13. ELECTRICAL - TECHNICAL

13.1 GENERAL REQUIREMENTS

1. Base the electrical design on providing the following features at the most economical cost, considering both investment and operating expenditures:
    a. Safety to personnel during operation and maintenance
    b. Ease of maintenance of equipment
    c. Flexibility of electrical services
    d. Energy conservation and efficiency (Pursuant to the latest edition of the National Energy Code)
    e. Proper coordination of all elements of the electrical system as to:
        i. insulation levels
        ii. interrupting capacities
        iii. voltage & current ratings
        iv. protective devices
        v. mechanical strength
        vi. hazardous location classification
2. Coordinate electrical systems with all other affected disciplines and building systems.

13.2 REGULATIONS

13.2.1 CODES AND STANDARDS

1. Canadian Electrical Code CSA C22
2. National Building of Canada (NBCC)
3. National Energy Code (NEC)
4. National Fire Code (NFC)
5. National Fire Protection Association (NFPA)
6. Provincial Fire Commissioner's Regulations
7. Electrical Safety in Patient Care Areas - CAN/CSA-Z32.2
8. Essential Electrical Systems for Hospitals - CAN/CSA-232.4

9. Installation of Fire Alarm Systems CAN/ULC-S524
10. Inspection and Testing of Fire Alarm Systems CAN/ULC-S536
11. Verification of Fire Alarm Systems CAN/ULC-S537
12. IESNA - Illuminating Engineering Society of North America
13. CAN/CSA-T530-M90 - Design Guidelines for Telecommunications
14. CAN/CSA-T529-M - Design Guidelines for Telecommunications Wiring in Commercial Buildings
15. EIA/TIA568, TSB40 Specifications for Category 6 Data Wiring

13.2.2 Authorities Having Jurisdiction

1. Office of the Fire Commissioner
2. Service NL
3. Department of Environment & Conservation
4. Mechanical & Building Inspections, Department of Government Services
5. Department of Health & Community Services
6. Workplace Health, Safety and Compensation Commission
7. Municipality

13.3 Submission Requirements

13.3.1 Submissions

1. Submissions are to follow “Guidelines for Electrical Engineering Services” published by PEGNL, August 1995 and this manual
2. Specifications are to follow the NL Master Specification Guide for Public Funded Buildings edited to suit the project requirements. Include track changes for each review submission.
3. Before final submission, submit plans and specifications required by the Inspection Authority, the Power Utility, Telephone Company, and Provincial Fire Commissioner’s Office. Submit copies of correspondence to Design Manager indicating status of submittals.

13.4 SERVICE AND DISTRIBUTION

13.4.1 INCOMING ELECTRICAL SERVICES

1. Generally, underground service through an exterior padmounted transformer is preferred and where required to conform to local practice. Cable and installation should be to the approval of the local Power Utility and Inspection Authorities. Provide spare ducts for future additions or maintenance. Ensure underground service conduit is suitably drained.
2. If an exterior padmount transformer is used, ensure padmount is at lower elevation than electrical room to prevent water infiltration into electrical room through underground ducts.
3. Overhead service is acceptable for small buildings.
4. Include protective devices, instrument transformers, metering equipment and other requirements of the local Power Utility.
5. Well in advance, discuss with the local Power Utility the size and type of service required. Obtain from them the three phase symmetrical short circuit fault level at the incoming end of their service to determine the interrupting capacity required for the service equipment.
6. Obtain from the local Power Utility data regarding point of connection, service characteristics and requirements, extent and cost of work provided by the Utility, type of service permitted (overhead or underground), whether a transformer vault is required and reasons therefore, and the best method of metering, outside or inside.
7. Obtain approval from the local Power Utility and Inspection Authority for proposed service entrance equipment, switchgear, duct-manhole systems, transformers, termination pole and associated equipment

13.4.2 CAPACITY OF ELECTRICAL SERVICE

1. Allow for 100% lighting load plus an appropriate demand factor on the remaining load based on operating characteristics.
2. The main service should provide for a maximum of 20% load growth plus an allowance for future expansion if anticipated.
3. Submit summaries of the connected and demand loads on the building at the contract document submission. Also show extent of loads connected to the emergency power, if applicable.

13.4.3 ELECTRICAL ROOMS

1. Allow room space for future expansion of equipment, (e.g. future distribution section on end of service entrance board or wall space for future distribution panel), when determined by program design.
2. Ensure an independent ventilation system, (gravity where possible), with intake and exhaust direct to the outside is provided, where heat generating equipment is installed, (e.g. transformers, remote mounted ballasts, etc.).
3. All major electrical equipment installations shall be located remotely from public areas and housed in areas providing limited access. All miscellaneous openings at the exterior of the building related to electrical systems shall be provided with approved security grilles or screens.
4. Design electrical rooms to allow future space for expansion/extension.
5. Do not locate electrical rooms under washrooms, shower rooms, janitor closets and kitchen's or any such areas where flooding could occur. Do not run plumbing lines in walls and ceilings of electrical rooms.
6. Minimize mechanical ventilation duct work in ceiling spaces above electrical rooms.
7. Do not design any plumbing or fire protection wet pipes so that they run in the ceiling spaces above electrical rooms. If it is absolutely unavoidable, the Consultant must get approval from TW before continuing with the design.

13.4.4 SWITCHGEAR ASSEMBLIES

1. Use metal-enclosed assemblies with circuit breakers where current, voltage and short circuit characteristics are within their limits.
2. Incorporate H.R.C. current limiting fuses into circuit breakers on circuits requiring high short circuit protection.
3. Fused switches may be used for main and distribution feeders.
4. The electrical equipment supplier is to provide a short circuit analysis and time-current coordination study to justify selection of fuses and breakers. Include in the analysis and study the system from the utility primary fuse to the largest breaker in each branch circuit panelboard and motor control center.

5. Specify for Owner's metering that the switchgear manufacturer install a micro-processor controlled digital AC instrumentation package for Owner's metering purposes.
6. All bussing shall be tin-plated aluminum in main switchgear assemblies.
7. Specify sprinkler proof enclosure as required.
8. Specify a ground fault protection system if warranted buy system size.
9. Specify quality and performance requirements to suit project application.

13.4.5 Transformer Types

1. Dry type transformers are preferred for primary voltages of 15 kV or lower where insulation, coordination and protection satisfactory to the Power Supply Authority can be obtained. Provide lightning arrestors.
2. Liquid cooled transformers are preferable above 15 kV, although dry type may be used if approved by the Power Utility. Check BIL requirements. This type of transformer should be supplied by the Utility.
3. When providing secondary voltage service entrance, padmounted or pole mounted utility-owned transformers are preferred.
4. Locate the transformer to minimize the length of the secondary cable run to the building and to minimize visual impact on the site.
5. Specify sprinkler-proof enclosures for transformers located in sprinklered rooms.
6. Meet or exceed US Department of Energy (DOE) CSL3 efficiency standards tested as per NEMA TP-2.

13.4.6 Wiring Methods

1. Wire size is to be No. 12 AWG minimum for power or lighting circuits. Bonding conductors may be a minimum of No. 14 AWG. Specify that each receptacle circuit providing computer power must have a separate dedicated neutral wire and be powered from dedicated panelboards thru separate harmonic mitigating transformers as required.
2. Specify wire type to be copper complete with RW90 XLPE insulation. Insulation ratings shall be a minimum of 600 volts for 347/600 volt a.c. circuits and 300 volts for 250 volt a.c. circuits and below. Specify the use of RWU90 type insulation on conductors for exterior underground use.

3. Give consideration to the use of nickel aluminum alloy conductors for feeders and large branch circuits 60 Amps and greater. Take into account differences in voltage drop and conduit size when using alloy conductors verses copper.
4. Minimum conduit size is to be 19 mm with an allowance made for the use of 12 mm conduit in cases where one (1) 3 wire, 15 amp branch circuit is wired or for switch legs.

13.4.7 PANELBOARDS

1. Use circuit breaker type panelboards for motors, power equipment and lighting. Consider use of MCP's for motor protection.
2. Circuit breakers are to be of the bolt-on type. Multiple breakers shall have single handle. Tie-bars are not permitted.
3. Specify mains or bussing to be made of tin plated aluminum.
4. Include in panelboards a minimum of 20% spare breakers and space for a minimum of 10% more.
5. Specify sprinkler proof enclosure as required.
6. Specify that splices are not permitted in any panelboard feeders.

13.4.8 CEILING DISTRIBUTION

1. Provide power distribution system, in the ceiling space, for office areas as follows:
    a. system to be capable of supplying three phase power to modular office furniture or single phase pack poles
    b. common neutrals not acceptable
    c. connection length in ceiling not to exceed 3.0 m
    d. allow for a maximum of four duplex receptacles per circuit except two duplex receptacles per circuit for computer
2. Provide communication (voice & data) system, in the ceiling space, for open office areas as follows:
    a. system of zone conduits sized as required for open office areas or instrumentation cable tray routed along corridor ceiling space
    b. terminate conduits/cable tray at backboard in communication closet

   c. design the system to minimize length of cables, do not install cables directly on ceiling tiles
3. If zone conduit system is utilized, provide separate zone conduits for telephone and data
4. Design system to minimize length of cables installed directly on ceiling tiles

13.5 LIGHTING

13.5.1 LIGHTING - GENERAL

1. For each room or area determine the task performed and provide maintained lighting levels as shown in the latest edition of IESNA (Illuminating Engineering Society of North America) Lighting Handbook.
2. Provide video display terminal task lighting to IESNA recommended practice for lighting offices containing computer visual display terminals (RP-24).
3. Recessed fixtures shall have hinged frame lenses.
4. Use fixtures with parabolic louvers where glare is a problem.
5. Provide minimum V.C.P. value of 70 for all spaces.
6. Design office area lighting to provide between 500 and 550 lux average maintained on the task with furniture and screens in place.
7. Provide local switching for enclosed rooms, (e.g. private offices, conference rooms, training rooms, etc.). For large areas provide a switching arrangement to conserve energy with the use of occupancy and day lighting sensors.
8. Fixtures are to be relocatable within a 1.5 m radius without wiring alterations.
9. Provide a life cycle cost analyses. If a life cycle cost saving can be achieved, provide a programmable low voltage lighting control system with the following options:
   a. high resolution color monitor and CPU
   b. desk top printer
   c. manual switch and digital telephone override
10. Provide exterior lighting control by a photo cell and contactor with HOA switch and time clock or programmable controller set back. Provide manual bypass.
11. Provide exterior security lighting for drives, walks and parking areas.

12. Energy efficient lighting systems shall be provided and shall not exceed the lighting power densities as per the latest edition of the National Energy Code of Canada for interior and exterior lighting systems.
13. The illumination of any space should be based on the intended use and the efficient utilization of energy. Follow the procedures recommended by the current IESNA Handbook to as great extent as possible without exceeding the allowable lighting power budget and power densities as permitted by the latest edition of the National Energy Code Canada.
14. In most cases, the levels of illumination listed in IESNA Model Handbook are for specific tasks. When levels are listed for locations, (e.g. foyer) they shall be considered average levels.
15. In areas surrounding task locations, the average level of illumination shall not be more than 1/3 the level of the task performed in the area. Where more than one task occurs in space, the general level shall not be more than 1/3 the average of the task levels.
16. In circulation and seating areas and other seldom occupied space or those in which no critical visual tasks occur, the average level of illumination shall not exceed 1/3 of the average lighting in the adjacent task space.
17. Recommended lighting levels for a few typical areas are as follows:
    a. hallways or corridors - 110 lx
    b. work and circulation areas surrounding work stations - 325 lx
    c. prolonged office work (on task only) - 550 lx
18. Design switching of lighting fixtures to conserve energy, using one or more of the following schemes:
    a. separate switching of lights at the perimeter of the building
    b. provide low voltage switching for general office areas
    c. provide switching at each floor and at central location
    d. automatic control systems (occupancy and daylighting sensors)
    e. switching by zones, not less than four (4) zones/floor
19. Switch lighting by zones in open and modified landscape spaces not exceeding 160 square meters.
20. Switching of lighting fixtures shall be designed to conserve energy, using one of more of the following schemes to achieve LEED credit:
    a. separate switching of lights at the perimeter of the building

b. provide low voltage switching for general office areas
c. provide switching at each floor and at central location
d. automatic control systems
e. switching by zones, not less than four (4) zones per floor
f. switch lighting in all enclosed rooms separately

21. In selecting reflectances and interior surfaces, bear in mind energy utilization implications as well as those of other disciplines.
    a. ceiling - 70%
    b. walls - 50%
    c. floors - 30%
22. Plan lighting designs for high ceiling areas (e.g. atriums, stairwells) such that ease of relamping is achievable. Use wall mounted fixtures in exit stairwells.
23. Place lighting to minimize the types of lamps to be used.

13.5.2 Lighting Fixtures

1. For indoors, recessed fluorescent fixtures utilizing low brightness pure virgin acrylic lenses or parabolic louvers are preferred. Ballasts to be electronic energy efficient type with less than 10% harmonic distortion. Lamps to be imperial measure, instant start, T8 configuration, energy efficient, color temperature and color rendering index (CRI) to match application.
2. For outdoors, LED fixtures are preferred.
3. Identify all fixtures on the working drawings and specify in detail in the specification, the quality of material, construction and standard of performance required.
4. Lenses are to be ULC certified.
5. Gymnasium lighting shall generally be fluorescent.
6. In schools classrooms arrange fixtures to avoid the need for special chalkboard fixtures

13.5.3 Exterior Lighting

1. For building perimeter lighting, use LED type fixtures, located on the exterior wall a minimum of 2700 mm above ground level. Ensure the fixtures are located to prevent damage caused from falling ice and snow from the roof.
2. Light the vehicle parking lot with pole-mounted, LED type fixtures.

3. Provide lighting levels as follows:
    a. perimeter lighting - 15 lx at ground level
    b. active entrance - 54 lx at ground level
    c. parking entrance - 10 lx at ground level
    d. secure parking compound - 10 lx at ground level
4. Emergency power is to be provided to perimeter lighting only to maintain 25% of the above lighting level where an emergency generator is provided in the project.
5. Account for site and building lighting impact on nearby residential areas. Lighting should be used in a positive way to enhance the appearance of both the site and building.
6. All exterior fixtures to be dark sky compliant.
7. Design exterior lights to achieve the LEED ® credit for Light Pollution Reduction.

13.5.4 Emergency Lighting

1. Provide sufficient emergency lighting to permit a safe evacuation. Design emergency lighting systems in accordance with the latest editions of the National Building Code of Canada, National Fire Code of Canada, and the NFPA 101 Life Safety Code.
2. Power for emergency lighting may be from a diesel generator, a central battery bank or individual unit battery packs.
3. If emergency lighting is from a diesel generator, supplement it with battery units in critical locations such as the public main lobby, electrical and mechanical rooms.

13.5.5 Exit Signs

1. Exits and paths of exit travel are to be indicated by electrically illuminated uni-lingual exit signs.
2. Exit signs are to be illuminated with energy efficient L.E.D. lamps.
3. Connect signs to emergency A.C. system, or provide additional sockets and D.C. lamps and connect to emergency battery units.
4. Bilingual and international signs are to be provided where required.

13.6 ELECTRIC HEATING

1. If electrical heating is used, ensure that the heating unit specified provides the required wattage but does not exceed specified values.
2. Integrate the heating controls with the total environmental aspect of the building.
3. Use low watt density heaters where feasible.

13.7 SYSTEMS

13.7.1 INTERCOMMUNICATION SYSTEMS

1. Provide an intercom and a public address/paging system as required.

13.7.2 FIRE ALARM SYSTEM

1. Provide a fire alarm system in accordance with the National Building Code of Canada and Authorities Having Jurisdiction.
2. The system is to be electrically supervised, single or two stage as necessary and zoned.
3. Control panel shall be multi-plexed type, of modular design, supervised, with space for future expansion, and in a metallic cabinet with viewing windows suitable for the location. Provide supervised bypass switches on panel to allow testing of bells, fan shut down or remote station notification.
4. Annunciator, where required, is to be electronic lamp type with lamp supervision, front relamping with plastic zone identification plates.
5. Manual Stations shall be addressable, pull lever, open circuit type, installed at 1200 mm height.
6. Heat and smoke detectors shall be the addressable type.
7. Wiring shall be color coded and minimum size #14 AWG for signal circuits, and #16 for station and detector circuits. Provide bonding wire for all field devices.
8. Specify the system be tested and verified by the equipment manufacturer prior to takeover inspection. At final inspection the certificates issued by the manufacturer shall be available to the Authorities Having Jurisdiction and Department of Transportation & Works.
9. Provide complete riser diagram on drawings indicating all devices, locations, conduit risers and sizes, wire type, and control sequences.

10. Provide one or more zones for each floor including penthouse, sprinkler system, dry or wet chemical systems, stairwells and air handling systems.

13.7.3 Intrusion Alarm and Remote Monitoring

1. Projects requiring Security Systems should be tendered with a separate contract for provision of security systems.
2. Use Departmental standard specifications and guidelines to suit project requirements.
3. All points of building entry and exit and interior unit spaces designated as requiring security control are to be equipped with the capacity for installation of intrusion alarms. All exterior doors and frames are to be provided with facilities for alarm devices and conduits to the security room.
4. Provide conduit for centralized monitoring and control systems and console for fire alarm, emergency telephones, elevators, and lighting systems.

13.7.4 Telecommunications System (Telephone and Data)

1. Provision of structured cable systems for data networks throughout new and existing buildings will be confirmed by the Design Manager at the Concept Design stage. Where required, they shall be configured for a “star” topology pattern, emanating from data closets with the use of dedicated zone conduits. Typically all data wire, conduit, patch panels, line cords, patch cords, plates, boxes, hubs, etc., will be supplied as part of the system.
2. Design a telecommunication system in accordance with the latest editions of the following guidelines and standards:
    a. CAN/CSA-T530-M90 “Building Facilities, Design Guidelines for Telecommunications”
    b. CAN/CSA-T529-M “Design Guidelines for Telecommunications Wiring System in Commercial Buildings”
3. Position Voice/Data outlets in close proximity to receptacle power outlets.
4. Provide a data raceway system complete with Cat 6 wiring, outlets, cover plates, patch panels, hub devices and patch cords to constitute a complete operable system. Zone conduits or cable trays in ceiling plenum are preferred complete with wall stub-ups from device outlets. Provide separate raceway for the telephone system.

5. Generally, provide one combination outlet per single office and at 8m intervals along perimeter walls where there are no offices (e.g. in open area office space).
6. Provide pay phones in the public lobby unless otherwise directed.
7. Connect elevator emergency phone to Security Control Center if applicable.

13.7.5 CLOCKS

1. Provide clock outlets in common areas such as main lobbies, cafeterias, lunch rooms, workshops, conference room, general offices, mail rooms, file rooms and classrooms wired back to central clock system controller.

13.8 MOTORS AND CONTROLS

13.8.1 MOTOR CONTROLS

1. Coordinate control sequences to provide starters, and other auxiliary control equipment with the proper characteristics and features to obtain the performance intended.
2. Provide disconnect switches, starters and auxiliary control equipment which are not an integral part of packaged units described in equipment specifications but which are required for performance and sequence of operation of equipment specified under other Divisions.
3. Check that the voltage drop due to motor starting is within limits acceptable to the local utility. If required, use a reduced-voltage starter or soft start.
4. Motor starters are not to be supplied from lighting panelboards -Supply separate from dedicated panelboards.
5. Automatic control devices such as thermostats, floats or pressure switches may control the starting and stopping of motors directly if designed and rated for that purpose. Otherwise use a magnetic starter.
6. When a manual-automatic operation is required, use a “Hand-Off-Automatic” selector switch. Connect the selector switch so that only the normal automatic regulating control devices will be bypassed when the switch is in hand position. Connect safety control devices, such as low or high pressure cutouts, high temperature cutouts, and motor overload in the control circuit in both the Hand and Automatic positions of the selector switch.
7. For three-phase motor starters provide:

a. magnetically operated motor starter
b. fused control transformer for 120 or 24 volt control
c. manual-off-automatic selector switch where remote control is used
d. combination starters are preferred, starters with separate disconnect devices may be acceptable
e. motor starter disconnecting devices to be manually operated and to be load-break fused or non-fused switches, or circuit breakers

8. Control devices in individual special purpose enclosures should be mounted in groups.
9. Mount control devices in a common enclosure where numbers warrant.
10. Motor starters are to be NEMA rated. Specify sprinkler proof enclosure as required.
11. Provide lockable disconnecting means within sight and 1 meter from each motor.

13.8.2 Motor Control Centers

1. Use motor control centers where they provide an economical and practical grouping of controls.
2. Centers should be free-standing structures.
3. Use combination starters.
4. Mount centers on continuous mounting channels on concrete.
5. Wall mount type may be used for groups of up to four starters.
6. Identify each starter by a black laminated plastic nameplate with white letters.
7. Specify control centers as per NEMA Standard for class and type.
8. Specify sprinkler proof enclosure as required.
9. Specify that splices are not permitted in MCC feeders.

13.8.3 Motor Equipment Feeders

1. In open equipment areas consider the advantages of running motor equipment feeders from overhead rather than up through floor slabs. Specify type of support.
2. Splices shall not be permitted in motor equipment feeders.

13.9 LIGHTNING PROTECTION

1. Review the requirement for the installation of lightning protection. If required, provide protection to meet CSA standard B72-1987 and any provincial or local regulation.
2. Provide specific comments on this subject in the design synopsis of the Concept Design submission.

13.10 CONTROL SYSTEMS

1. Coordinate provision of building automated control systems with the mechanical division.

13.11 EMERGENCY GENERATOR

1. Provide an emergency power generator as directed or required by code, sized to operate the following:
    a. a number of spaces. See unit spaces for requirements
    b. a limited number of exterior lights for perimeter security (25%)
    c. minimal heating and ventilating equipment
    d. elevators (1 at a time to operate to closest floor)
    e. fire alarms and exit lights, emergency lighting in stairwell, corridors and all other areas where required by code
    f. alarm and control systems
    g. all electrically operated doors
2. Confirm the load requirements for the standby generator to power the security lighting in addition to the emergency services and fire alarm systems.

13.12 CENTRAL CONTROL CONSOLES

1. The majority of large public buildings are equipped with fire alarms, trouble alarms and voice communication systems terminating at a central control console area which is monitored by security staff on a twenty-four hour basis. Where required, the master elevator control and intrusion alarm system shall also terminate at this area.
2. The central control console is normally located on the ground floor of the building and is readily accessible to any emergency response force responding to an alarm. Where the

central control console is co-located with an information desk or security checkpoint, the control console should be planned in such a manner as to prevent overview of access from the public counter.

13.13 POWER QUALITY

1. To ensure good quality power for standalone and networked computer systems, the building electrical systems design should incorporate features to reduce and eliminate line noise, voltage fluctuation, harmonics, and frequency variations.
2. Electrical distribution of power for computer receptacles shall be:
3. On dedicated branch circuit panelboards used solely for computer power supplies. Do not connect lighting, heating, motors, print M/C's, fax M/C's, etc. to dedicated panels for computers.
4. Regular ground receptacles complete with ground conductor to ground bus of panelboard. Provide bonding ground in panelboard feeder and tie to common ground bus in main electrical room. Specify distinguishing color for receptacle cover plate.
5. Dedicated computer panelboards shall incorporate a line voltage conditioner/surge suppressor installed and connected in parallel with the panelboard feeder at the panel location.
6. Isolate power for computer receptacle panelboards from the rest of the electrical distribution through a separate power-conditioning harmonic mitigating transformer. Specify that the transformer be sized to accommodate harmonic currents.
7. In existing buildings, perform a power quality study on the existing electrical distribution system with respect to power factor, harmonics, line noise (common and normal mode), voltage fluctuations and frequency variations.

13.14 GROUNDING

1. Provide grounding systems within electrical distribution networks to meet the latest edition of the Canadian Electrical Code, CSA C22.1, Section 10 - Grounding and Bonding.
2. Ground conductors shall be copper.
3. Provide grounding riser diagrams on working drawings and distinguish between distribution ground and bonding ground.

13.15 SUSTAINABILITY MANAGEMENT SYSTEM (SMS) PUBLIC INTERFACE

1. Provide an interactive Sustainability Management System (SMS) that uses real-time building systems data to educate users about energy and resource use as well as the building's high performance features. The user interface shall incorporate intuitive animated graphics and user interaction to engage a wide primarily non-technical audience via both a local touch-screen display and web browser.
2. SMS System Hardware: A touch-screen display and computer.
3. Web-hosted SMS System Software.
4. Provide all software, programming and hardware to provide a seamless BACNET interface to all monitored items including but not limited to Building Automation System, electric meters and water meters. Utilize this interface to provide all data for the public interface.
5. Provide facility electrical metering systems to have the data stream communication compatibility to transfer building electrical load information seamlessly to the BAS system and from the BAS system to the SMS system. The following load profiles require complete independent monitoring: lighting loads, heat loads, process loads, mechanical loads, elevators and others as indicated.