January 16, 2026

ADDENDA NO / ADDENDUM NO. 1

À / TO

MERX N^{O} DE RÉFÉRENCE / REFERENCE NO.: 311397

GOC4945209-CT - Workshop HVAC Modifications
À / AT
15 Eddy St (LTDLC), Gatineau QC

La modification qui suit, apportée au document de l'Appel d'offres (AO), est considérée comme faisant partie du document de l'AO ou de l'accord subséquent, le cas échéant.

Aucun complément ou modification résultant du manque de connaissances du fournisseur quant au contenu de cet addenda ne sera pris en compte.

The following amendment to the Invitation to Tender ("ITT") documents is considered to form part of the ITT document and/or the resulting Agreement, if any.

No consideration will be given for extras and/or changes due to the Supplier not being familiar with the contents of this Addendum.

Modification:

1. Ajouter les documents suivants à l'AO / Add the following documents to the ITT :

    1. LTDLC Design Guidelines.R1.8.pdf

EN: The Contractor shall comply with the attached Building Maintenance Guidelines "LTDLC Design Guidelines.R1.8" when performing work within the facility. In the event of any discrepancy between these guidelines and the project specifications, the more stringent requirement shall govern.

FR: L'Entrepreneur doit se conformer aux Lignes directrices de maintenance du bâtiment ci-jointes "LTDLC Design Guidelines.R1.8" lors de l'exécution des travaux dans l'installation. En cas de contradiction entre ces lignes directrices et les exigences du devis, la clause la plus stricte prévaudra.

Clarification:

2. Réponds au questions suivants / Respond to the following questions:

    Q1: 1). Is a building permit required? If so, Who pays? 2). Who is responsible for paying FA Bypass? 3). Who is the FA Contractor?

    A1: EN : 1) Refer to article 2.1 of "GC SOW and General Instructions. 2) The general contractor is responsible for all applicable fees to perform the required work. 3) Johnson Controls LP

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A1: FR : 1) Se référer à l'article 2.1 de « EG Énoncé des travaux et instructions générales BI-1 ». 2) L'entrepreneur général est responsable de tous les frais applicables pour exécuter les travaux requis. 3) Johnson Controls LP

ALL OTHER ITEMS, TERMS AND CONDITIONS REMAIN THE SAME.

END OF ADDENDUM

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LTDLC DESIGN GUIDELINES

Version	Changes	Author	Date
0.0	For Review	Nicolas Séguin	January 25, 2021
1.0	Initial Release	Nicolas Séguin	March 16, 2021
1.1	Clarifications added in coring section	Nicolas Séguin	March 31, 2021
1.2	General review	Nicolas Séguin	July 13, 2021
1.3	Clarification for IAQ and water testing (sections 22 05 00 and 23 05 00)	Nicolas Séguin	June 9, 2022
1.4	Clarification for lighting control wiring colour code (25 05 54)	Nicolas Séguin	July 12, 2022
1.5	Section '23 81 23 – Computer Room Air Conditioning' added and modification to item '26 05 00.6.1.5'	Nicolas Seguin	September 27, 2022
1.6	Modifications to items 02 41 00.08, 22 11 16, 22 13 16.13, 23 05 00, 25 05 01, 26 09 43	Alexandre Sauvé	March 20, 2023
1.7	Added section 1.3 – Scope of Work and 26 09 23, and made modifications to sections 22 05 15, 22 05 53 and 26 05 00.	Alexandre Sauvé	April 30, 2024
1.8	**Modified section 10 14 00 - Signage**	**Alexandre Sauvé**	**January 1, 2026**

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1 INTRODUCTION

1.1 PURPOSE

This document shall serve as a guide to ensure consistency between all fit-up projects at LTDLC. Consultants shall use this as a guide to develop the design documents (specifications and drawings). It is the consultant's responsibility to ensure his design adheres to regulating codes and standards. If there are discrepancies between this document and/or; regulating codes and standards; the consultant's opinion; non-compatibility with the systems; the consultant shall inform the project manager before proceeding with the design.

1.2 BACKGROUND

Les Terrasses de la Chaudière (LTDLC) complex was originally built by the Campeau Corporation, completed in 1978 and purchased by PSPC in 2013. This multi building complex consist of 1 Promenade du Portage, 15 and 25 Eddy and 10 Wellington which includes office towers, tunnel system, commercial spaces sub-grade parking structure and Crowne Plaza Hotel. The towers are linked at the first and second levels by an interconnected retail concourse. The complex has two (2) basement levels interconnected by a tunnel system. It has been the long-standing headquarters for Indigenous Services Canada, Crown-Indigenous Relations and Northern Affairs Canada, Canadian Heritage, The Canadian Radio-television and Telecommunication Commission (CRTC) and the Canadian Transportation Agency (CTA). LTDLC also serves as an administrative headquarters for many Government of Canada (GOC) departments such as: Shared Services Canada (SSC), Public Services and Procurement Canada (PSPC), Women and Gender Equality Canada (WAGE) and Employment and Social Development Canada (ESDC). LTDLC accommodates approximately 6,400 occupants as well as retail tenants and a daycare. The complex represents 4 percent of Government of Canada's office space in the National Capital Region (NCR) and contributes to the 25 percent requirement of federal presence in Gatineau.
Based on the Tiering exercise from National Capital Area Portfolio, Asset and Investment Management and Project Leadership (NCAP AIM & PL) LTDLC has been adjusted to Tiering 3 Renovate, and Major capital improvements are under development.

1.3 SCOPE OF WORK

When modernizing a complete or partial floor, it is imperative that the consultant thoroughly evaluates and replaces all electrical and mechanical components and systems situated within the floor under renovation. This includes but is not limited to panels, transformers, sanitary/domestic piping and related infrastructure, even if they serve other floors unaffected by the modernization.

In terms of examples:

1) When essential systems such as emergency power extend across multiple floors, the consultant must ensure the replacement or upgrade of relevant panels, equipment, and infrastructure to ensure comprehensive safety and functionality throughout the entire building.
2) In cases where a bus plug, distribution panel, transformer, disconnect switches or distribution splitter are located within the floor undergoing renovation but supplies power to a floor not included in the modernization project, consideration must be given to replacing them.
3) If sanitary drainpipes serving the floor above are located in the project's space, consideration must be given to replacing them.

Despite those equipment servicing floors not currently undergoing renovation, these components are integral to the overall infrastructure. Neglecting their replacement during the modernization process could result in these crucial elements being missed or disregarded, potentially leading to operational inefficiencies or safety hazards in the future. In addition, replacing them while the floor is under renovation will be cost effective. Therefore, it is imperative that consultants assess and, if necessary, replace such components to ensure the comprehensive upgrade of the building's systems and prevent any essential equipment from remaining unchanged.

1.4 ACRONYMS

AC – Alternating Current
AHU – Air Handling Unit
AI – Analog Input
AO – Analog Output
BAS – Building Automation System
CAD – Computer-Aided Design
CMMS – Computerized Maintenance Management System
CO_2 – Carbon Dioxide
Cx – Commissioning
DC – Direct Current
DI – Digital Input
DO – Digital Output
DWV – Drain Waste Vent
EMCS – Energy Monitoring and Control Systems
EMT – Electric Metallic Tubing
FIP – Federal Identity Program
FLA – Full Load Amps
HDi – Harmonic Distortion
HVAC – Heating, Ventilation and Air Conditioning
IT – Information Technology
LCD – Liquid Control Display
LED – Light Emitting Diode
LRA – Locked Rotor Amps
LSIG – Long Time, Short Time, Instantaneous, and Ground Fault
LTDLC – Les Terrasses de la Chaudière
NMS – National Master Specification
O&M – Operations and Maintenance
OWS – Operator Workstation
P – Proportional
PI – Proportional and Integral
PID – Proportional, Integral and Derivative
PMS – Property Management Services
PSPC – Public Services and Procurement Canada
RMS – Root Mean Square
SOP – Standard Operating Procedures

TAB – Testing, Adjusting and Balancing
THDi – Total Harmonic Distortion Current
THDv – Total Harmonic Distortion Voltage
UPS – Uninterruptible Power Supply
VFD – Variable Frequency Drive

1.5 DESIGN DEVELOPMENT DELIVERABLES

When preparing the specification sections, Consultants must use the latest release of the National Master Specification (NMS) for the production of the specifications, subject to the consultant's overriding responsibility and for the content of the construction project specification. Edit, amend and supplement the NMS as required to produce a project manual that is appropriate and specific to the circumstances of the project, free from conflict and ambiguity and sealed. Consultant must also adhere to the latest edition PSPC NMS user guide.
The Consultant shall, in a careful, efficient and professional manner, provide the following additional requirements, as applicable:

1. 33 % construction documents:
   1.1. Drawing list and specifications table of contents
   1.2. Design drawings showing concept.
   1.3. Class "D" cost estimate.
2. 66 % construction documents:
   2.1. Completed specifications with list of drawings with 33% comments addressed.
   2.2. Design drawings with complete concept, demo and construction details.
   2.3. Complete Control Sequences instructions to execute and commission the project.
   2.4. The consultant must identify all CMMS numbers for equipment affected by the project (removed and or modified) and show them on the 66 % submission plans.
   2.5. Single line diagram indicating all new equipment being added/connected to an existing distribution system. Details of transformers, cables, panels (with ratings and capacities) shall be included indicating, but not limited to, impedance of transformers and winding configuration, short circuit rating of breakers and fuses, switchboards and switchgear, busducts with tap-offs and splitters.
   2.6. Panel schedules indicating, but not limited to, connected load values, estimated/calculated demand load in KVA/KW/A.
   2.7. Identify clearly on the plan, area's concerning hazardous building materials and designated substances.
   2.8. Class "C" cost estimate.
   2.9. Lighting photometric study (refer to section 26 05 00 – Lighting).
3. 99 % construction documents:
   3.1. Completed specifications and drawings (bilingual) with 66 % comments addressed.
   3.2. Shop drawing log containing a list of all shop drawings expected to be reviewed.
   3.3. "Class A" cost estimate.
4. Issued for tender and tender phase administration:
   4.1. Completed specifications and drawings (bilingual) with 99 % comments addressed.
   4.2. All "issued for tender" documents (drawings and specifications) must be signed and sealed by respective disciplines.
   4.3. Prepare and process addenda during bidding and before award of construction contract.
5. Issued for Construction:

5.1. All “issued for construction” documents (drawings and specifications) must be signed and sealed by respective disciplines and must include addenda changes, as applicable.

1.6 COMMUNICATIONS

1. General:
   1.1. All communications shall be done through the project manager.
   1.2. Communication protocols shall be clearly indicated in the design documents.
2. Work permits:
   2.1. Contractor to submit completed work permits to BGIS project manager at least 48 hours in advance
3. System bypass:
   3.1. Contractor to inform BGIS project manager of upcoming bypasses at least 48 hours in advance.
4. Tenant Notices:
   4.1. Tenant notices shall be sent to the tenants one (1) week prior to the event which it is intended for. The tenant notice is needed a minimum of one (1) week prior to the notice to be sent to tenant representatives in order to allow enough time for review and edits. Therefore, tenant notices need to be communicated to BGIS-PMS a minimum of three (3) weeks prior to the event it is intended for.
   4.2. A tenant notice shall be drafted at the start of construction.
   4.3. Updates shall be required for any changes to the schedule or area of work.
5. Shutdowns:
   5.1. All shutdowns require a clear two (2) week notice to occupants. The tenant notice is needed a minimum of one (1) week prior to the notice to be sent to tenant representatives in order to allow enough time for review and edits. Therefore, tenant notices need to be communicated to BGIS-PMS a minimum of three (3) weeks prior to a shutdown.
   5.2. Coordinate shutdowns with project manager in an effort to combine multiple shutdowns and reduce disruptions to tenants.

2 FUNCTIONAL REQUIREMENTS

DIVISION 01 – GENERAL REQUIREMENTS

01 14 00 – Work Restrictions

1. The LTDLC complex is occupied from Monday to Friday, between 6am and 6pm.
2. All noise generating work shall be carried out during unoccupied times.
3. Deliveries and waste disposal shall be coordinated with regular building operations activities such as cleaning, maintenance and other contractors.

01 31 19 – Project Meetings

1. Prior to starting the design, the consultant and sub-consultants to hold a mandatory meeting with the BGIS Operations team to discuss and review the following items:
   1.1. Mechanical systems, BAS, graphical user interface and sequence of operations.
   1.2. Electrical systems and sequence of operations of lighting control system.

01 33 00 – Submittal Procedures

1. Shop drawings log:
   1.1. Prime consultant to produce a shop drawing log and submit for review as part of the 99 % design package.
   1.2. Prime consultant to coordinate with sub-consultants to ensure all structural, mechanical and electrical materials/equipment are captured in the shop drawing log.
   1.3. The shop drawings log shall include, but not be limited to, the following information:
      1.3.1.Specification section.
      1.3.2.Specification item number.
      1.3.3.Description.
      1.3.4.Revision number.
      1.3.5.Submission date.
      1.3.6.Actual submission date.
      1.3.7.Date returned.
      1.3.8.Action (reviewed, reviewed as noted, revise & resubmit).
      1.3.9.Comments.
   1.4. Shop drawings for all equipment, materials and devices shall be submitted for consultant approval prior to being ordered and delivered to site.
   1.5. The shop drawing log shall illustrate the progression of submittals in chronological order.
   1.6. A colour code shall be used to illustrate the status of each item:
      1.6.1.Reviewed – Green.
      1.6.2.Reviewed as noted – Orange.
      1.6.3.Revise and resubmit – Red.
2. Contractor shall produce coordination drawings for all mechanical rooms, surrounding areas and all other areas with potential interference points. The coordination drawings shall be completed three (3) weeks after award of contract. Once completed, the contractor shall hold a meeting for review

with the consultant. The BGIS project manager shall be informed of the meeting to invite appropriate stakeholders.

01 61 00 – Common Product Requirements

1. All equipment specification shall be performance based. No manufacturer names or models shall be referenced in the design documents.

01 77 00 – Closeout Procedures

1. Prior to issuance of substantial completion, consultant to ensure the following requirements are met:
   - 1.1. Training is complete and documented.
   - 1.2. O&M manuals are reviewed and submitted to O&M team.
   - 1.3. Performance verification of equipment is complete, and reports are submitted BGIS Cx Oversight team confirming equipment is operational.
   - 1.4. As-built drawings (CAD version) are completed by consultant and submitted to BGIS.
   - 1.5. CMMS forms are completed and submitted to BGIS.
   - 1.6. Update of SOP manual.

01 91 13 – General Commissioning Requirements

1. O&M team to be involved in Cx process.
2. Performance verification forms to be submitted to BGIS Cx Oversight Manager prior to performing performance verification activities.
3. A Cx meeting shall be held with all parties involved prior to the start of the performance verification activities.
4. The Cx program for the project shall cover, but not be limited to, the following systems, equipment and functions:
   - 4.1. Division 21
     - 4.1.1. Complete inspection of sprinkler and piping installations.
     - 4.1.2. Witness and review hydrostatic tests.
   - 4.2. Division 22
     - 4.2.1. Performance checks of:
       - 4.2.1.1. Drainage pumps.
       - 4.2.1.2. Faucets and thermostatic mixing valves.
       - 4.2.1.3. Water fountains.
     - 4.2.2. Pressure testing of domestic water and drainage piping systems.
     - 4.2.3. Review of domestic water piping flushing and cleaning reports.
   - 4.3. Division 23
     - 4.3.1. Performance checks of:
       - 4.3.1.1. Air handling units.
       - 4.3.1.2. Heating and cooling coils.
       - 4.3.1.3. VFDs (refer to section 23 73 00.16 – Air Handling Units – Packaged)
       - 4.3.1.4. Motorized dampers.
       - 4.3.1.5. Terminal units (applicable sampling of 10%).
       - 4.3.1.6. Exhaust fans.
       - 4.3.1.7. Control valves.

4.3.1.8. Balancing valves.

4.3.2. Verification of system functions:

4.3.2.1. Modulating outdoor air supply according to the CO_2 control sequence (reset schedule).

4.3.2.2. Positive relative pressurization of the floor spaces, air masses balance and general exhaust air control.

4.3.2.3. Maintenance and monitoring of environmental conditions (temperature) of occupied and technical spaces (electrical rooms and telecommunication / IT rooms.

4.3.2.4. Performance of variable volume HVAC systems (duct static pressure controls, air flow modulation profiles and supply temperature according to loads, demand profiles / energy consumption) [Seasonal tests - winter and summer conditions].

4.3.2.5. Performance of HVAC coils (maintenance and control of zone supply temperatures) [Seasonal tests - winter and summer conditions].

4.3.3. Review of TAB report (refer to section 23 05 93 – Testing, Adjusting and Balancing for HVAC).

4.3.4. Ductwork pressure testing.

4.4. Division 25

4.4.1. Witness and review of point-by-point verifications and calibrations.

4.4.2. Witness and review of sequences of operation for HVAC systems in all operation modes

4.4.3. Detailed review of graphical interfaces of systems subject to BAS controls and monitoring.

4.4.4. Performance and stability of control loops (P / PI / PID).

4.4.5. Detailed review of the setup of trend data registers and graphs required for Cx activities and operations.

4.5. Division 26

4.5.1. Dry type transformers (26 12 16.01 – Dry Type Transformers Up To 600 V Primary). A set of harmonic readings shall be taken on the primary side, as well as the secondary side, of each new transformer. The readings shall include each phase and the neutral current. They shall indicate the 60 hz currents and the THDi of all other harmonic currents, up thru 25th. All the lighting and mechanical equipment must be ON; the duration of these readings is momentary. These results shall be submitted in a written report to BGIS.

4.5.2. Performance of the normal lighting system consisting of the verification of illumination levels and rate of uniformity throughout all spaces.

4.5.3. Performance of the emergency lighting system consisting of the verification of emergency lighting levels and uniformity rates across all access paths to the exit [Night tests].

4.5.4. Functional tests on all operating modes and lighting control devices.

4.5.5. Performance of lighting modulation systems based on ambient lighting (daylighting controls). Testing and demonstration of maintaining required lighting levels, and effective modulation of fixtures / zones.

4.5.6. A set of harmonic readings shall be taken, for the whole renovated floor, at the 600 VAC/ 3ph tap supply from the existing riser busduct; if there are more than one (1) riser busducts involved, per floor, then there shall be a set of readings for each busduct tap. The busduct tap readings shall include each phase and the neutral current. These readings shall

include current and voltage; They shall indicate the THDi and THDv, as well as the individual harmonics, up to the 25th.

4.5.7. Provide report on protection, coordination and arc flash including, but not limited to:

4.5.7.1. Based upon IEEE 1584-2018 and CSA Z462-2018.

4.5.7.2. Provide additional short circuit calculations for all 120/208 Vac panels including, but not limited to, single phase to ground faults at 120 Vac, on all transformers that have a zigzag secondary. This shall require the Z0 values from the transformer manufacturer and the impedance of the bare ground conductor within EMT conduit of the feeder.

4.6. Division 28

4.6.1. Witness and review of fire alarm verifications in accordance with CAN/ULC S537.

4.6.2. Integrated functional tests on electromagnets installations (maglocks). These tests must review and cover all the modes and requirements for release and rearming prescribed by the National Building Code of Canada.

4.6.3. Integrated functional tests on stopping fans in fire alarm conditions.

DIVISION 02 – EXISTING CONDITIONS

02 41 00.08 – DEMOLITION – MINOR WORKS

1. Coring:
   1.1. If coring is required, it shall be completed as part of the fit-up project (not a separate project).
   1.2. Prime consultant to include a coring coordination drawing indicating the location and size of the penetrations from all divisions.
   1.3. Contractor to scan the slab to pinpoint structural elements, including but not limited to, rebar, post-tension cables, wire mesh, metallic and non-metallic pipes and conduits.
   1.4. Scanning shall be performed from **above and below** the slab.
   1.5. The results of the scan shall be reviewed by the engineer of record or consultant for structural, mechanical and electrical elements prior to proceeding with coring. A signed report shall be provided to BGIS for records.
   1.6. Unless otherwise directed by the structural engineer, no structural elements shall be cut.
   1.7. Work permits and bypass permits shall be completed and attached to the consultant document, then submitted to the BGIS PMS team. Communications protocols identified in section “1.5 Communications” shall be followed at all times.
   1.8. If coring work penetrates a fire partition, the consultant shall review fire stopping materials shop drawings prior to approval of work permits and bybass permit. Consultant shall review the fire stopping work and confirm adequacy of the installation. Refer to section “07 84 00 – Fire Stopping”.
   1.9. Any coring work to be reviewed and approved by the BGIS property management services team before the work.

DIVISION 03 – CONCRETE

03 30 00 – CAST-IN-PLACE CONCRETE

1. Housekeeping pads.

1.1. Housekeeping pads shall be provided for all new floor mounted mechanical equipment in the mechanical room as well as transformers and switchboards in the electrical room.
1.2. The height of the housekeeping pads shall be coordinated with the drainage piping and p-trap requirements.
1.3. The housekeeping pads shall be coordinated with acoustic requirements.
1.4. The edge of the housekeeping pads shall be painted yellow to highlight tripping hazards.

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

06 08 99 – Rough Carpentry for Minor Works

1. Wooden studs are not acceptable for the construction of partitions.

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 84 00 – Fire Stopping

1. Fire stopping shall be provided at all penetrations that compromise the integrity of a fire partition.
2. Prime consultant to include a fire stopping coordination drawing, including but not limited to:
   2.1. Location of all penetrations from all divisions requiring fire stopping.
   2.2. Requirements for ULC listed fire stopping products at each penetration.
3. All fire stopping details, including products shall be submitted as shop drawings. Consultant shall review all fire separations and confirm adequacy of the installation.
4. Review expansion joint/gap at floor and exterior wall perimeter and determine requirements for fire stopping.

DIVISION 08 – OPENINGS

08 11 00 – Metal Doors and Frames

1. The condition of all doors on the floor shall be reviewed and replaced by doors with proper fire rating and acoustic performance.
2. Mechanical room doors to be provided with a means to release pressure before opening door.

08 31 00 – Access Doors and Panels

1. Consultant to identify all access doors and panels locations, sizes and construction (materials) on drawings.
2. All access doors and panels shall be submitted as shop drawings. Consultant shall review all access doors and panels and confirm adequacy of the installation.

08 71 00 – Door Hardware

1. Door hardware on all new doors shall be:
   1.1. Lever handle.
   1.2. Brushed finish.
   1.3. Door operators to be touchless.
2. Mechanical room and service room doors locks to be compatible with O&M keys.

DIVISION 09 – FINISHES

09 51 13 – Acoustical Panel Ceilings

1. If acoustical panel ceilings systems replacement is part of the fit-up, the following shall apply:
   1.1. Rectangular ceiling tiles: 1,220 mm x 610 mm.
   1.2. Face profile shall not be smaller than 24 mm.

09 91 23 – Interior Painting

1. Mechanical room walls, ceiling and floors shall be painted.

DIVISION 10 – SPECIALTIES

10 14 00 – Signage

1. Signage shall meet the following requirements:
   1.1. FIP – Federal Identity Program.
   1.2. CSA-B651 – Accessible Design for the Built Environment.
   1.3. Bilingual, with French text predominating as per article 24 of the Charter of the French Language of Quebec
2. Construction:
   2.1. Engraving sheet: lamacoid 3.2 mm, white core.
   2.2. Flat configuration.
   2.3. Fabricated bracket for wall projecting or ceiling suspended.

DIVISION 21 – FIRE SUPPRESSION

21 05 00 – Common Work Results for Fire Suppression

1. All existing horizontal distribution, including devices and accessories shall be replaced with new.
2. Refer to section 23 05 53 – Identification for HVAC Piping and Equipment for identification of fire protection systems.
3. Provide sprinkler head guards in mechanical rooms, electrical rooms, janitor rooms, server rooms and other technical rooms.

DIVISION 22 – PLUMBING

22 05 00 – Common Work Results for Plumbing

1. All existing horizontal distribution, including devices and accessories shall be replaced with new.
2. All piping, equipment and accessories shall be 100% lead free.
3. Refer to section 23 05 53 – Identification for HVAC Piping and Equipment for identification of plumbing systems.
4. Plumbing diagram:
   4.1. Consultant shall provide a hard copy, size A1, of the mechanical piping diagram for installation in the mechanical rooms. All equipment and devices shall be properly identified using the LTDLC nomenclature.
   4.2. Consultant shall ensure the construction documents have provision for the general contractor to print the diagram and install it under a plexiglass in the mechanical rooms.
5. Any piping or other obstacles that pose a risk for tripping or hitting the head shall be clearly marked.

6. Water testing (including E.coli and coliforms) shall be included in all projects affecting plumbing fixtures and performed on all plumbing fixtures affected in the project. The result of each fixture must be within the acceptable range before putting it in use.

22 05 15 – Plumbing Specialties and Accessories

1. Provide 19 Ø domestic cold and hot water lines with anti-siphon dual hot/cold wall faucet complete with automatic draining hose connection backflow preventer in all mechanical rooms for technicians to perform maintenance duties.
2. Trap seal primers.
   - 2.1. Trap seal primers to be provided for the following equipment:
     - 2.1.1. All floor drains.
     - 2.1.2. Washroom janitor sinks.
     - 2.1.3. Trap seal primers shall be hardwired electric solenoid activated when flow is insufficient.
   - 2.2. The location of trap seal primers and associated piping shall be clearly identified on the drawings.
   - 2.3. The use of trap guards shall not be permitted.
   - 2.4. If the flow of plumbing fixtures is not large enough for pressure drop activated tap seal primers, hardwired electric solenoid trap seal primers shall be used.
3. Thermometers.
   - 3.1. Provide thermometers on main domestic hot and hot water recirculation pipes serving the floor.
   - 3.2. The thermometers shall be installed in the janitor closet.
4. Pressure gauges.
   - 4.1. Provide pressure gauges on domestic cold, hot and hot water recirculation pipes serving the floor. If pressure reducing valves are used, pressure gauges shall be installed both upstream and downstream of the pressure gauges.
   - 4.2. The pressure gauges shall be installed in the janitor closet.
5. Pressure reducing valves:
   - 5.1. All domestic water pressure reducing valves to be replaced with new.
   - 5.2. The pressure reducing valves shall be installed in the janitor closet.
6. Backflow preventers:
   - 6.1. Backflow preventers shall be installed where there is a possible source of contamination.
   - 6.2. Consultant to clearly specify the type of backflow preventer on the drawings.
7. Soap Dispensers:
   - 7.1. Touch-free, barrier-free, electronic soap dispenser.
   - 7.2. Controls to be hardwired with an AC to DC transformer. The transformer shall be easily accessible for maintenance purposes.
   - 7.3. Division 22 to provide the transformer, while installation shall be carried out by Division 26.
   - 7.4. Multiple soap dispensers may be connected to a single transformer if the system allows for such configuration.

22 11 16 – Domestic Water Piping

1. The use of non-metallic piping is not allowed.
2. Isolation valves.

2.1. Isolation valves shall be installed on the main domestic cold, hot and hot water recirculation pipes in the mechanical room to isolate the floor systems from main building systems.
2.2. Isolation valves shall be installed before and after all equipment that require maintenance, including but not limited to, coils, circulation pumps, meters.
2.3. Isolation valves shall be installed at a height that is accessible from the floor, without obstructions or the use of special tools.

22 13 16.13 – Sanitary Waste and Vent Piping – Cast Iron and Copper

1. The use of non-metallic piping is not allowed.
2. The condition of all existing DWV piping shall be assessed prior to connecting new equipment, including main plumbing stacks. If the piping is in poor condition, it shall be replaced as part of the project.
3. Condensate drains shall be terminated in floor drain.
4. Cleanouts shall be provided where there is a change of direction of 45 degrees or more.

22 42 13 – Commercial Water Closets, Urinals and Bidets

1. Plumbing fixtures type and location shall be clearly identified on drawings.
2. Water closets:
   2.1. Flush valves:
      2.1.1. Touch-free, barrier-free, electronic flush valve.
      2.1.2. Controls to be hardwired with AC to DC transformer. The transformer shall be accessible for maintenance.
      2.1.3. Transformer to be provided by Division 22 and installed by Division 26.
      2.1.4. Multiple flush valves may be grouped to one (1) transformer if the system allows it.
3. Urinals:
   3.1. Flush valves:
      3.1.1. Touch-free, barrier-free, electronic flush valve.
      3.1.2. Controls to be hardwired with AC to DC transformer.
      3.1.3. Transformer to be provided by Division 22 and installed by Division 26.
      3.1.4. Multiple flush valves may be grouped to one (1) transformer if the system allows it.
4. Lavatories:
   4.1. Faucet:
      4.1.1. Touch-free, barrier-free, electronic faucet.
      4.1.2. Controls to be hardwired with AC to DC transformer.
      4.1.3. Transformer to be provided by Division 22 and installed by Division 26.
      4.1.4. Multiple electronic faucets may be grouped to one (1) transformer if the system allows it.
      4.1.5. When possible, one (1) thermostatic mixing valve shall be provided for all lavatories located in the same washroom. The thermostatic mixing valve shall be located at proximity of faucets.

22 42 16 – Commercial Lavatories and Sinks

1. Kitchenette sink:
   1.1. Barrier-free installation with barrier-free faucet.

22 47 00 – Drinking Fountains and Coolers

1. Drinking fountains and coolers:
   1.1. Touch-free and barrier-free.

DIVISION 23 – HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

23 05 00 – Common Work Results for HVAC Systems

1. The use of non-metallic piping is not allowed.
2. All heating valves shall be 3-way
3. All existing horizontal distribution, including devices and accessories shall be replaced with new.
4. Mechanical piping diagram:
   4.1. Consultant shall provide a hard copy, size A1, of the mechanical piping diagram for installation in the mechanical rooms. All equipment and devices shall be properly identified using the LTDLC nomenclature.
   4.2. Consultant shall ensure the construction documents have provision for the general contractor to print the diagram and install it under a plexiglass in the mechanical rooms.
5. Any piping or other obstacles that pose a risk for tripping or hitting the head shall be clearly marked.
6. Outdoor air and exhaust air ductwork to be replaced up to the ventilation shaft c/w all devices, including but not limited to, terminal units.
7. All ductwork connected to the main shafts (outdoor air, general exhaust and washroom exhaust) shall be installed in a way to minimize obstructions within the shaft.
8. Consultant to review outdoor air requirements for the affected area and coordinate with base building systems (previous outdoor air studies are available for reference).
9. Post-construction Indoor Air Quality (IAQ) testing shall be included in all fit-up projects.

23 05 19.13 – Thermometers and Pressure Gauges – Piping Systems

1. General:
   1.1. When accessories are installed through insulation, extensions shall be provided.
2. Direct reading thermometers:
   2.1. Provide at the following locations:
      2.1.1. Connection to building heating water loop.
      2.1.2. Connection to building chilled water loop.
      2.1.3. Inlet and outlet of water heating and cooling coils.
3. Pressure gauges:
   3.1. Provide at all the following locations:
      3.1.1. Connection to building heating water loop.
      3.1.2. Connection to building chilled water loop.
      3.1.3. Upstream and downstream of pressure reducing valves.
      3.1.4. Inlet and outlet of heating and cooling coils.
4. Temperature sensor:
   4.1. HVAC contractor to provide a temperature probe well on the supply and return of every hydronic coil.

23 05 23.05 – Butterfly Valves

1. A butterfly valve shall be installed on main heating water and chilled water pipes in the mechanical room to isolate the floor systems from main building systems. The valves shall be installed on both supplies and returns, as close as possible to the risers.
2. The isolation valves shall be installed at a height that is accessible from the floor, without obstructions or the use of special tools.

23 05 29 – Hangers and Support for HVAC Piping and Equipment

1. Provide insulation protection shields for insulated piping.

23 05 53 – Identification for HVAC Piping and Equipment

1. System nameplates:
   1.1. Construction:
      1.1.1. Three (3) mm laminated plastic.
2. Identification of piping systems:
   2.1. Identify contents by background colour marking with direction of flow by arrows.
   2.2. Legend:
      2.2.1. Block capitals to sizes and colours listed in CAN/CGSB 24.3.
   2.3. Arrows showing direction of flow:
      2.3.1. Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
      2.3.2. Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
   2.4. Materials for background colour marking, legend, arrows:
      2.4.1. Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
      2.4.2. Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150˚C and intermittent temperature of 200˚C.
   2.5. Colours and legends:

System	Legend (text & background colour)
Chilled water supply	ALIM. EAU REF / CH. WATER SUP.
Chilled water return	RET. EAU REF./ CH. WATER RET.
Hot water heating supply	ALIM. EAU DE CHAUF. / HEAT. WATER SUP.
Hot water heating return	RET. EAU DE CHAUF. / HEAT. WATER RET.
Domestic hot water supply	EAU CHAUDE DOM. / DOM. HOT WATER
Domestic hot water recirculation	RECIRC. EAU CHAUDE DOM. / DOM. HOT WATER RECIRC.
Domestic cold water supply	EAU FROIDE DOM. / DOM. COLD WATER
Sanitary drainage	DRAINAGE SANITAIRE / SANITARY DRAINAGE
Vent	ÉVENT / VENT
Condensate drain	DRAIN CONDENSÉ / CONDENSATE DRAIN
Compressed air	AIR COMP. / COMP. AIR

   2.6. Valves:
      2.6.1. All valves shall be identified by zone.
      2.6.2. Identification of valves to follow the table above.
   2.7. Identification of piping systems shall be installed at all the following locations:

2.7.1.Transfers between rooms and floors.
2.7.2.At every 10m.
2.7.3.At every junction.
2.7.4.At every change of direction.

3. Identification of ductwork systems:
   3.1. 50 mm high stenciled letters and directional arrows 150 mm long x 50 mm high.
   3.2. Colours: black or coordinated with base colour to ensure strong contrast.
4. Language:
   4.1. Identification in BOTH French and English.

23 05 93 – Testing, Adjusting and Balancing for HVAC

1. Design airflows shall be clearly identified in the design documents, for all the following equipment:
   1.1. Ductwork main runs.
   1.2. All ductwork branches.
   1.3. Air handling units.
   1.4. Fans.
   1.5. Balancing dampers.
   1.6. Terminal boxes.
   1.7. Fan coil units.
   1.8. Diffusers.
2. In the event of a variable air volume system, both maximum and minimum airflows shall be indicated in the design documents.
3. Design water flows shall be clearly identified in the design documents, for all the following equipment:
   3.1. Hydronic heating and cooling coils balancing valves.
   3.2. Fan coil units balancing valves.
4. Design documents to indicate a summary of airflows by core as per ASHRAE 62.1, for:
   4.1. Total supply air.
   4.2. Total outdoor air.
   4.3. Total return air.
   4.4. Total exhaust air.
5. Preliminary balancing report reflecting HVAC as-builts to be submitted to O&M and Cx teams.
6. Indicate outdoor air calculations on drawings to meet MD 15000 (ASHRAE 62-2001), MD 15000 (CO_2 steady-state concentration of 800 ppm) and ASHRAE 62.1-2016. The stringiest shall be used to determine outdoor air requirements.
7. TAB to be done at full flow and max design parameters.

23 05 94 – Pressure Testing of Ducted Air Systems

1. All ductwork on the floor to be pressure tested (existing and new).

23 07 16 – HVAC Equipment Insulation

1. All HVAC equipment insulation shall be finished with a PVC jacket.

23 07 19 – HVAC Piping Insulation

1. All HVAC piping insulation shall be finished with a PVC jacket.

23 08 16 – Cleaning and Start-Up of HVAC Piping Systems

1. All piping on floor to be cleaned and flushed prior to start-up.
2. Flushing and cleaning report shall be submitted to BGIS project manager, indicating concentration levels of inhibitors.

23 21 13.02 – Hydronic Systems: Steel

1. Heating and chilled water requirements for floor shall be submitted to BGIS O&M team for review.
2. Hydronic systems in floor mechanical rooms shall be steel or copper.
3. A hydronic system schematic shall be provided as part of the design documents, indicating but not limited to all associated equipment, devices and accessories:
   - 3.1. Piping configuration.
   - 3.2. Heating and cooling coils.
   - 3.3. Shut-off valves.
   - 3.4. Balancing valves.
   - 3.5. Automatic air vents.
   - 3.6. Strainers
   - 3.7. Drains.
   - 3.8. Thermometers.
   - 3.9. Pressure gauges.
   - 3.10. Control Devices.
   - 3.11. Unions.
4. Balancing valves shall be compatible with O&M team balancing valve meter (model: TA-SCOPE).
5. Strainers shall be installed upstream of all mechanical equipment, including but not limited to:
   - 5.1. Heating and cooling coils.
6. Provide bypass c/w associated valves at all major equipment, coils and heat exchangers.

23 31 13.01 – Metal Ducts – Low Pressure to 500 Pa

1. A HVAC schematic for the mechanical room shall be provided as part of the design documents, indicating but not limited to all associated equipment, devices and accessories:
   - 1.1. Air handling unit.
   - 1.2. Terminal units.
   - 1.3. EMCS end devices (pressure sensors, flow sensors and temperature sensors).
   - 1.4. Transitions.
   - 1.5. Elbows.
   - 1.6. Turning vanes.
   - 1.7. Access doors.

23 33 00 – Air Duct Accessories

1. Provide turning vanes for short radius and mitered elbows.
2. Access doors/panels:
   - 2.1. Access doors/panels location and size shall be clearly identified on the drawings. Proper coordination between architectural and M&E trades shall be conducted to ensure location, construction and materials are specified in the design documents.
   - 2.2. Access doors/panels shall not be smaller than 400 mm x 400 mm.

2.3. Access doors/panels shall be installed in a manner to provide easy access and be free of obstruction.
2.4. Access doors/panels shall be installed to provide access for operating, inspecting, adjusting, servicing, without the use of special tools, of the following equipment:
2.4.1. Upstream and downstream of hydronic heating/cooling coils.
2.4.2. Fire Dampers.

23 33 14 – Dampers – Balancing

1. Balancing dampers shall be provided on all ductwork branches.

23 33 16 – Dampers – Fire and Smoke

1. All fire dampers on the floor to be replaced with new.
2. All fire dampers shall be submitted as shop drawings. Consultant shall review all fire dampers and confirm adequacy of the installation.

23 36 00 – Air Terminal Units

1. VAV terminal units:
   1.1. All VAV terminal units to be provided with capabilities of measuring airflow.
   1.2. Coordinate air flow adjustments with balancing trade.
   1.3. A VAV terminal unit shall be provided on the outdoor air supply duct.
   1.4. A VAV terminal unit shall be provided on the general exhaust duct.
   1.5. VAV terminal units to be installed in open space for ease of access.
2. Conference room shall be provided with a dedicated terminal unit with the following capabilities:
   2.1. Dedicated outdoor air (VAV) and independent controls for temperature and CO_2.
   2.2. Cooling coil.
   2.3. Condensate pump and controls.

23 37 13 – Diffusers, Registers and Grilles

1. All supply air diffusers shall be 24” x 24” square cone diffusers c/w adjustable pattern deflectors.

23 73 00.16 – Air Handling Units – Packaged

1. Filter section.
   1.1. Filters: Merv 13.
   1.2. No pre-filtration shall be part of air handling unit.
   1.3. Adequate clearance shall be provided to facilitate filter replacement.
2. Coil section.
   2.1. If an air handling unit serves both interior and perimeter zones, the coils shall be installed in the ductwork to allow independent heating/cooling for different exposures.
   2.2. If an AHU contains both a heating and cooling coil, the cooling coil shall be installed upstream of the heating coil to allow dehumidification.
   2.3. Drains valves shall be provided on the return of each coil.
   2.4. Shut-off valves (ball type) shall be provided at the inlet and outlet of each coil.
   2.5. Thermometers shall be provided at the inlet and outlet of each coil.
   2.6. Pressure gauges shall be provided at the inlet and outlet of each coil.
   2.7. A balancing valve shall be provided on the return of each coil.

2.8. Access doors shall be provided and adequately sized to access all heating and cooling coil faces to facilitate heating and cooling coil cleaning.
2.9. Drain pans:
2.9.1. Provided for condensate and coil cleaning.
2.9.2. The drain pans shall have an adequate slope to ensure they are constantly drained to eliminate stagnant water.
2.9.3. A drain, 25 Ø minimum, shall be provided from the drain pans to the funnel floor drain complete with adequate slope and P-trap of proper height.

3. Fan section.
3.1. Fan:
3.1.1. Access doors to be provided on both sides of the fan.
3.2. Motors for normal and VFD applications:
3.2.1. Motors not being driven by a VFD shall be rated standard duty and meet ANSI/NEMA MG 1-2018 – Motors and Generators, Part 30.
3.2.2. Motors being driven by a VFD shall meet ANSI/NEMA MG 1-2018 – Motors and Generators, Part 31.
3.2.3. Motors greater or equal to 0.5 hp, shall be 3-phase.
3.2.4. Motors shall have a maximum LRA of 4.5 to 5.5 times the FLA.
3.2.5. Motors shall have a minimum power factor of 0.85 at full load.
3.2.6. Motors shall be designed to operate with a Class B temperature rise and have a Class H insulation as defined by UL 1446.
3.2.7. Bearings shall have a rated life of L10 = 100,000 hours.
3.3. VFD:
3.3.1. Three phase VFD electrical performance.
3.3.1.1. VFDs shall have BACnet compatibility.
3.3.1.2. VFDs rated less than 10 hp shall have a THDi at input ≤ 10% with the use of DC choke and input harmonic filter, operating at 100% load.
3.3.1.3. VFDs rated 10 hp or greater shall have a THDi at input of ≤ 10% with the use of DC choke and input harmonic filter, operating at 100% load.
3.3.1.4. VFDs rated 30 hp or greater shall have automatic motor adaptation and automatic energy optimization.
3.3.1.5. Shop drawings shall indicate a harmonic current profile (THDI and HDI) at the input, at 100% load and at 60% load. Harmonic currents shall be I1, I3, I5, I7, I9, I11, I13, I17, I19, I21, I23 and I25. If this is not available, manufacturer/contractor shall pay to have this specially tested at their assets or a third party's assets prior to approval, delivery and installation.
3.3.1.6. All mechanical systems with VFD driven motors shall have shop drawings of motor curves (torque, current, hp and speed) showing derating required for VFD operation.
3.3.1.7. All HVAC units with VFDs shall be provided with inverter drive balance resonant frequencies. The contractor shall include programming of inputting these frequencies during commissioning, as per manufacturer's instructions.
3.3.2. Single-phase, 120 VAC VFDs less than ½ hp electrical performance.

3.3.2.1. Manufactured products from European countries, manufactured to meet European harmonic level standard & voltages, imported for installation in Canada, shall not be exempt from meeting all the European Harmonic Standard simply because some voltages in Europe are not utilized in Canada. The manufacturer shall meet the Harmonic levels standard, as if the product were to be installed in Europe and all optional filtering devices required to meet these European Harmonic Standards shall be included. If this requires supplementary transformers to adapt the Canadian Voltages to the European counterpart, then these transformers shall be included. Products with unlimited Harmonic levels will not be accepted.

3.3.2.2. The product manufacturer shall submit a harmonic spectrum of currents, for each product that generates harmonic currents. If not available from manufacturer, manufacturer/contractor shall arrange, at their cost, to test each product and submit a written report of the harmonic spectrum that the product generates. If the Harmonic THDi of the product does not meet the specified level of the European Harmonic Standards, then the manufacturer shall include any additional filtering at no cost.

3.3.3.VFD performance verification to include, but not be limited to:

3.3.3.1. When all loads are in normal running operation, provide harmonic readings, in a written report for THDI, THDV, 60 hz, up to 25th harmonic. The report shall also contain a bar graph of the percentage of individual harmonic currents and voltages, up to the 25th harmonic.

3.3.3.2. The readings shall be all phase currents and neutral, all phase to phase and phase to neutral voltages.

3.3.3.3. The above shall be conducted on all dry-type transformers (ANN), both primary side and secondary side.

3.3.3.4. The above shall be conducted on all VFDs, at their Input.

3.4. Vibration isolation:

3.4.1.Flexible connections shall be provided at ductwork connections.

3.4.2.Vibration isolators shall be installed for each fan.

3.5. Silencers:

3.5.1.Silencers to be coordinated on site prior to ordering. They shall also be included int the interference coordination drawings. Refer to division 01 33 00 – Submittal Procedures.

3.6. Electric coils:

3.6.1.All units utilizing electronic controls to modulate the output (i.e. SCR) shall have a maximum THDi < 10% at 50% output, measured at the input power terminals to the unit. In addition, shop drawings shall indicate this value, along with the current level of the 60 hz component, as well as all other harmonics up thru 25th.

23 81 23 – Computer Room Air Conditioning

1. Computer room air conditioning systems shall follow the requirements of MD 15116-2006 Computer Room Air-Conditioning.

DIVISION 25 – INTEGRATED AUTOMATION

25 01 11 – EMCS: START-UP, VERIFICATION AND COMMISSIONING

1. O&M to be present for the commissioning process.

25 01 12 – EMCS: TRAINING

1. Training to consist of:
   1.1. Run-through of sequences of operations with O&M team.
   1.2. Project specific modifications.
   1.3. Location of equipment.
   1.4. BAS graphic user interface.

25 05 01 – EMCS: GENERAL REQUIREMENTS

1. The current BAS service provider for the LTDLC complex is Johnson Controls.
2. All existing horizontal distribution, including devices and accessories shall be replaced with new.
3. All existing pneumatic control components located on the floor shall be removed.
4. All new third-party devices shall be BACnet compatible with the existing BAS.
5. All new UPS units for the EMCS shall be three-phase, double conversion type units with a maximum THDi at the input power terminal of 10%.
6. The lighting control system shall be integrated to the existing building automation system (Refer to section 26 09 43)

25 05 02 – EMCS: SUBMITTALS AND REVIEW PROCESS

1. Submit preliminary shop drawings, network architecture and sequences of operation 40 working days prior to start of installation.
2. Submit detailed shop drawings, network architecture and sequences of operations 20 working days prior to start of installation.

25 05 03 – EMCS: PROJECT RECORD DOCUMENTS

1. Controls diagram:
   1.1. Consultant shall ensure the construction documents have provision for the controls contractor to submit a hard copy, size A1, of the controls diagram to the general contractor. All equipment and devices shall be properly identified using the LTDLC nomenclature.
   1.2. Consultant shall ensure the construction documents have provision for the general contractor to print the diagram and install it under a plexiglass in the mechanical rooms.

25 05 54 – EMCS: IDENTIFICATION

1. General:
   1.1. Identification of all EMCS system shall be done on lamicoids.
   1.2. Lamicoid electronic template (.dwg or .dwt) shall be provided by the BGIS O&M team.
   1.3. Lamicoids shall be populated by the contractor, using the LTDLC identification system.
   1.4. Lamicoids shall be supplied and installed by the contractor.
   1.5. Lamicoids shall be reviewed and approved by the BGIS O&M team prior to installation.
2. Lamicoid colour code:

Device	Background colour	Text colour
Thermostat	White	Black

Control panel	Orange	White
Heating coil	White	Red
Cooling coil	White	Blue

3. IP addressing:

Complex		Building		Floor	Address	
1	*LTDLC*	15	*15 Eddy (103-104)*	1-30	1-4	*Supervisory controllers*
		25	*25 Eddy (101-102)*		5-6	*Bacnet/IP light panels integration*
		10	*10 Wellington (200)*		7-140	*Field controllers*
		1	*1 Place du Portage (300)*		141-160	*Other IP integrations/addressing*

Ex: 1.25.5.1 – Supervisory controller located at LTDLC, 25 Eddy Street, on the 5th floor, with address 1.
Ex: 1.10.12.39 – Field controller located at LTLDC, 10 Wellington street, on the 12th floor, with address 39.

4. Supervisory controller identifier number:
   4.1. The supervisory controllers have a unique identifier number by building core in order to be able to sort them out. The sheet can be accessed on site.

Building core	Supervisory controller identifier number
15-25 Eddy	1-140
10 Wellington	141-198
1 Place du Portage	199-214

5. Naming identifier:

Equipment		Floor	Building		Zone		Addressing
VAV	*VAV box*	1-30	E1	*25 Eddy Core 101*	ZN	*North Zone*	SNE#-Trunk#-Address#
FPB	*Fan powered box*		E2	*25 Eddy Core 102*	ZE	*East Zone*	
FC	*Fan coil unit*		E3	*15 Eddy Core 103*	ZW	*West Zone*	
AHU	*Air handling unit*		E4	*15 Eddy Core 104*	ZS	*South Zone*	
FAVAV	*Fresh air VAVbox*		W	*10 Wellington*	INT	*Interior*	
			P	*1 Place du Portage*	INTFA	*FAVAV*	

Ex: VAV6;E2;ZW-47A023 – VAV located on the 6th floor of 25 Eddy, Core 102, in Zone West, on SNE 47, on the first trunk, address 23.

6. Wiring colour code:

Serving	Colour
AI	Yellow
DI	Orange
AO	Tan
DO	Purple
FC Bus Communication	Blue
SA Bus Communication	Brown
T-SAT CAT3	White

Bacnet/IP CAT5-6 Communication	Orange
24 VAC	Grey
Lighting controls	Green

25 05 60 – EMCS: Field Installation

1. Electrical:
   1.1. All wiring for the EMCS system shall be run in conduits.
2. Pneumatic:
   2.1. Pneumatic systems are not permitted.

25 10 02 – EMCS: Operator Work Station (OWS)

1. Graphic user interface for floor shall be created/updated on OWS.
2. BGIS O&M team shall give acceptance for the graphics user interface, when all requests and modifications have been implemented.

25 30 01 – EMCS: Building Controllers

1. General:
   1.1. All new building controllers to be latest technology compatible with existing.
   1.2. Building controllers must not exceed 80 % of device end points count capacity.
2. Local Control Units (LCU):
   2.1. Local Control Units shall have:
      2.1.1. A minimum of 32 I/O points of which minimum be 8 AOs, 8 AIs, 8 DIs, 8 DOs; and/or
      2.1.2. A minimum of 2 AOs, 2 AIs, 2 DIs, 2 DOs spare points.

25 30 02 – EMCS: Field Control Devices

1. General:
   1.1. All field control devices other than temperature sensors shall use a 0-10V signal.
2. Temperature sensors:
   2.1. Room temperature sensors:
      2.1.1. Room temperature sensors shall be provided:
         2.1.1.1. In each room (with display).
         2.1.1.2. In open areas (with display).
         2.1.1.3. Complete with occupancy sensor.
         2.1.1.4. Tamper proof (lockable display).
   2.2. Duct temperature sensors:
      2.2.1. Duct temperature sensors shall be provided:
         2.2.1.1. Before and after each coil.
         2.2.1.2. In the return transfer duct.
         2.2.1.3. In the air handling unit intake.
      2.2.2. Duct temperature sensors shall be installed in a location that is accessible for maintenance.
      2.2.3. Duct temperature sensors shall be installed in the mechanical room.
   2.3. Hydronic temperature sensors:
      2.3.1. Hydronic temperature sensors shall be provided:
         2.3.1.1. On the supply and return of every hydronic coil.

3. Humidity sensors:
   3.1. Duct humidity sensors shall be provided:
      3.1.1. In the AHU supply duct and return transfer duct.
      3.1.2. In open areas (without display).
4. CO_2 sensors:
   4.1. CO_2 sensors shall be provided:
      4.1.1. In open areas (without display).
      4.1.2. In the return transfer duct (without display).
      4.1.3. In conference rooms or any other densely occupied spaces (without display).
5. Pressure sensors:
   5.1. Air side:
      5.1.1. Static pressure sensors shall be installed:
         5.1.1.1. In the supply duct of each zone (installed at 2/3 of the longest run or before the last terminal unit).
         5.1.1.2. At the air handling unit discharge.
         5.1.1.3. Upstream and downstream of the filters.
         5.1.1.4. In the mechanical room with a tube to the open area for floor static pressure.
      5.1.2. Static pressure sensors shall be set to metric (Pa).
      5.1.3. Static pressure sensors shall have integral LCD display.
   5.2. Water side:
      5.2.1. Pressure sensors shall be installed:
         5.2.1.1. On the supply and return of heating and cooling coils.
         5.2.1.2. On the supply and return of terminal units with cooling coils.
6. Flow sensors:
   6.1. Means to measure the air flow shall be provided in:
      6.1.1. The general exhaust air duct.
      6.1.2. The outdoor air intake duct.
      6.1.3. The washroom exhaust duct. The sensor shall be installed in the mechanical room.
   6.2. Means to measure the water flow shall be provided for:
      6.2.1. The heating and cooling coils.
7. Control valves:
   7.1. Control valves shall be globe style.
   7.2. Control valves installed on the heating loop shall be normally open.
   7.3. Control valves installed on the cooling loop shall be normally closed.
8. Electrical metering:
   8.1. Means to monitor electrical consumption shall be provided for:
      8.1.1. Main feed for the floor.
      8.1.2. Lighting.
      8.1.3. HVAC systems.
      8.1.4. Server rooms.
   8.2. Current sensing devices shall be “true RMS” type with capability to handle harmonics up through 25^{th}.
   8.3. The monitoring system shall be compatible with the BAS system.
9. Surface water detectors:

9.1. Surface water detectors shall be provided
9.1.1. In all mechanical rooms.
9.1.2. In the janitor room.

10. Electric transformer winding temperature monitoring:
10.1. Refer to section 26 12 16.01 – Dry Type Transformers up to 600V Primary.
10.2. When transformers are provided with winding temperature monitoring, a field controller shall be provided in the electrical room for temperature monitoring and exhaust fan control.

11. Wiring colour code:

System	Colour
AI	Yellow
DI	Orange
AO	Tan
DO	Purple
FC Bus Communication	Blue
SA Bus Communication	Brown
Thermostat CAT 3	White
Bacnet/IP CAT 5-6 Communication	Orange
24 VAC	Grey
Lighting controls	Green

25 90 01 – EMCS: Site Requirements, Applications and System Sequences of Operation

1. Consultant to submit sequences of operations as part of 66% design submission to BGIS O&M team for review.

DIVISION 26 – ELECTRICAL

26 05 00 – Common Work Results for Electrical

1. All existing horizontal distribution, including devices and accessories shall be replaced with new.
2. Each vertical busduct shall be clearly identified on the drawings.
3. All panels and circuiting shall be clearly identified on the drawings.
4. All panels located within a specific core shall be fed from the services of the same core.
5. Each emergency power supply for the floor shall be identified on the drawings.
6. Panel U-FP-1A-01 and all downstream panels serve as the dedicated fire alarm emergency riser for their respective floor levels. These panels shall be reserved exclusively for fire-related systems and relevant equipment.
7. Panel USE-L2-1 and their respective downstream panels form the base building emergency riser. Ensure that connections on this base building riser are solely designated for non-fire alarm emergency systems.
8. Conduits identification:
8.1. Every conduit shall be identified:
8.1.1. At the exit of the electrical panel.
8.1.2. Where transferring from one room to another, on each side of the wall.
8.1.3. Where entering and exiting junction boxes.
8.1.4. At every 10 m.
8.1.5. Connectors, junction box covers and conduit anchors shall be marked as per colour code.

8.2. Colour code:

System	Colour Code
120V	
120V Emergency	
347/600V	
347/600V Emergency	
Communications	
Stanley Security	
Fiber Optic	
BAS Control	
Fire Alarm	
Lighting Control	

9. Naming identifier:

Equipment		Building		Floor	Tower		ID
L	*347V/600V pan.*	N	*10 Wellington*	1-30	1	*10W low rise or 25E core 1*	#
B	*120V/208V pan.*	C	*1 Place du Portage*		2	*10W high rise or 25E core 2*	
T	*Transformer*	E	*15/25 Eddy*		3	15E core 3	
					4	15E core 4	

Ex: LN 3-2-1 – 347V/600V panel, located at 10 Wellington, on the 3rd floor, in the low-rise tower and it is the first 347/600V panel in the room. If there is a second panel of the same kind in the room, the next one would carry the ID "2".

10. Outlet identification:
    10.1. All electrical outlets shall be identified with the circuit number and the panel number. Power poles shall be identified in the same manner.
11. Emergency lighting fixtures identification
    11.1. All lighting fixtures on emergency circuits shall be identified by a red sticker on the fixture or similar.
12. Single line diagram:
    12.1. Consultant shall provide a single line diagram in the design documents, indicating all new elements, as well as existing elements that are to be used for supply power.
    12.2. Consultant shall provide update of the master single line diagrams. Contractor to provide a hard copy of the single line diagrams, size A1, colour and laminated and install them in the respective electrical rooms. All equipment and devices shall be properly identified using the LTDLC nomenclature and CMMS numbers.
    12.3. Consultant shall ensure the construction documents have provision for the general contractor to print the diagram and install it under a plexiglass in the electrical rooms.
13. Labels:
    13.1. Labels must comply with the Official Language Act, including bilingual labels for regions prescribed under section 35(2) of the Act.
14. Electrical metering:
    14.1. Means to monitor electrical consumption shall be provided for:
        14.1.1. Main feed for the floor.

14.1.2. Lighting.
14.1.3. HVAC systems.
14.1.4. Server rooms.
14.2. Coordinate with Division 25.

26 05 05 – Selective Demolition for Electrical

1. When electrical equipment is removed, the feed shall be removed back to the source.
2. All obsolete wiring, conduit and junction boxes in mechanical rooms, electrical rooms and telecommunications rooms, shall be removed.

26 05 21 – Wires and Cables (0-1000 V)

1. All wiring shall be copper.
2. Maximum length of armoured cable (BX) shall be 3 m.
3. All 120/208 V feeders from transformer secondary to panels shall be designed to include consideration of non-linear loads. This will require to consider the neutral as a current carrying conductor, which shall in turn require derating of the feeder to 80%, as per the electrical code. In addition, all neutrals shall be sized to double capacity neutrals in each panel that is being fed by these feeders.
4. Individual LED circuits on 120 V shall:
   4.1. Have a maximum load of 600 W.
   4.2. Have separate neutrals.
   4.3. For feeds up to 15 m from panel to ceiling junction box, be #12 AWG, minimum.
   4.4. For feeds greater than 15 m, be #10 minimum.
5. Individual 120 V/l 15 A receptacle circuits shall:
   5.1. Have separate neutrals.
   5.2. For feeds up to 15 m from panel to ceiling/ wall/ floor junction box, be #12 AWG, minimum.
   5.3. For feeds greater than 15 m, be #10 minimum.

26 05 36 – Cable Trays for Electrical Systems

1. Cable trays that penetrate a fire rated partition shall be sealed as per section 07 84 00 – Fire Stopping.
2. Cable trays shall be included in the coordination drawings.

26 09 23 – Lighting Controls

1. General Lighting Operation/Control Strategy
   1.1. Working Hours
      1.1.1. Lighting fixtures will not follow a preset schedule but will be activated by occupancy.
      1.1.2. The first person entering a floor will turn on lighting fixtures as they move through dedicated lighting zones.
   1.2. Scheduled Off Time
      1.2.1. At 6 pm, all lighting fixtures will be scheduled to turn off.
      1.2.2. The turn off time should be adjustable through the Building Automation System (BAS) on a per floor basis.
   1.3. After hours Scenario

1.3.1. If a person enters after the scheduled off time, only lighting zones they walk into will activate until reaching their destination.
1.3.2. Similar to daytime operation, this mirrors the behavior of the first person entering during working hours.

1.4. Constant Illumination
1.4.1. Lobby lighting fixtures and exit signs will remain on at all times for safety purposes.

1.5. Emergency Lighting
1.5.1. In the event of a fire detection or power loss, all emergency lighting will activate at 100% intensity.

1.6. Motion Detector-Controlled Zones
1.6.1. Lighting zones with motion detectors will be set to turn off after 30 minutes of no motion detection by default.
1.6.2. The turn off time can be adjusted through the BAS, and confirmation is needed on whether this adjustment can be done on a per zone basis.

1.7. Dimming in Response to Daylight
1.7.1. Lighting zones equipped with daylight sensors around the perimeter will dim fixtures based on natural light levels from outside.
1.7.2. Information is needed on the default dimming levels and whether the BAS allows for an override to increase intensity on a per zone basis.

26 09 43 – Network Lighting Controls

1. Relay Panels
   1.1. Relays for 120/ 208 V systems shall be rated for that system. Short circuit rating shall be 10 kA.
   1.2. Relays for 347/ 600 V systems shall be rated for that system. Short circuit rating shall be 25 kA.
   1.3. Relay panels shall include surge protection devices, rated in voltage to match panel rating, with a 25 kA minimum capacity, surge counter LED pilot lights for “ON Normal”/ “OFF Fault”, and shall be as per UL 1449 4th edition. Panels that are sub-fed from a main panel, need not have surge protection devices.
2. System Integration Capabilities
   2.1. The lighting control system shall be compatible with the BAS provider exsisting base building system. The lighting control system shall be monitored and controlled by the existing Building Automation System as well as locally.
   2.2. Building operations team shall be capable of controlling and monitoring each and every load-control relay from the new system, by using the existing base-building BAS interface for HVAC.
   2.3. The lighting control system shall have the capability to be integrated to the existing building automation system via BACnet/IP communication protocols.
   2.4. Products shall be found in the BTL listing of tested products (tested by a recognized BACnet testing organization) and shall have a Certificate or Conformance.
   2.5. A lighting mock-up using real fixtures, controllers integrated with the existing base building (BAS) shall be tested for a full-scale evaluation to ensure compatibility and proper communication between both systems prior to submittals approval and installation. The integration between the lighting control system to the BAS shall have no limitations to the troubleshooting actions available to the operation technicians and shall have the ability to respond efficiently.

26 12 16.01 – Dry Type Transformers Up To 600 V Primary

1. Three-phase transformers:
   1.1. Three-winding type, ANN natural convection cooling.
   1.2. Impedance Z rating shall be no greater than 4 % for transformers up to 150 kVA.
   1.3. Delta-Wye-nGnd (primary to secondary).
   1.4. Particular attention shall be given for proper selection of transformers, with regards to their type and connection:
      1.4.1. Type 1: Where more than one (1) transformer is to be connected (on a "per floor" basis) to the same 600 V busduct supply, they shall alternate as follows: one (1) transformer Delta-Wye-nGnd and the next Delta-Zigzag-nGnd, or Wye-Zigzag-nGnd and the next Delta-Zigzag-nGnd.
      1.4.2. Type 2: If the scope of the project is limited to one (1) floor, and only one (1) transformer shall be connected to one 600 V busduct supply, the consultant shall verify the type of transformer installed on the previous floor and shall alternate the transformers as follows: (floor X-1): Delta-Wye-nGnd, (floor X): Delta-Zigzag-nGnd, (floor X+1): Delta-Wye-nGnd, (floor X+2): Delta-Zigzag-nGnd, etc. Or, (floor X-1): Wye-Zigzag-nGnd, (floor X): Delta-Zigzag-nGnd, (floor X+1): Wye-Zigzag-nGnd, (floor X+2): Delta-Zigzag-nGnd.
      1.4.3. This is to be applied to each 600 V busduct supply (per floor) when there is more than one busduct.
      1.4.4. All construction drawings shall have a single line diagram identifying each 600 V busduct, each transformer type, and shall identify the types of transformers installed on the previous and next floors. Due to the nature of the floor renovation schedule, one contract may involve floors 5 and 6; another contract may involve floors 19 and 20. The goal of all the floor renovations is to have half of the transformers as Delta-Wye and half as Delta-Zigzag, or preferably, half Wye-Zigzag and half Delta-Zigzag. This can only be accomplished if each contract identifies and records on the drawings, the types of transformers installed, and on each Busduct.
   1.5. Consultant to select proper K rating for transformer based on calculations. The minimum rating shall be K9. Calculations to be submitted to BGIS O&M team for review.
   1.6. All Delta-Zigzag-nGnd and Wye-Zigzag-nGnd transformers shall be complete with winding temperature sensor to monitor and alarm. The sensor shall be connected to BAS by Division 25.
   1.7. Nameplate to indicate Z and K rating, as well as winding configuration.
   1.8. Shop drawings shall indicate all nameplate data, as well as X/R ratio and inrush current.
   1.9. Shop drawings shall include zero sequence impedance, Z0, for all transformers with a zigzag secondary winding; $0.9 \leq Z0 \leq 1.0$. If this data is not readily available, testing by the manufacturer (one (1) unit per batch) shall be included in the contract.
   1.10. Dry type transformers performance verification to include, but not be limited to:
      1.10.1. When all loads are in normal running operation, provide harmonic readings, in a written report for THDI, THDV, 60 hz, as well as the individual harmonics up to 25th harmonic, at the secondary side.
      1.10.2. The readings shall be all phase currents and neutral, all phase to phase and phase to neutral voltages.
      1.10.3. The above shall be conducted on all dry-type transformers (ANN), both primary side and secondary side.

26 24 16.01 – Panelboards Breaker Type

1. All new panelboards rated 400 A or greater (both 600 VAC and 208 VAC) shall have a meter that can store 60 Hz and harmonics up to 25th of all phase voltages, phase currents and neutral currents, as well as THDi and THDv. These new panels with digital metering shall be connected to the BAS building monitoring system.
2. All new 120/208V panelboards with LED lighting and receptacles for office workstations shall have a minimum 173% neutral. They shall also have a supply feeder with a minimum 173% rated neutral. In addition, the ampacity rating of the 3-ph, 4-w, feeder shall include the neutral as a current carrying conductor and therefore, with four (4) conductors, instead of three (3), the 80% derating factor shall be applied as per the electrical code.
3. Panelboards shall be provided with thermal window to allow infrared scans of main lugs.
4. Panel legends shall be updated at the end of project.
5. Design documents:
   - 5.1. Consultant shall include on the drawings, connected loads and estimated demand loads for each distribution panel and each relay panel, as part of the panel schedule. This shall include 347/600 V Panels, as well as 120/208 V Panels.
   - 5.2. Examples:
     - 5.2.1. If kW rating of HVAC equipment is incomplete, power factor must be incorporated in order to reflect the total current, and thus the total load.
     - 5.2.2. If a 225 A panel has a connected load of 180 A (which is more than the 80% limit) but will have a demand load of 125 A, this shall be shown. In addition, amps (or KVA) shall include the power factor of each load.
     - 5.2.3. For circuits that supply VFDs, rms current shall be used for the load calculations, and not simply the HP rating FLA of the motor. In addition, the VFD input is typically more than the output, as it has an efficiency rating that is less than 1. Therefore, the load current for the VFD circuit, will be larger than the FLA of the motor, and this must be considered and reflected in the panel schedules, as well as the rating of the respective branch circuit wiring.
   - 5.3. The aforementioned format of load calculations and branch circuit wiring ratings shall apply to all other loads, such as the small 120 V, 208 V single phase VFDs (of mechanical equipment) and lighting elements with drivers. Both of these classes of loads are non-linear, and therefore require taking into account the harmonics that these elements create, by way of rms values of current, and not just 60 Hz current. For example, if an LED Driver has a THDI of 30%, then the resultant total rms load current is 9% more than just the 60 hz current. A Driver with a 10% THDI will have a rms current that is 1% more than the 60 hz current.
   - 5.4. Sample panel schedule (although demand loads are missing):

Panneau / Panel: BN6-1A

Emplacement / Location: SALLE ÉLECTRIQUE / ELECTRICAL ROOM E368 **Tension / Volts:** 208/120 **Phases :..** 3

De / From: TN6-1 **Nbr de fils: Nbr of wires:** 4

circ	Description	Dis...	P.	A		B		C		P.	Dis...	Description	circ
1	POSTES DE TRAVAIL 1, 2, 3 WORKSTATIONS 1, 2, 3	15 A	1	900 VA	900 VA					1	15 A	POSTES DE TRAVAIL 115, 117, 119 WORKSTATIONS 115, 117, 119	2
3	POSTES DE TRAVAIL 4, 5, 7 WORKSTATIONS 4, 5, 7	15 A	1			900 VA	900 VA			1	15 A	POSTES DE TRAVAIL 111, 112, 116 WORKSTATIONS 111, 112, 116	4
5	POSTES DE TRAVAIL 6, 8 WORKSTATIONS 6, 8	15 A	1					600 VA	600 VA	1	15 A	POSTES DE TRAVAIL 111, 112, 116 WORKSTATIONS 111, 112, 116	6
7	POSTES DE TRAVAIL 9, 10 WORKSTATIONS 9, 10	15 A	1	600 VA	900 VA					1	15 A	POSTES DE TRAVAIL 113, 114, 119 WORKSTATIONS 113, 114, 119	8
9	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1			600 VA	240 VA			1	15 A	PRISE(S) LOCAL 621 OUTLET(S) ROOM 621	10
11	PRISE(S) LOCAL 622 OUTLET(S) ROOM 622	15 A	1					240 VA	240 VA	1	15 A	PRISE(S) LOCAL 621 OUTLET(S) ROOM 621	12
13	PRISE(S) LOCAL 622 OUTLET(S) ROOM 622	15 A	1	120 VA	240 VA					1	15 A	PRISE(S) LOCAL 620 OUTLET(S) ROOM 620	14
15	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	15 A	1			0 VA	240 VA			1	15 A	PRISE(S) LOCAL 620 OUTLET(S) ROOM 620	16
17	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1					600 VA	0 VA	1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	18
19	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1	600 VA	0 VA					1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	20
21	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1			600 VA	0 VA			1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	22
23	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	15 A	1					0 VA	0 VA	1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	24
25	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1	600 VA	0 VA					1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	26
27	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1			600 VA	0 VA			1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	28
29	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1					600 VA	0 VA	1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	30
31	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	15 A	1	0 VA	0 VA					1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	32
33	PRISE(S) LOCAL 625 OUTLET(S) ROOM 625	15 A	1			120 VA	240 VA			1	15 A	PRISE(S) LOCAL 626 OUTLET(S) ROOM 626	34
35	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1					600 VA	120 VA	1	15 A	PRISE(S) LOCAL 626 OUTLET(S) ROOM 626	36
37	POSTES DE TRAVAIL LOCAL 625 WORKSTATIONS ROOM 625	15 A	1	600 VA	120 VA					1	15 A	ÉCRAN TÉLÉVISION LOCAL 626 TELEVISION SCREEN ROOM 626	38
39	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	15 A	1			0 VA	0 VA			1	15 A	LIBRE (BOÎTE DE RACCORD PLAFOND) SPARE (CEILING JUNCTION BOX)	40
41	EXF-002-006	15 A	1					403 VA	120 VA	1	15 A	RÉSERVÉ POUR CONTRÔLE VENTILATION RESERVED FOR HVAC CONTROL	42
43	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	30 A	1	2200 VA	120 VA					1	15 A	PRISE(S) SALLE ÉLECTRIQUE E368 OUTLET(S)ELECTRICAL ROOM E368	44
45	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	30 A	1			2200 VA	1200 VA			1	20 A	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	46
47	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	20 A	1					1200 VA	1200 VA	1	20 A	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	48
49	PRISE(S) ÉTAGÈRE TÉLÉCOM OUSS-LAN 621 TELECOM OUTLET(S) OUSS-LAN 621	20 A	1	1200 VA	286 VA					1	15 A	CP-006-001 & FCZ-006-001	50
51	ESPACE SPACE	-	-			0 VA	0 VA			-	-	ESPACE SPACE	52
53	ESPACE SPACE	-	-					0 VA	0 VA	-	-	ESPACE SPACE	54
55	ESPACE SPACE	-	-	0 VA	0 VA					-	-	ESPACE SPACE	56
57	ESPACE SPACE	-	-			0 VA	0 VA			-	-	ESPACE SPACE	58
59	ESPACE SPACE	-	-					0 VA	0 VA	-	-	ESPACE SPACE	60
61	ESPACE SPACE	-	-	0 VA	3165 VA					3	60 A	BN6-1C	62
63	ESPACE SPACE	-	-			0 VA	1949 VA			-	-	-	64
65	ESPACE SPACE	-	-					0 VA	1666 VA	-	-	-	66
	Charge totale / Total load:			12551 VA		9789 VA		8189 VA					
				107 A		84 A		68 A					

Charge connectée / Connected Load : **30529 VA** **Bar omnibus / Bus bar: 400 A**

Notes:

26 28 16.02 – Moulded Case Circuit Breakers

1. All circuit breakers rated 400 A or greater (both 600 VAC and 208 VAC systems) shall be equipped with an electric trip adjustable LSIG. Trip unit shall be:
   1.1. Solid state.

1.2. True RMS sensing
1.3. Adjustable long delay setting and pickup with I^2t response, adjustable short delay setting and pickup with I^2t response and adjustable ground fault setting and pickup.
1.4. Ground fault alarm.
1.5. UL 489 compliant.
1.6. Harmonic current monitoring.

2. Consultant shall be responsible of performing short circuit calculations and select adequate breaker short circuit interrupting capacity.
3. Series rating shall not be permitted.
4. Electrical room main breaker shall be:
   4.1. Capable of monitoring:
      4.1.1.Line voltage;
      4.1.2.Phase current;
      4.1.3.Power factor;
      4.1.4.Power demand;
      4.1.5.Power consumption;
      4.1.6.Frequency;
      4.1.7.Harmonics.
   4.2. Compatible with the electrical management and monitoring system (to be confirmed with building operations).
   4.3. Operable remotely.

26 28 13.01 – Fuses – Low Voltage

1. Consultant shall be responsible of performing short circuit calculations and select adequate fuses:
   1.1. 10 kA; or
   1.2. 100 kA.

26 28 23 – Disconnect Switches – Fused and Non-Fused

1. All disconnect switches shall be replaced.

26 50 00 – Lighting

1. The Consultant shall specify LED light sources unless otherwise directed by the Project Manager and must meet regional incentive application requirements.
2. The lighting specification shall be:
   2.1. CRI (Color Rendering Index) >80.
   2.2. Life expectancy L-70 @ 25 °C >50 000 hours.
   2.3. Colour temperature: 3500 K or as directed by PSPC.
   2.4. CSA or ULc certified.
   2.5. Harmonic Distortion Rate (THDi) < 10%.
   2.6. Power Factor > 0.9.
   2.7. High efficacy >90 lm/W.
   2.8. DLC listed.
   2.9. Manufacturer's warranty of at least 5 years.
   2.10. For Indoor lights: Operating temperature: 2 °C to 38 °C.
3. Photometric light study:

3.1. Photometric study to include:
3.1.1. Light fixture schedule.
3.1.2. Intensity levels:
3.1.2.1. At work surface height.
3.1.2.2. Point by point grid of 1 m by 1 m.
3.1.3. Avg levels.
3.1.4. Max/Min levels.
3.1.5. Avg/Min levels.
3.2. Electrical consultant shall communicate with architect to obtain reflectance factors of all surface finishes, in a timely manner. The electrical consultant shall then refine the software-generated lighting layout illumination levels by correcting the reflectance factors of all surfaces.

4. Consultant shall include a lighting plan with levels and controls as part of 66 % design documents.
5. Shop drawings to include:
5.1. Photometric data.
5.2. Lumen output.
5.3. VA and Watts input power.
5.4. Driver THDi and harmonic profile (individual harmonic currents up through 25th) for each type of fixture.
5.5. Inrush current and duration, at the input of each LED driver type/ model.

26 52 13.13 – Emergency Lighting

1. Emergency lighting shall be LED.
1.1. Consultant shall include a lighting plan with levels and controls as part of 66% design documents.
1.2. The emergency lighting system layout shall be accompanied by lighting levels (in lux at floor level) for the exit pathways to the emergency exit doors, as established by the architect. The lighting levels shall be an average of 10 lux with a minimum 1 lux and a min/max ratio not more than 10.

26 52 13.16 – Exit Signs

1. Exit signs shall be LED.
2. No photoluminescent or Tritium exit signs shall be allowed.