for 50 mm (2 in) and larger conduits.

.2 Cast fittings are not permitted to be used.

3.6 Branch circuits, control wiring, etc.

.1 Conceal conduit work in finished areas unless otherwise noted.

.2 Run conduit exposed in unfinished areas such as service rooms, rooms with no suspended ceilings, service tunnels, and penthouses. Install parallel to building lines.

.3 Use rigid metal conduit in mechanical spaces.

.4 Use PVC conduit in service tunnels and for exterior work unless noted otherwise.

.5 Use liquid tight flexible conduit for connection to motors.

.6 Use flexible metal conduit for connection to recessed downlight fixtures without a pre-wired outlet box, connection to surface fixtures, across expansion joints, work in movable metal partitions, or transformers.

.7 Flexible metal conduit for fixtures in finished areas only where chain hanging is specified. Tie wrap the flexible conduit to the chain.

.8 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe sized for free passage of conduit, and protruding 50.8 mm (2 in).

.9 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.10 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

4.0 BOXES FOR ELECTRICAL SYSTEMS

4.1 Junction and Pull Boxes:

.1 Junction and pull boxes: to CSA C22.2 No. 40-17 welded steel construction, with screw-on flat covers for surface mounting.

.2 Covers with 25.4 mm (1 in) minimum extension all around, for flush mounted pull and junction boxes. Only main junction and pull boxes are indicated. Provide all boxes so as not to exceed 30 m (100 ft) of conduit run between pull boxes.

4.2 Outlet boxes, conduit boxes to CSA C22.2 No. 18.1-13 (R2018).

4.3 Sheet Steel Outlet Boxes:

.1 Hot Dipped Galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 75 mm x 50 mm x 32 mm (3 in x 2 in x 1-1/4 in). 100 mm (4 in) square outlet boxes when more than one conduit enters one side with extension.

.2 Cast boxes for surface work in finished areas.

4.4 Size boxes in accordance with CSA C22.1, rule 12-3036. Provide 100 mm (4 in) square or larger outlet boxes as required for special devices.

4.5 Gang boxes where wiring devices are grouped.

4.6 Blank cover plates for boxes without wiring devices.

4.7 Combination boxes with barriers where outlets for more than one system are grouped.

4.8 Location of Outlets

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6 in) horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10 ft), and information is given before installation.

5.0 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

5.1 Provide all equipment grounding as required, regardless of whether it has been shown on drawings or called for in this specification.

5.2 Arrange grounds so that under normal operating conditions, no injurious amount of current will flow in any grounding conductor.

5.3 Provide a ground wire in every conduit.

6.0 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

6.1 Support Channels:

.1 Support channels: length as indicated, u-shape, size 44 mm x 44 mm x 3 mm (1-3/4 in x 1-1/3 in x 1/8 in) thick, surface mounted or suspended as required.

6.2 All supporting devices, strut channel, threaded rod, anchors, etc. of the "hot dipped" galvanized type. Electrogalvanized components will not be accepted.

6.3 Supports

.1 All conduits, panels, etc. to be securely and adequately supported.

.2 Where more than three conduits run together, conduit racks to be used.

.3 Single runs of conduit to be supported by galvanized conduit straps or ring bolt type hangers.

.4 Tie wire or perforated metal strap hangers will not be accepted.

.5 Support all luminaires independently of the ceiling structure.

6.4 Floor supports:

.1 Provide a 100 mm (4 in) high concrete housekeeping pad for floor mounted electrical distribution equipment, such as transformers, switchboards, distribution panelboards, engine generators, uninterruptible power supplies and batteries, and transfer switches.

.2 Extend pad a minimum of 100 mm (4 in) beyond footprint of equipment, unless noted otherwise.

7.0 VIBRATION CONTROLS FOR ELECTRICAL SYSTEMS

7.1 Ensure that all electrical equipment operates without objectionable noise or vibration. Provide isolation devices to prevent noise and vibration transmission (i.e., spring type and pad type isolators and loop flexible conduits).

7.2 Provide flexible conduits for final connections of conduits to any vibrating equipment.

8.0 IDENTIFICATION FOR ELECTRICAL SYSTEMS

8.1 Nameplates

.1 Ensure manufacturer's nameplates, approval label (CSA, cUL, etc.), and identification nameplates are visible and legible after equipment is installed.

.2 Provide warning signs, as specified, or to meet requirements of inspection department, health and safety, and the Consultant.

8.2 Wiring Identification

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

8.3 Identification of Equipment

.1 Identify all electrical equipment with engraved phenolic nameplates, engraved 10 mm (3/8 in) high white block letters, securely fastened with rivets.

.2 Identify all electrical splitters, junction boxes, conduits crossing walls and pull boxes of different systems with a different colour consistent throughout the project.

.3 Match existing identification system colours. Where an identification system does not exist, colours as follows:

.1 347/600 volt: blue.

.2 120/208 volt: black.

.3 Emergency: yellow.

.4 UPS power: orange.

.5 Communications: green.

.6 Fire Alarm: red.

.4 Label all receptacles and devices indicating panel and circuit numbers. Use electronic labeller with adhesive label. Install label on the faceplate of the device.

.5 Ensure that all panel directories are typewritten and indicate the latest work. Identify all circuits. Do not provide the words 'existing' for any circuits remaining as is. Should an existing panel not be labeled, the Contractor shall provide such, indicating the panel name, voltage, phase, current rating and 'fed from' information.

9.0 OVERCURRENT PROTECTIVE DEVICE COORDINATION

9.1 Ensure interrupting capacity of circuit protective devices meet the required fault level.

9.2 Provide high-interrupting capacity breakers for panels fed from dry-type transformers rated greater than 75 kVA.

10.0 EQUIPMENT WIRING

10.1 Doors

.1 Ascertain exact locations of door operators, push buttons, automatic sensors, and other door hardware.

.2 Provide branch circuit wiring for door operators.

.3 Provide control and control wiring for all low voltage door interconnections.

.4

26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

1.0 STARTUP

1.1 Startup equipment to NETA ATS standards.

2.0 CONDUCT FOLLOWING TESTS:

2.1 Insulation resistance testing:

.1 Megger circuits, feeders, and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders, and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

2.2 Integrated systems testing of fire protection and life safety systems:

.1 The following items shall be tested by activating fire alarm or system device and confirming correct operation of fire alarm and/or system.

.1 Audio/visual and/or lighting control systems: fire alarm relay that deactivates background music system shall be confirmed to be operational.

.2 Auxiliary fire suppression systems (computer room and/or cooking equipment): each interconnection shall be confirmed to annunciate on the base building fire alarm panel.

.3 Electromagnetic locks: each lock shall be confirmed to be released by the fire alarm. All local release integrations shall be tested in each location.

3.0 LOAD BALANCING:

3.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes. Balance the loading on feeders so that unbalanced load is less than 10 per cent.

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

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

26 09 23 - LIGHTING CONTROL DEVICES

1.0 OCCUPANCY SENSORS, TIME SWITCHES, ETC.

1.1 As described in applicable schedules.

1.2 Dimming Switches

.1 Provide dimmers with linear slide controls, and sized to suit loads controlled for fluorescent, incandescent, low voltage magnetic and low voltage electronic lighting as indicated.

.2 All dimmers shall incorporate an air gap which shall be accessible without removing the faceplate.

.3 Dimmer shall meet CSA C22.2 no. 111-10 and CSA C22.2 no. 184.1-15 limited short circuit test requirements for snap switches;

.4 Dimmer shall meet ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, tested to withstand voltage surges of up to 6000 V and current surges of up to 200 A without damage. Manufacturer shall provide file card upon request showing their compliance with the above standards.

.5 Gang dimmers shown side by side on plans under one seamless, multi-gang faceplate.

.6 Dimmers: rated 1000 W, unless otherwise noted.

.7 Finish colour by architect/designer.

.8 Manufacturers: Lutron Nova T series or approved equal.

2.0 SEQUENCES OF OPERATION

2.1 In accordance with ASHRAE 90.1-2013 as amended by OBC SB-10 2017.

2.2 Configure sensors to turn off lighting a maximum of 20 minutes of all occupants leaving the space. Confirm exact set point with the Consultant prior to installation.

3.0 SITE TESTS AND INSPECTIONS

3.1 The lighting controls manufacturer's representative and Contractor shall conduct functional testing and provide report as described in ASHRAE 90.1-2013:

.1 Lighting control devices and control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions.

.2 When occupant sensors, time switches, programmable schedule controls, or photosensors are installed, at a minimum, the following procedures shall be performed:

.1 Occupant Sensors

.1 Certify that the sensor has been located and aimed in accordance with manufacturer recommendations.

.2 For projects with up to seven (7) occupancy sensors, all occupancy sensors shall be tested.

.3 For projects with more than seven (7) occupancy sensors, testing shall be done for each unique combination of sensor type and space geometry.

.4 For each sensor to be tested, verify the following:

.1 Status indicator (as applicable) operates correctly.

.2 Controlled lights turn off or dim down to the specified level within the required time (20 minutes, or as noted), as applicable to the space type.

.3 For auto-on occupant sensors (occupancy mode), the lights turn on to the permitted level when someone enters the space.

.4 For manual-on sensors (vacancy mode), the lights turn on only when manually activated.

.5 The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation.

.2 Automatic Time Switches

.1 Confirm that the automatic time switch control is programmed with appropriate weekday, weekend, and holiday (as applicable) schedules.

.2 Document for the owner automatic time switch programming, including weekday, weekend, and holiday schedules, as well as all setup and preference program settings.

.3 Verify that correct time and date are properly set in the time switch.

.4 Verify that any battery backup (as applicable) is installed and energized.

.5 Verify that the override time limit is set to no more than two (2) hours.

.6 Simulate occupied condition. Verify and document the following:

.1 All lights can be turned on and off by their respective area control switch.

.2 The switch only operates lighting in the enclosed space in which the switch is located.

.7 Simulate unoccupied condition. Verify and document the following:

.1 All non-exempt lighting turns off.

.2 Manual override switch allows only the lights in the enclosed space where the override switch is located to turn on or remain on until the next scheduled shut off occurs.

.3 Daylight Controls

.1 All control devices (photocontrols) have been properly located, field-calibrated, and set for appropriate set points and threshold light levels.

.2 Daylight controlled lighting loads adjust to appropriate light levels in response to available daylight.

.3 The location where calibration adjustments are made is readily accessible only to authorized personnel.

.3 The individual(s) responsible for the functional testing shall not be directly involved in either the design or construction of the project and shall provide documentation certifying that the installed lighting controls meet or exceed all documented performance criteria.

26 22 00 - LOW-VOLTAGE TRANSFORMERS

1.0 LOW-VOLTAGE TRANSFORMERS

1.1 Dry type transformers to CSA C22.2 No. 9-17, CSA C22.2 No. 47-13 (R2018), and CSA-C802.2-18 (R2023) with the following features:

.1 CSA type 2 drip-proof enclosure.

.2 Comply with ANSI, NEMA, and IEEE standards.

.3 Final coating to be ANSI 61 grey epoxy power.

.4 60 Hz operating frequency, 600-120/208 V, 3ø, delta-wye 3-phase with 3-coil, AN/AA type.

.5 Four (4) taps, 2xFCAN and 2xFCBN with 2.5% per tap.

.6 Copper windings.

.7 Epoxy impregnation, anti-vibration pads, electrostatic shield.

.8 220 deg C insulation class and 115 deg C winding temperature rise.

.9 Wall mounted for 45 kVA or less unless otherwise noted.

.10 Heavy gauge steel with rust and corrosion protection.

.11 1-2 kV class with 10 kV BIL.

.12 Double neutral connector.

1.2 Meet or exceed the nominal efficiencies shown in CSA C802.2, and SOR/20180-201 (NRCan 2019).

1.3 Average sound levels:

.1 45 dB max up to 45 kVA.

.2 50 db max up to 150 kVA.

.3 55 db max up to 300 kVA.

.4 57 db max up to 500 kVA.

1.4 Manufacturers:

.1 STI.

.2 Delta Transformer.

.3 Hammond.

.4 Powersmiths.

.5 Square D by Schneider Electric.

.6 Approved equal.

1.5 T-connected transformers are not acceptable.

26 24 16 - PANELBOARDS

1.0 DISTRIBUTION PANELBOARDS

1.1 Manufacturers:

.1 Square D by Schneider Electric, I-Line series.

.2 Eaton Cutler Hammer, PRL3 or PRL4 series.

.3 Equal by Siemens.

1.2 Description: CSA C22.2 No. 29-15 (R2024), circuit breaker type. Circuit breakers to CSA C22.2 No. 5:16 (R2021).

1.3 Panelboard bus: copper, ratings as indicated. Provide copper neutral bus for panelboards indicated for 4-wire systems. Provide copper ground bus in each panelboard.

1.4 Minimum integrated short circuit rating: 10 kA RMS symmetrical for 240 V panelboards; 25 kA RMS symmetrical for 600 V panelboards, or as indicated.

1.5 Molded case circuit breakers: CSA C22.2 No. 5, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers CSA classified as type HACR for air conditioning equipment branch circuits.

1.6 Molded case circuit breakers with current limiters: CSA C22.2 No. 5, circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.

1.7 Current limiting molded case circuit breakers: CSA C22.2 No. 5, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100 000 symmetrical amperes, let through current and energy level less than permitted for same size class RK5 fuse.

1.8 Circuit breaker accessories: trip units and auxiliary switches as indicated.

1.9 Cabinet front: surface type, fastened hinge and latch, metal directory frame, finished in manufacturer's standard gray enamel.

1.10 Breaker positions labeled as "spare" or "space" constituting no less than 20% of available breaker positions, whether indicated or not in panelboard schedules.

1.11 Two keys for each panelboard and key panelboards alike.

1.12 Breakers feeding motors: motor rated.

1.13 Breakers for lighting circuits: switch rated.

1.14 Circuit breakers feeding transformers rated accordingly.

2.0 LIGHTING AND RECEPTACLE PANELBOARDS

2.1 To CSA 22.2 No. 29-15 (R2024) with the following features:

.1 600 V panelboards: bus and breakers rated for 25 000 asymmetrical interrupting capacity, or as indicated.

.2 250 V panelboards: bus and breakers rated for 10 000 asymmetrical interrupting capacity, or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with full size copper neutral, copper ground bus.

.7 Mains suitable for bolt on breakers 25 mm (1 in) or 19 mm (3/4 in) wide.

.8 Finish trim and door baked grey enamel.

2.2 Molded case circuit breakers to CSA C22.2 No. 5:16 (R2021).

2.3 Bolt-on molded case circuit breaker, quick-make, quick break type for manual and automatic operation with temperature compensation for 40°C (104°F) ambient.

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

2.5 All panels to be flush or surface mounted as indicated.

2.6 Lock-on devices on emergency lighting, night lights, security and exit light circuits.

2.7 Breakers feeding motors: motor rated.

2.8 Circuit breakers feeding transformers rated accordingly.

26 28 00 - LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

1.0 FUSES

1.1 Dimensions and Performance: CSA C22.2 No. 248 Series, Class as specified or indicated.

1.2 Manufacturers:

.1 Mersen.

.2 GEC.

.3 Littelfuse.

.4 Eaton-Cooper Bussman.

1.3 Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

1.4 Power Load Feeder Switches: HRC-1 Class J time delay type (Gould type AJT).

1.5 Other Feeder Switches: HRC-1 Class J time delay type (Gould type AJT).

2.0 ENCLOSED SWITCHES

2.1 Fusible and non-fusible to CSA C22.2 no. 4, size as indicated.

2.2 Provision for padlocking in on-off switch position by one lock.

2.3 Mechanically interlocked door to prevent opening when handle in ON position.

2.4 Fuses: size as indicated.

2.5 Fuse holders: suitable without adaptors, for type and size of fuse indicated.

PRELIMINARY NOT FOR CONSTRUCTION

No.	Description	Date
1	ISSUED FOR 90% CLIENT REVIEW	2026-03-12
2	ISSUED FOR CLASS B COSTING	2026-03-20

QUASAR CONSULTING GROUP
48-176 LAKESHORE DRIVE, NORTH BAY, ON P1B 2A8
TEL: 905-507-0800
WEB: WWW.QUASARCG.COM
PROJECT NO: NOR-24-ED-004

SHIELD ENGINEERING & ARCHITECTURE
WWW.SHIELDENG.CA 130 PARIS STREET,
TEL: 705-885-6010 SUDBURY, ON P3E 3E1

CANADORE COLLEGE ACTIVE TRANSPORTATION HUB

CANADORE COLLEGE

ELECTRICAL SPECIFICATIONS I

Project number 5436

E-002

Scale AS SHOWN

2.6 Quick-make, quick-break action.

2.7 On-off switch position indication on switch enclosure cover.

26 51 00 - INTERIOR LIGHTING

1.0 LED INTERIOR LUMINAIRES

1.1 Performance tested in accordance with IES LM-79, LM-80, and L70 lumen maintenance at 50 000 hours or greater calculated per IES TM-21 extrapolation.

1.2 Drivers minimum 0.9 power factor, THD less than or equal to 20%, 0-10 volt dimming standard, or alternate protocol to suit controls.

1.3 5 year warranty.

1.4 80 CRI minimum.

1.5 Luminaire efficacy in accordance with DesignLights Consortium (DLC), or Energy Star, as applicable.

26 52 13.13 - EMERGENCY LIGHTING

1.0 BATTERY UNITS AND REMOTE HEADS PER SCHEDULE.

1.1 Use minimum 10 gauge or heavier if needed to provide a maximum voltage drop of 5%. Consult manufacturer's table for sizing the minimum gauge and length of wire runs permitted for connected loads to ensure a maximum voltage drop of 5% from the battery unit to the farthest emergency remote, in accordance with OBC and local inspection authorities.

1.2 Provide breaker lock on emergency lighting circuit at source panelboard.

1.3 Contractor to certify in writing to the Consultant that the system is complete, installed per CSA C22.2 No. 141, has been tested, and operates for the specified battery run time, and meets voltage drop requirements.

1.4 Manufacturers: Lumacell, Aimlite, BeLuce (formerly Beghelli), Emergilite, Lithonia, Stanpro.

26 52 13.16 - EXIT SIGNS

1.0 EXIT SIGNS PER SCHEDULE.

1.1 Internally illuminated exit signs consisting of a green and white LED pictogram ("Running Man").

1.2 Certified to CSA 22.2 No.141-15, meets ISO 3864-1, and meets ISO 7010:2010.

1.3 Include a standard single face with optional double-faceplate included.

1.4 Maximum 5 Watts per face.

1.5 Manufacturers: Lumacell, Aimlite, BeLuce (formerly Beghelli), Emergilite, Lithonia, Stanpro.

26 56 00 - EXTERIOR LIGHTING

1.0 LED EXTERIOR LUMINAIRES

1.1 Performance tested in accordance with IES LM-79, LM-80, and L70 lumen maintenance at 50 000 hours or greater calculated per IES TM-21 extrapolation.

1.2 Drivers minimum 0.9 power factor, THD less than or equal to 20%, 0-10 volt dimming standard, or alternate protocol to suit controls.

1.3 5 year warranty.

1.4 70 CRI minimum.

1.5 Luminaire efficacy in accordance with DesignLights Consortium (DLC), or Energy Star, as applicable.

PRELIMINARY NOT FOR CONSTRUCTION

No.	Description	Date
1	ISSUED FOR 90% CLIENT REVIEW	2026-03-12
2	ISSUED FOR CLASS B COSTING	2026-03-20

QUASAR CONSULTING GROUP
4B-176 LAKESHORE DRIVE, NORTH BAY, ON P1B 2A8
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PROJECT NO: NOR-24-ED-004

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CANADORE COLLEGE ACTIVE TRANSPORTATION HUB

CANADORE COLLEGE

ELECTRICAL SPECIFICATIONS II

Project number 5436

E-003

Scale AS SHOWN

GENERAL SHEET NOTES

1.	ALL WIRING SHALL BE RWU90 WITH 600V INSULATION, AND INSTALLED IN RIGID GALVANIZED STEEL CONDUIT.

SHEET KEYNOTES

1.	PROVIDE INTERMATIC #ET2125CP TIMER FOR CONTROL OF CANOPY LIGHTING. COORDINATE WITH OWNER TO SET HOURS OF OPERATION.

LIGHTING CONTROL DEVICE SCHEDULE

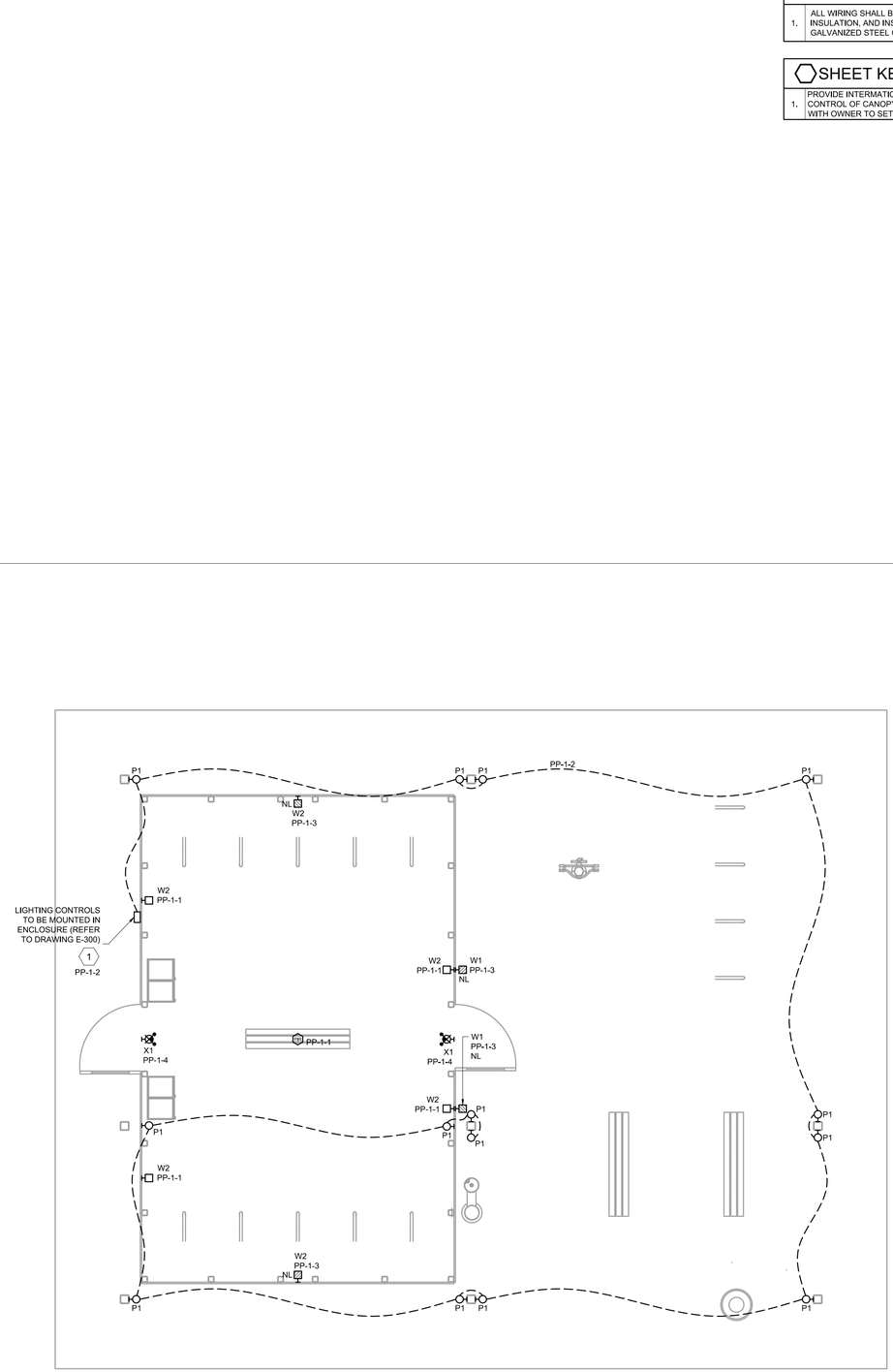
SYMBOL	DESCRIPTION	IMAGE
PIR	CEILING MOUNTED PASSIVE INFRARED OCCUPANCY SENSOR, 120V LINE VOLTAGE CONTROL, WHITE FINISH, SUITABLE FOR OPERATION IN -40°C TO 50°C AMBIENT ENVIRONMENTS. LEVITON #OSFHU-CTW	

LIGHTING CONTROLS SCHEDULE NOTES:
1. LIGHTING CONTROLS OF ONE MANUFACTURER THROUGH PROJECT TO ENSURE PRODUCT COMPATIBILITY.
2. ALTERNATE MANUFACTURERS: ACUITY BRANDS LIGHTING (SENORSWITCH, nLIGHT), COOPER LIGHTING SOLUTIONS, CRESTRON, CURRENT (FORMERLY HUBBELL LIGHTING), LEVITON, LUTRON VIVE/QS, SIGNIFY (FORMERLY PHILIPS LIGHTING), WATTSTOPPER-LEGRAND.
3. DUAL TECHNOLOGY SENSORS: PASSIVE INFRARED/ULTRASONIC, OR PASSIVE INFRARED/MICROPHONIC, DEPENDING ON MANUFACTURER. MICROPHONIC SENSORS ACCEPTABLE IN LIEU OF ULTRASONIC.
4. CONFIRM INSTALLATION REQUIREMENTS, WIRING DIAGRAMS, ETC. WITH MANUFACTURER'S DETAILS.
5. SUBMIT SHOP DRAWINGS FOR CONSULTANT'S REVIEW PRIOR TO PLACING ANY ORDER.
6. CONFIRM FINISH COLOUR WITH ARCHITECT DURING SUBMITTAL REVIEW.

LUMINAIRE SCHEDULE

SYMBOL	TYPE	LAMP	DESCRIPTION	IMAGE
	W1	26 WATT LED 3000 K 80 CRI 2500 LM	ARCHITEECTURAL WALL-MOUNTED LED LIGHT, SUITABLE FOR OPERATION IN -40°C TO 40°C AMBIENT ENVIRONMENTS, DOWNLIGHT ONLY, IES TYPE IV DISTRIBUTION, AND INTEGRAL 120 V DIMMABLE 0-10 V LED DRIVER (10% DIMMING LEVEL). KIMLIGHTING #CY2-25-3K8-2-4-4-UNV-BLT-T	
	W2	26 WATT LED 3000 K 80 CRI 2500 LM	SIMILAR TO TYPE 'W1' BUT INCLUDES 50/50 DOWN/UPLIGHT, BOTH IES TYPE IV DISTRIBUTION. KIMLIGHTING #CY2-25-3K8-1-4-UNV-BLT-T	
	P1	33 WATT LED 3000 K 80 CRI 2400 LM	ARCHITECTURAL FLOOD LED LIGHT, SUITABLE FOR OPERATION IN -30°C TO 50°C AMBIENT ENVIRONMENTS, COMPLETE WITH CLEAR WATERSHED LENS, TAPER LOCK YOKE MOUNT, CYLINDRICAL WALL MOUNT ARM TOP, AND INTEGRAL 120 V DIMMABLE 0-10 V LED DRIVER (1% DIMMING LEVEL). HYDREL #SAF7 LED P1 80CRI 30K MVOLT 100DEG CWL CWMA_T YM ZT DNA	
	X1	4 WATT LED	NEMA-4X RATED WALL MOUNT PICTOGRAM COMBINATION UNIT EXIT SIGN COMPLETE WITH REMOTE HEADS, BLACK FINISH, 120/347 VAC INPUT, BUILT-IN BATTERY BACK-UP, AND SUITABLE FOR OPERATION IN COLD-WEATHER (-40°C). LUMACELL #LNC1B6N36LD1CW	

LIGHTING FIXTURE SCHEDULE NOTES:
1. UNLESS NOTED OTHERWISE, ACCEPTABLE SUBSTITUTE MANUFACTURES AND SUPPLIERS: ACUITY BRANDS LIGHTING, COOPER LIGHTING SOLUTIONS, CREE CANADA, HUBBELL LIGHTING, PEERLESS ELECTRIC, SIGNIFY (FORMERLY PHILIPS LIGHTING), VISCOR/VISIONEERING.
2. WHERE AN INCOMPLETE MODEL/CAT NO. IS LISTED, MANUFACTURERS/SUPPLIERS MUST CONFIRM THE PROPOSED FIXTURE WITH THE CONSULTANT A MINIMUM OF ONE WEEK PRIOR TO TENDER CLOSE.
3. SUBMIT SHOP DRAWINGS FOR CONSULTANT'S REVIEW PRIOR TO PLACING ANY ORDER.



1 LIGHTING LAYOUT
SCALE: 1/4" = 1'-0"

PRELIMINARY NOT FOR CONSTRUCTION

No.	Description	Date
1	ISSUED FOR 90% CLIENT REVIEW	2026-03-12
2	ISSUED FOR CLASS B COSTING	2026-03-20

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CANADORE COLLEGE ACTIVE TRANSPORTATION HUB

CANADORE COLLEGE

LIGHTING LAYOUT

Project number 5436

E-200

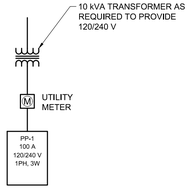
Scale AS SHOWN

GENERAL SHEET NOTES

1.	ALL WIRING SHALL BE RWU90 WITH 600V INSULATION, AND INSTALLED IN RIGID GALVANIZED STEEL CONDUIT.

⬡ SHEET KEYNOTES

1.	PROVIDE 20A, 120V WEATHERPROOF GFCI DUPLEX RECEPTACLE COMPLETE WITH WEATHERPROOF WHILE-IN-USE WET LOCATION COVER.
2.	PROVIDE 1/2" EMPTY CONDUIT AND PULL STRING TERMINATED IN THE ENCLOSURE.



2 SINGLE LINE DIAGRAM
SCALE: N.T.S.

ELECTRICAL PANELBOARD SCHEDULE

PANEL ID: PP-1	VOLTS: 120/240 V	LOCATION: ENCLOSURE EXTERIOR WALL
MAIN BUS: 100A	PHASE: 1	FED FROM: UTILITY
MAIN BREAKER: 60A/2P	WIRE: 3	FEEDER ENTRY AT: TOP/BOTTOM
TYPE: SIEMENS P1	MOUNTING: SURFACE	FEEDER:
INTERRUPTING CAPACITY:	ENCLOSURE RATING: NEMA 4X	REMARKS:

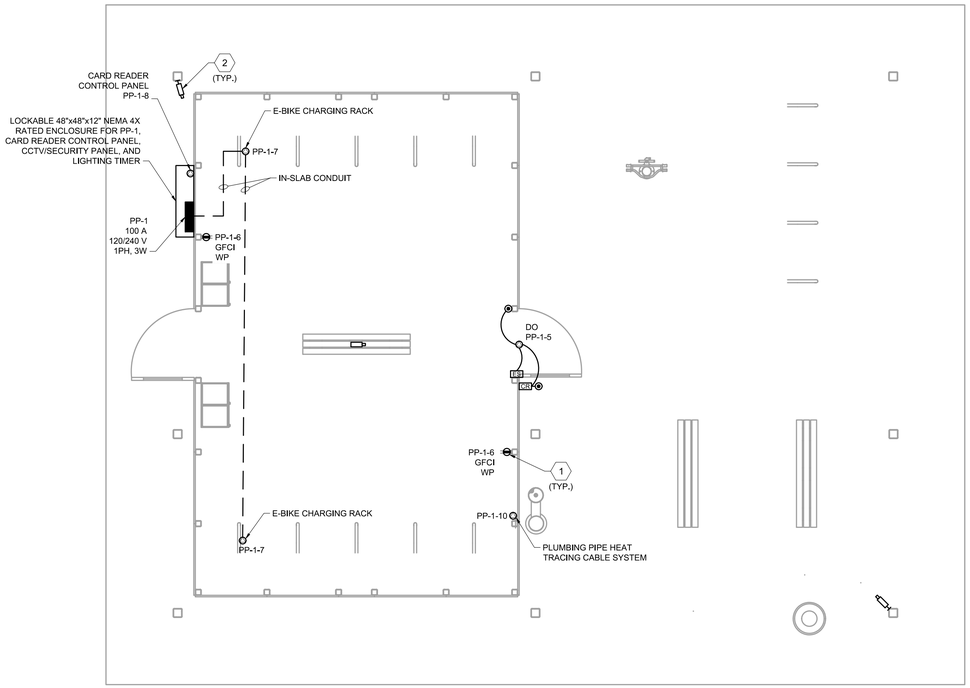
CKT	DESCRIPTION	WATTAGE	BRKR	Ø	BRKR	WATTAGE	DESCRIPTION	CKT
1	FUNCTIONAL LIGHTING	104 W	15 A	A	15 A	528 W	CANOPY LIGHTING	2
3	FUNCTIONAL 24/7 LIGHTING	104 W	15 A	B	15 A	13 W	EMERGENCY LIGHTING	4
5	POWERED DOOR OPERATOR	500 W	15 A	A	20 A	360 W	RECEPTACLES	6
7	E-BIKE CHARGING RACK	1920 W	20 A	B	15 A	200 W	CARD READER CONTROL PANEL	8
9	SPARE		15 A	A	20 A	800 W	PLUMBING PIPE HEAT TRACING CABLE	10
11				B				12
13				A				14
15				B				16
17				A				18
19				B				20
21				A				22
23				B				24
25				A				26
27				B				28
29				A				30

TOTAL: 4,529 W

NOTES:

* - PROVIDE LOCKABLE BREAKER
** - PROVIDE GFI TYPE BREAKER
*** - COORDINATE EXACT BREAKER SIZE WITH EQUIPMENT SHOP DRAWINGS
R - RECEPTACLE
L - LIGHTING

CIRCUIT NUMBERS ARE GIVEN FOR GROUPING ONLY. SITE VERIFY AVAILABLE CIRCUIT BREAKER SPACES IN PANELS DURING TENDER WALKTHROUGH.



1 POWER AND SYSTEMS LAYOUT
SCALE: 1/4" = 1'-0"

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POWER AND SYSTEMS LAYOUT

Project number 5436

E-300

Scale AS SHOWN