November 6, 2009

Toronto Hydro responses to OEB questions on the Electrical Safety Authority

Board File Numbers EB-2009-0180/181/182/183

It is the Board's understanding that the Electrical Safety Authority (the "ESA"), by regulation, is responsible to ensure that all electrical installations comply with the Ontario Electrical Safety Code which, in the case of Public Works Operations, includes maintenance of existing and installation of new streetlighting and traffic signals.

1. Using the point of supply, as referenced in Section F, Tab 18, Schedule 2 of the Applicants' response to Board Staff Interrogatory No. 2, as the demarcation point of ownership between Toronto Hydro-Electric System Limited's distribution assets and the assets associated with street lighting in the City of Toronto (the "SEL System") owned and operated by Toronto Hydro Energy Services Inc., please describe the design and regulatory oversight requirements of the ESA pertaining to the SEL System as non-distribution assets.

2. Please describe the design and regulatory oversight requirements of the ESA pertaining to the SEL System in a scenario where all SEL System assets are considered to be distribution assets.

3. Please provide a comparative cost estimate of the two scenarios depicted above.

Background

The context for the additional information request is "the Board's understanding that the ESA is responsible to ensure that all electrical installations comply with the Ontario Electrical Safety Code (the "Code") which, in the case of Public Works Operations, includes the maintenance of existing and installation of new street lighting and traffic signals" (page 1 of the Board's October 21, 2009 letter). The answers to the questions that the Board pose illustrate that ESA oversight involves different approaches to regulatory oversight depending upon whether the SEL System is considered part of the distribution function or is non-distribution.

ESA, Code and Ont. Reg. 22/04 Requirements

The ESA is an administrative authority designated under the *Safety and Consumer Statutes Administration Act, 1996* and an Administrative Agreement with the Government of Ontario, pursuant to which it has delegated authority under Section 113 of the *Electricity Act, 1998* and Ontario Regulation 89/99 *Electrical Safety Authority* for ensuring public electrical safety in Ontario.

Section 113 of the *Electricity Act, 1998* authorizes the making of regulations on a broad range of matters relating to "works, matters and things used or to be used in the generation, transmission, distribution, retail or use of electricity in Ontario." To carry out its mandate under the *Electricity*

Act, 1998, the ESA is authorized to prepare and issue plans and specifications governing the design, construction and testing of any of the works; appoint persons or associations who have special knowledge and facilities to inspect, test and report on the works; and issue orders relating to work to be done in the installation, removal, alteration, repair, protection, construction or disconnection of any of the works.[1]

The Code

The Minister may adopt by reference any code or standard that governs any matter set out above and the Minister may require compliance with any code or standard that is so adopted.[2] The Ontario Electrical Safety Code, which is currently in its 24th Edition, effective May 1, 2009 (the "Code"), is adopted under Ontario Regulation 164/99 *Electrical Safety Code* as a compilation of the Canadian Electrical Code and specific Ontario amendments. Section 2 of Ontario Regulation 164/99 provides that "[e]very act or omission in connection with the generation, transmission, distribution, retail or use of electricity in Ontario must be done or made in compliance with the Electrical Safety Code." The Code covers all electrical work and electrical equipment operating or intended to operate at all voltages in electrical installations for buildings, structures, and premises, subject to a number of specific exceptions one of which applies in respect of licensed distributors (discussed further below).

Prior to the 1999 restructuring of Ontario's electricity sector, municipal electric utilities traditionally installed roadway and streetlighting electrical systems and as a result these systems were exempt from the ESA electrical inspections applied to these installations (see Exhibit A). According to an ESA notice, starting January 1, 2003 (see Exhibit B) all electrical work performed on traffic signals and roadway lighting systems were required to meet the requirements of the Code, which includes inspections by the ESA. These requirements under the Code now applied to (i) all new roadway lighting systems, and to (ii) replacements, relocations, re-installations, repairs and addition of components made to the existing systems. During the decades of exemption from the Code the street lighting system was built and treated as part of a holistic distribution system and therefore subject to the regulatory oversight of the former Ontario Hydro regime.

The Regulation

The Code does not apply to, among other things, "electrical equipment and electrical installations used exclusively in the generation, transmission, or distribution of electrical power or energy intended for sale or distribution to the public, where" [...] "the distributor is licensed to own or operate the distribution system under Part V of the *Ontario Energy Board Act, 1998*."[3]

Instead, Ont. Reg. 22/04 establishes objective based electrical safety requirements for the design, construction, and maintenance of electrical distribution systems owned by licensed distributors and offers distribution companies options for achieving compliance. The regulation requires the

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[1] See *Electricity Act, 1998* at Section 113(7)-(11).
[2] See *Electricity Act, 1998* at Section 113(2).
[3] Code, Section 2.000 *Scope*.

approval of equipment, plans, specifications and inspection of construction before they are put into service, but the regulation provides LDCs with some discretion and a number of options to obtain these approvals. The ESA maintains regulatory oversight over this audit-based compliance regime, and together with industry representatives the ESA has developed a series of guidelines to help clarify and interpret the regulation.

The regulation speaks explicitly to the applicability of the Code and the regulation. The following is a summary of these provisions, and the complete regulation and the applicable sections of the Code are attached to this response.

- The regulation, and not the Code, applies to distributors who are licensed to own or operate a distribution system under Part V of the *Ontario Energy Board Act, 1998* and *vice versa* the Code, and not the regulation, applies to distributors who are not licensed under Part V of the *Ontario Energy Board Act, 1998.*[4] This is an important distinction, as the Board's decision in respect of licensing will be determinative of the whether the Code or the regulation will apply to the SEL System.

- The regulation applies with respect to a distribution system as far as the "ownership demarcation point" and no further.[5] The "ownership demarcation point" is a defined term and means the point at which the distributor's ownership of a distribution system, including connection assets, ends at the customer, and that is not located beyond, (i) the first set of terminals located on or in any building, or (ii) an electrical room or vault in a building where the electrical room or vault is of tamperproof construction, bears a sign to indicate that it is an electrical room or vault and is accessible only to authorized persons.[6]

- Beyond the ownership demarcation point, the Code applies with respect to (i) electrical installations and electrical equipment located beyond the ownership demarcation point, except for revenue metering equipment and associated equipment, current transformers, voltage transformers and remote terminal units; and (ii) electrical installations and electrical equipment that are located in buildings, or rooms in buildings, used as offices, washrooms, cafeterias, warehouses, garages, machine shops and recreational facilities if the installations and equipment belong to the distributor.[7]

The Gap Between Current Requirements and Operational Reality

ESA inspectors and street lighting crews are tasked with operationalizing these Code and Regulation requirements on a day by day basis by making pragmatic assumptions about where the "point of supply" is at each given inspection point. The problem is that the "point of supply" is not fixed at the same ownership demarcation point but changes, and can change considerably,

[4] O.Reg. 22/04, s. 2(5).
[5] O.Reg. 22/04, s. 2(3).
[6] O.Reg. 22/04, s. 1.
[7] O.Reg. 22/04, s. 2(4).

depending upon the type of equipment that is connected to secondary servicing. This is further complicated by the fact that the type of equipment connected can change over time (i.e. a dedicated street lighting line which later has a bus shelter attached would change the point of supply assessment).

Therefore, an additional consequence of the status quo situation is the existence of a regulatory gap wherein some electricity infrastructure may be subject to no consistent ESA, LDC or OEB oversight. This regulatory gap has its origins in the co-mingling of distribution and street lighting infrastructure which is discussed extensively in the pre-filed evidence. The "point of supply" and ownership demarcation points change over time depending upon what type of equipment is connected and where that equipment is connected. A gulf of ambiguity exists between:

(i) the black-letter requirements of the Code and O. Reg. 22/04; and

(ii) the operational assumptions made by ESA inspectors; and

(iii) the LDC system engineers and maintenance crews that are tasked with inspecting and auditing the system; and

(iv) how the system itself actually functions and operates.

This confusing and dynamic reality is illustrated through various attached diagrams which are explained below.

Toronto Hydro submits that one of the benefits in granting the relief sought will be to eliminate the existing ambiguity and gaps and strengthen the existing body of regulation by having all distribution infrastructure, including the SEL System, contained within a single LDC and therefore be subject to one consistent, comprehensive ESA/LDC/OEB regulatory approach.

Responses

1. For practical purposes, the design and regulatory oversight requirements of the ESA pertaining to the SEL System as non-distribution assets are confined to handwells and exclusive SEL System circuits (i.e. only those circuits that feed street lights). This is prescribed under section 2-004 of the Code which requires that an application for inspection must be filed with the ESA before or within 48 hours after commencement of work on all new electrical work and installations as well as for the maintenance of existing installations. As a result, ESA inspections are mandatory for all new street lighting systems, and to replacements, relocations, re-installations, repairs and addition of components made to the existing systems. In addition, the assets associated with the street lighting system must comply with the specific technical requirements contained in Section 75 and elsewhere in the Code. Section 2-300 provides that all operating electrical equipment shall be kept in safe and proper working condition.

It is also important to understand those areas over which ESA has no regulatory oversight. ESA neither inspects nor otherwise regulates any below-grade civil SEL System-related infrastructure

(i.e. no inspection of vaults, ducts, trenches, etc). In practice, the overwhelming majority of ESA's regulatory oversight involves inspection of new/replacement installation (95% plus). With respect to existing "non-distribution" SEL System, in practice the ESA requires that Toronto Hydro keep records of maintenance work done by its street lighting staff and ESA has the option to accompany Toronto Hydro crews when servicing and maintaining street lighting but there is no comprehensive inspection of the existing SEL System. The ESA inspects those existing SEL System components that relate to reactive repairs completed by THESI crews on any given day during the ESA inspections.

Accordingly, the vast majority of ESA's focus involves inspection of new and replacement SEL System installations. Inspection of the existing SEL System is subject to company-specific arrangements (or a municipality-specific arrangements if it owns the street lighting system) made on a monthly basis between THESI and ESA. The actual equipment that happens to be inspected varies according to THESI's repair requirements for the particular day on which the ESA inspection takes place.

It is also very important to understand that even the general description of ESA's jurisdiction over handwells and exclusive SEL System circuits is a malleable concept since the "point of supply", raised in the Board's question, changes depending upon what equipment is connected at the handwell and secondary system level. We attach a series of diagrams showing how "point of supply" and equipment classification can change from a SEL System (to which the Code applies) to a mixture of SEL and LDC systems (to which O.Reg. 22/04 applies) which results in ambiguity regarding "whose equipment is whose" and which can result in inefficiencies and delay in repairing equipment such as streetlights and traffic signals because of the unnatural bifurcation of SEL and LDC infrastructure.

The ever changing "point of supply" complicates the regulatory oversight relationships between ESA, THESI and THESL since ESA's jurisdiction changes, practically speaking, depending upon what equipment and where equipment is connected. The result is a gap in regulatory oversight: some equipment may not get inspected at all and other inspections may result in duplication of effort. The other implication of the status quo is that the SEL System, in effect, functions as an unlicensed distributor as a result of the changing "point of supply". This situation will be remedied by transferring the SEL System into distribution utility to allow the utility to self-regulate SEL System assets according to ESA guidelines pursuant to O. Reg. 22/04 and through the maintenance of SEL System assets through standard THESL O&M programs which are overseen by the OEB through its regulatory function.

2. In the scenario where SEL System assets are considered to be distribution assets, Ontario Regulation 22/04 establishes objective-based electrical safety requirements for the design, construction, and maintenance of electrical distribution systems owned by licensed distributors and provides distributors with options for achieving compliance. The Regulation only applies to assets owned by licensed distributors. The Regulation requires the approval of equipment, plans, specifications and inspection of construction before they are put into service, but the regulation provides LDCs with some discretion and a number of options to obtain these approvals. The ESA maintains regulatory oversight over this audit-based compliance regime, and together with

industry representatives the ESA has developed a series of guidelines to help clarify and interpret the Regulation. All engineering and construction standards and equipment installed are under the jurisdiction of the utility regulations prescribed under the Regulation. This second scenario posed by the Board will eliminate confusion surrounding the demarcation point and address, from a regulatory oversight perspective, the changing "point of supply" issue as between the LDC and the SEL System and facilitate a common governance boundary between Code and O. Reg. 22/04.

The practical result is the placement of responsibility for public safety, design and construction, standards and specifications with THESL as the LDC, and one clear audit-based regulatory oversight role for the ESA. In this scenario the confusing and ambiguous situation described above would no longer exist.

3. The costs associated the scenario described in question 1 involve inspection charges levied by ESA to THESI in the amount of approximately $30,000 per year. With respect to the scenario described in question 2, THESL pays ESA approximately $355,000 per year for audit-based fees. If Toronto Hydro's relief is granted it expects that the $30,000 inspection fees will be completely absorbed within the $355,000 audit based fees.

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EXHIBIT A

Electrical Safety Authority

For Your Safety

NOTICE/ARTICLE
From the ELECTRICAL SAFETY AUTHORITY

Electrical Inspection of Street Lighting and other Roadway Electrical Systems

October 2001

Municipalities, Local Distribution Companies (utilities), contractors, consultants, and suppliers should be advised that changes are being introduced to the electrical inspection requirements associated with Roadway Electrical Systems, such as **Traffic Signals and Street Lighting.**

Historically, electrical inspections were required for all electrical installations up to the service entrances (power supply connection points) for roadway electrical systems. Since electrical municipal utilities traditionally installed and maintained these systems the utility exemption for electrical inspections applied to these installations. As a result of restructuring in the utility business this is changing. To respond to these changes a working committee, comprised of a cross section of industry representatives, was established to:

- Examine possible safety issues associated with these installations
- Develop installation and inspection guidelines for these systems

Roadway electrical systems, such as traffic signal systems and roadway lighting, have some unique elements and performance requirements that are not explicitly recognized in the current Ontario Electrical Safety Code. Thus, there was a need to develop guidelines to cover these systems. The primary objective of these standards is to ensure that roadway electrical systems are both electrically safe for workers and the public, and operationally safe for motorists and pedestrians.

The Electrical Safety Authority (ESA) is a delegated administrative authority with the Ministry of Consumer and Business Services and is the standard bearer for electrical safety in Ontario. ESA is mandated by the provincial government to oversee wiring inspections, general inspections, Ontario Electrical Safety Code advice and information, and ensure equipment is approved

New requirements will be implemented on January 02, 2002. ESA has agreed to an interim inspection practice, to continue to inspect up to the service entrance only. Following implementation, the new guidelines and requirements will apply to any new installations but will not be retroactive.

Bulletin 2-12-* (Traffic Signal Systems) and 30-9-* (Roadway Lighting System (Street lighting)), issued October 2001, details the guidelines and requirements for these systems that have been identified by the committees.

For further information and to view these bulletins, please visit our website at www.esainspection.net

EXHIBIT B

Traffic Signal and Roadway Lighting Systems

Electrical Safety Authority

LIGHTING THE WAY TO SAFETY

Make Sure You Know the Rules

Communiqué

The Ontario Electrical Safety Code (Reg. 164/99) (OESC) defines requirements for electrical installations and products to keep the public safe from potential hazards.

Starting January 1, 2003, all electrical work performed on traffic signals and roadway lighting systems must meet the requirements of the Ontario Electrical Safety Code, which includes inspections by the Electrical Safety Authority (ESA). ESA is working to assist owners of traffic signals and roadway lighting systems to meet OESC requirements for both new installations and maintenance work.

New Installations -

The Ontario Electrical Safety Code requires individuals who are installing new traffic signals and/or roadway lighting systems, to file "Applications for Inspection" with the Electrical Safety Authority.

- **New traffic signal systems** include the controller, the underground and/or overhead lines, the service and all devices.
  Inspection Fee: $330 per signal system (intersection).
- **New roadway lights** vary in size (# of lights) and service requirements.
  Inspection Fee: cost associated with specific roadway lighting systems depend on the # of services and lights.
  - ⇒ $59 for each service (0-225 amps) plus $30 if a panel, splitter or sub-service is required, *plus*
  - ⇒ $59 for the first 10 devices (lights, photocells, etc.), plus $7 for each additional 10 devices
  - ⇒ $89 for the inspection of overhead lines or underground installations

Maintenance Work -

This covers replacing, relocating, re-installing, and repairing existing systems. This also includes the addition of components to enhance an existing installation.

Options include:

	Full Inspection	Periodic Inspection	Maintenance Program
Available to	everyone	the owner of the system	a contractor who maintains a system for an owner
Recorded work	file applications for all jobs	document all jobs in a logbook format	document all jobs in a logbook format
Inspection approach....	100% inspections	audit	audit
Fees are	variable	fixed, annual	fixed, annual
Fees calculated . ..	$59 per job	$250 for each multiple of 50 traffic signal systems or 1500 streetlights	$250 for each multiple of 50 traffic signal systems or 1500 streetlights

- Technical information is available from ESA Bulletins 2-12-1 for traffic signals and 30-9-1 for roadway lighting (**www.esainspection.net/street_light.html**)
- For additional information, or to arrange for an "application for inspection" visit ESA's website at **www.esainspection.net**, or call...**1-877-421-2228**

8/28/02

EXHIBIT C

Demarcation Example 1.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

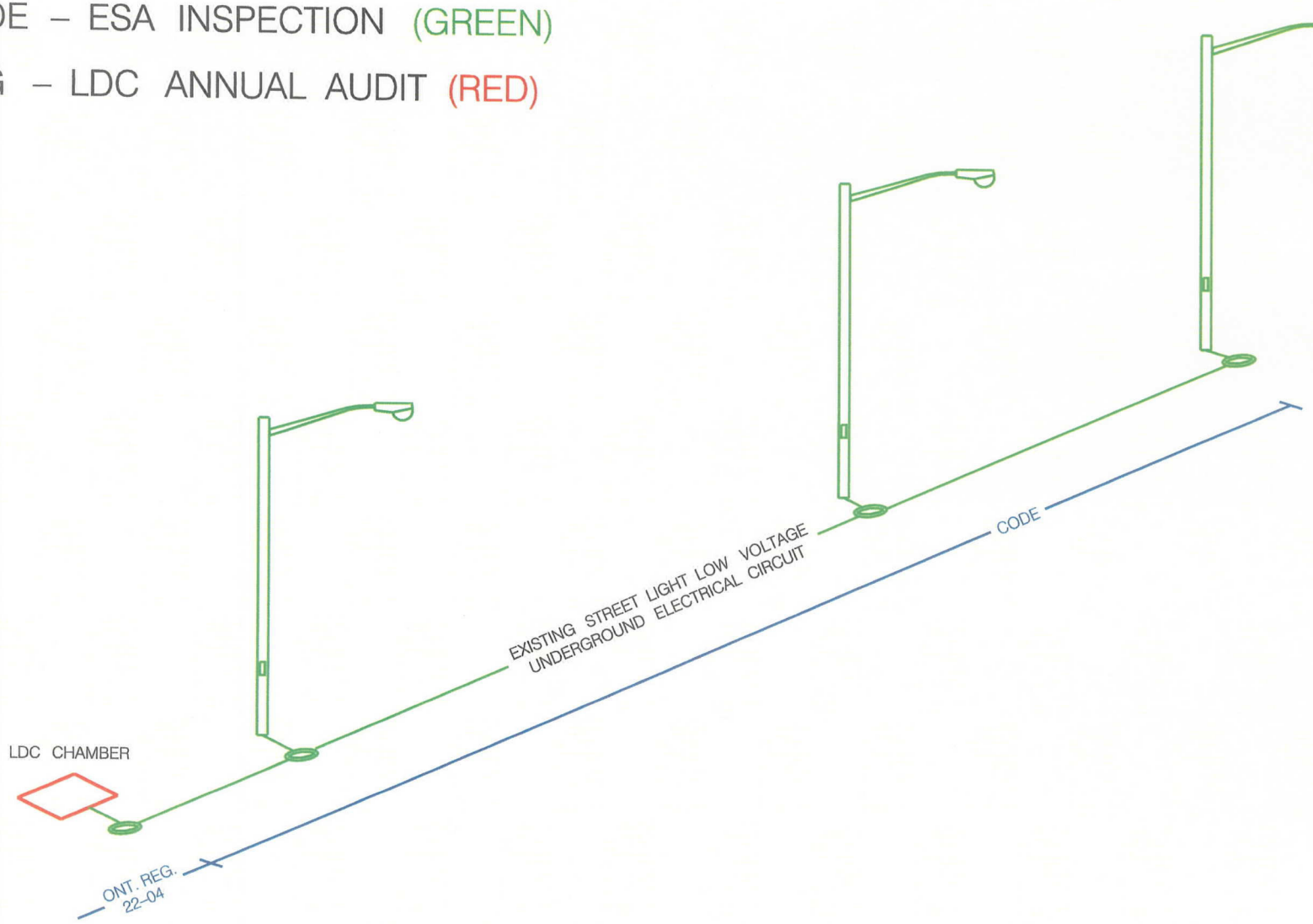

EXHIBIT D

Demarcation Example 2.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

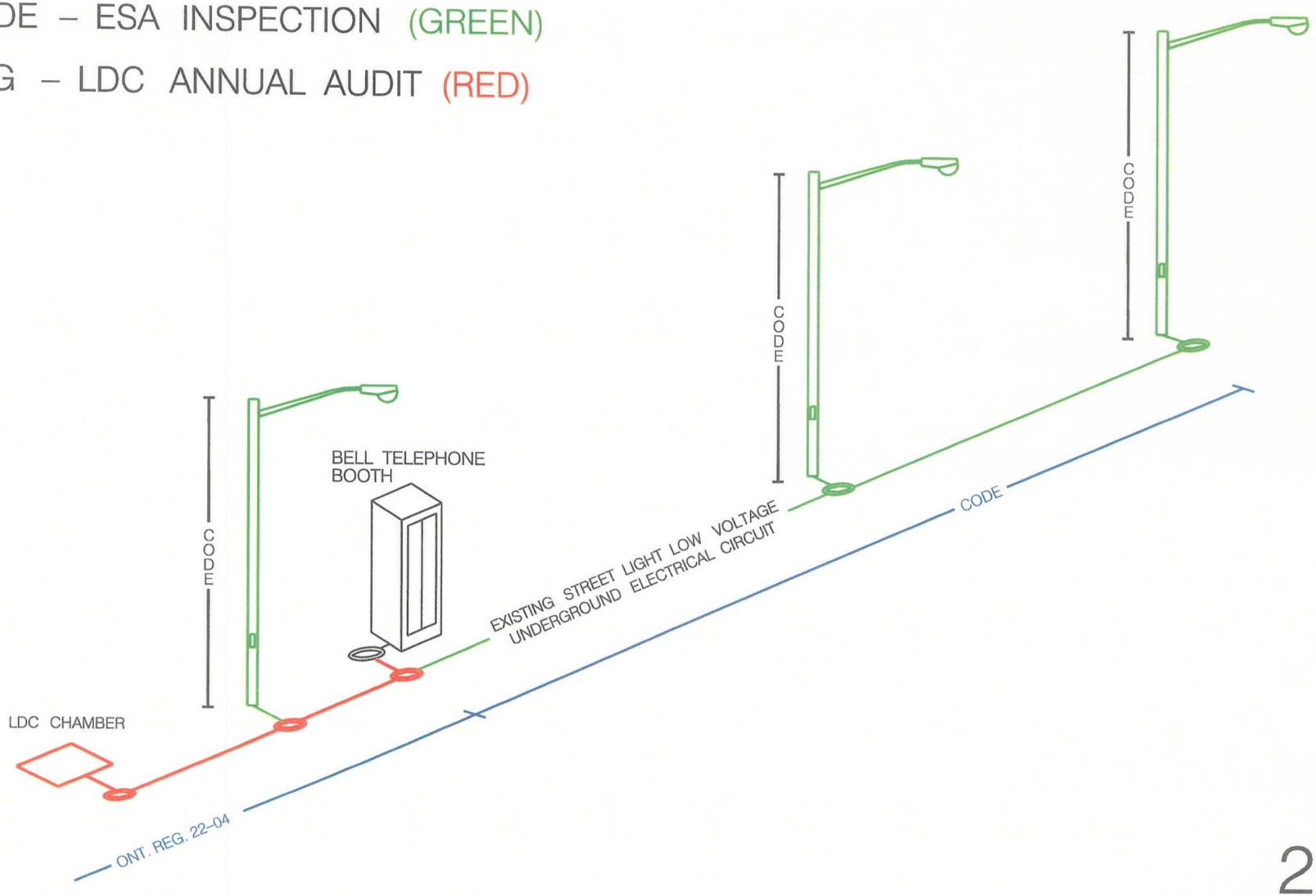

EXHIBIT E

Demarcation Example 3.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

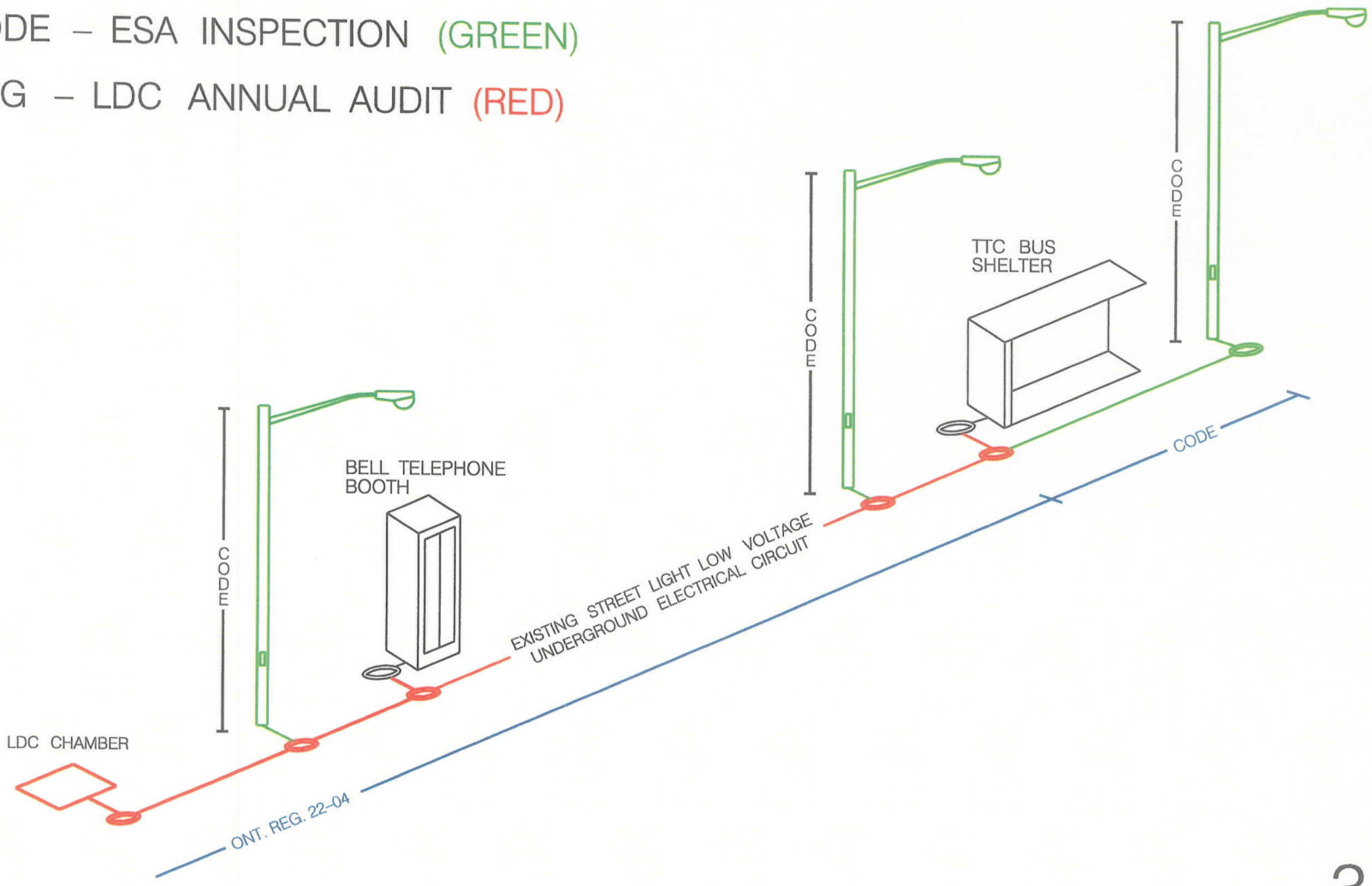

EXHIBIT F

Demarcation Example 4.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

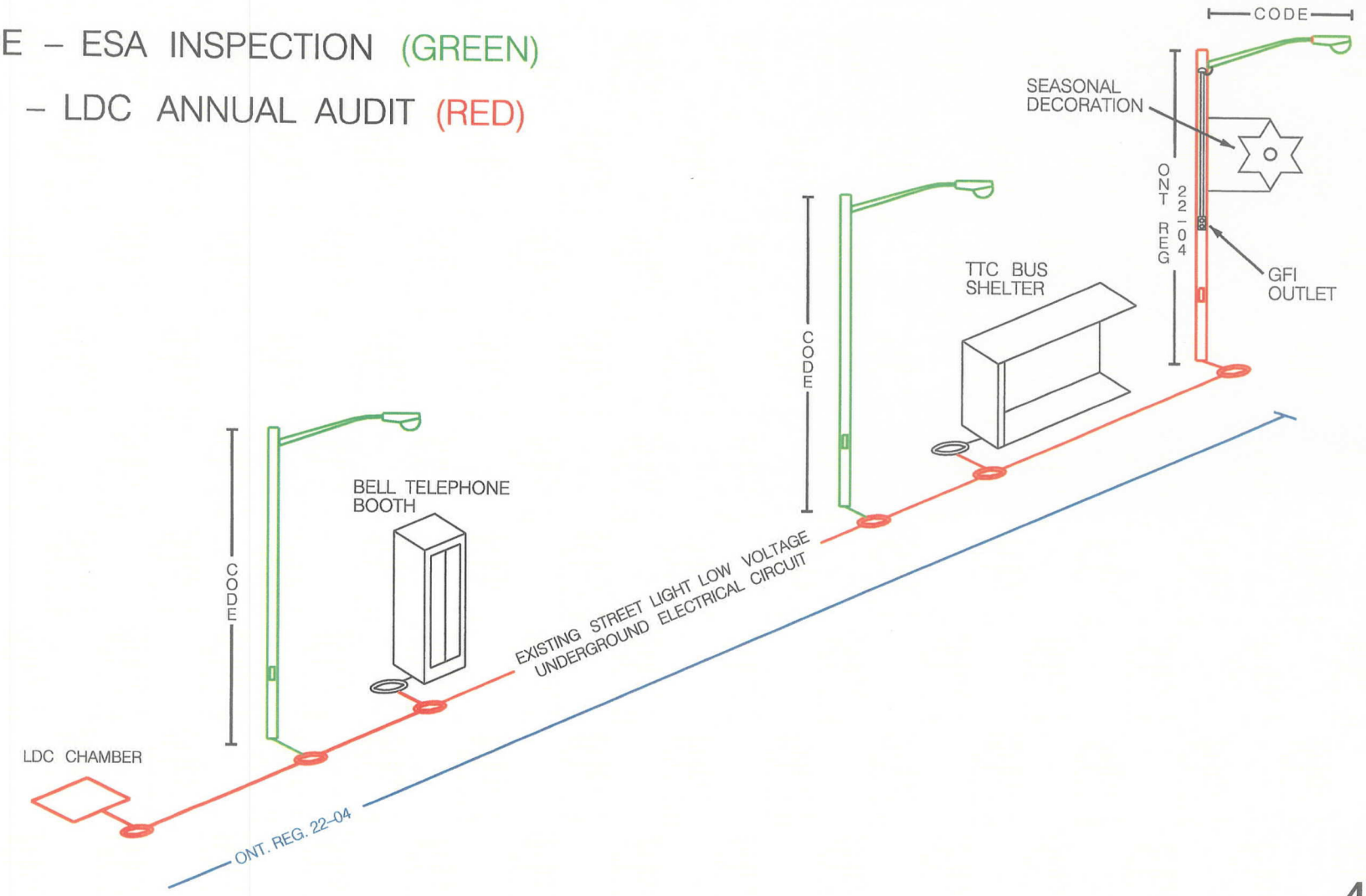

EXHIBIT G

Demarcation Example 5.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

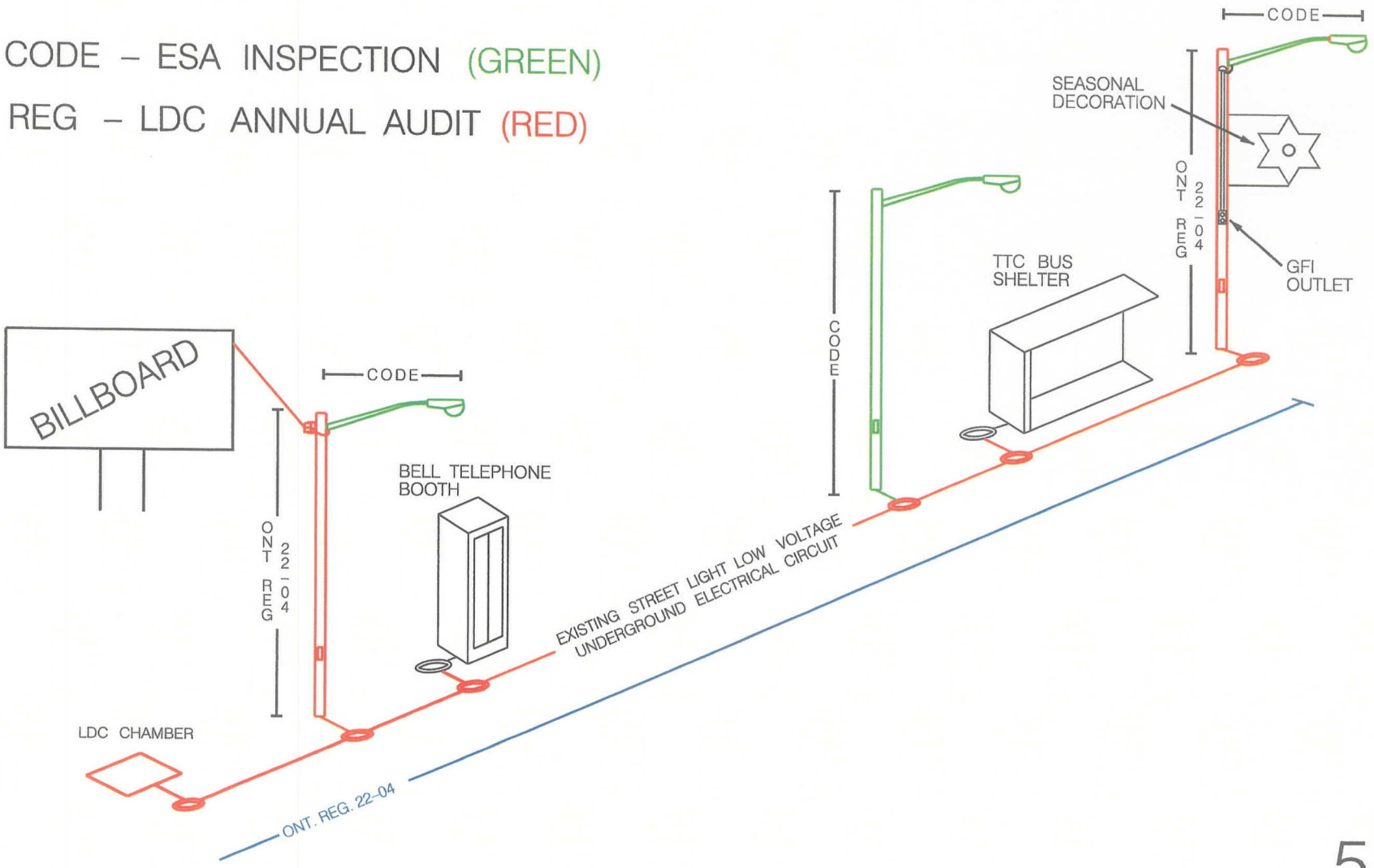

EXHIBIT H

Demarcation Example 6.

See attached.

LOW VOLTAGE ELECTRICAL INFRASTRUCTURE – INTEGRATION WITH LDC PLANT

CODE – ESA INSPECTION (GREEN)

REG – LDC ANNUAL AUDIT (RED)

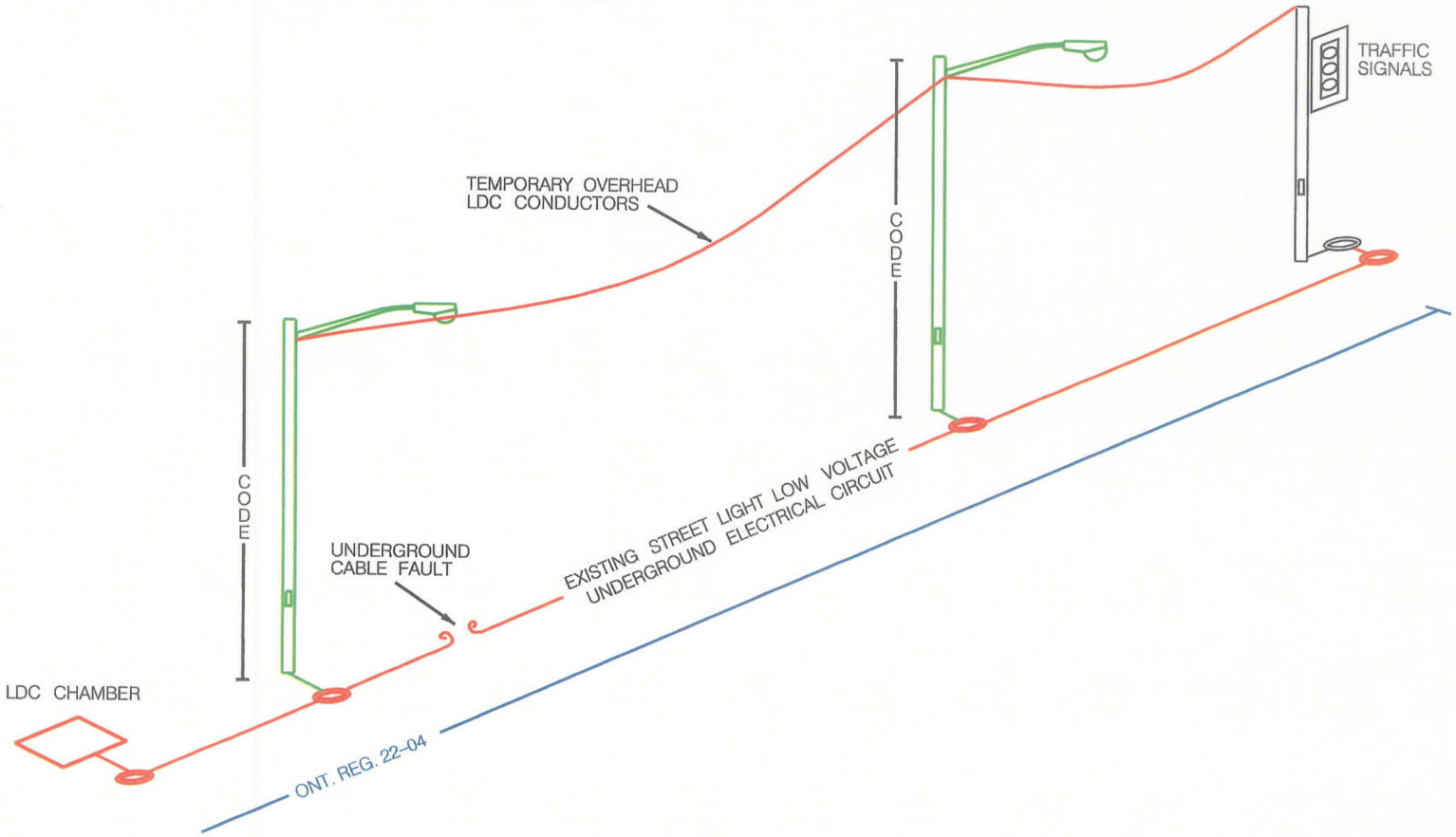

EXHIBIT I

Selected excerpts from the Ontario Electrical Safety Code (Sections 2 and 75).

See attached.

Ontario Electrical Safety Code

(Twenty-fourth edition)

consisting of

CSA C22.1-09
Canadian Electrical Code, Part I
Safety Standard for Electrical Installations
(Twenty-first edition)

AND

Ontario Amendments to CSA C22.1-09,
Canadian Electrical Code, Part I

Electrical
Safety
Authority

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- *The* Canadian Electrical Code, Part I, *is a voluntary code for adoption and enforcement by regulatory authorities.*
- *The* Canadian Electrical Code, Part I, *meets the fundamental safety principles of International Standard IEC 60364,* Electrical Installations of Buildings.
- *Consult with local authorities regarding regulations that adopt and/or amend this Code.*

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Delete Rules 2-000 through 2-032 of the CE Code and replace with:

Section 2 — General Rules

Administrative

2-000 Scope

This Code does not apply to

(a) electrical equipment and electrical installations used exclusively in the generation, transmission, or distribution of electrical power or energy intended for sale or distribution to the public, where

(i) the distributor is licensed to own or operate the distribution system under Part V of the Ontario Energy Board Act, 1998;

(ii) the transmitter is licensed to own or operate the transmission system under Part V of the Ontario Energy Board Act, 1998; or

(iii) the generator is licensed to own or operate the generation system or is licensed to provide ancillary services for sale through the IESO-administered markets or directly to another person, under Part V of the Ontario Energy Board Act, 1998;

(b) electrical equipment and electrical installations in communication systems from the transformer or other current-limiting device used at the junction of the communication system with the electric circuit supplying the communication system;

(c) electrical equipment and electrical installations in the cars, car-houses, passenger stations or freight stations used in the operation of an electric railway or electric street railway and supplied with electric current from the railway power-circuit;

(d) electrical equipment and electrical installations in railway locomotives, railway cars, signalling systems, communication systems, wayside train monitoring systems, and track facilities including the branch circuit supplying such electrical equipment or electrical installations when such electrical equipment or electrical installation is used in the operation of a railway;

(e) electrical equipment and electrical installations in an aircraft;

(f) electrical equipment and electrical installations in a mine as defined in the Mining Act, excluding any dwelling house or other building not connected with, or required for, mining operations or purposes or used for the treatment of ore or mineral;

(g) electrical equipment and electrical installations on a vessel of non-Canadian registry or on a vessel that is required to be certified in accordance with the Canada Shipping Act except for such equipment and installations required to connect the electrical supply from the onshore electrical supply facility to the service box on the boat and including the service box; or

(h) electrical equipment forming an integral part of a self-propelled vehicle that is required to be certified in accordance with the Motor Vehicle Safety Act except for such equipment supplying electrical power from an electrical installation to the vehicle and those portions of a vehicle capable of receiving electrical power from an electrical installation.

2-002 Special requirements

Sections devoted to Rules governing particular types of installations are not intended to embody all Rules governing these particular types of installations, but cover only those special Rules that add to or amend those prescribed in other sections covering installations under ordinary conditions.

2-003 Record of electrical installation work

The owner, owner's agent, or operator shall maintain a record of all electrical installation acceptable to the inspection department in any public building, commercial or industrial establishment, apartment house, or other building in which the public safety may be involved and shall produce this record to any inspector at any time and from time to time upon request, as specified by the inspection department.

2-004 Inspection

(1) A contractor shall file with the inspection department a completed application for inspection of any work on an electrical installation:

(a) before or within 48 hours after commencement of the work whether or not electrical power or energy has been previously supplied to the land, building, or premises on which the work was performed;

(b) shall pay the fees prescribed by the inspection department; and

(c) be in compliance with Ontario Regulation 570/05 made under Part VIII of the Electricity Act, 1998.

Add Section 75 as follows:

Section 75 — Installation of lines and wiring of buildings

75-000 Scope

(1) This Section applies to

(a) installations of primary and secondary lines except for lines owned by a supply authority;

Δ (b) poles and pole-mounted electrical equipment; and

(c) installation of electrical equipment in farm buildings and similar structures.

(2) This Section supplements or amends the general requirements of this Code.

75-002 Special terminology

In this Section, the following definitions apply:

ACSR — aluminum conductor, steel reinforced.

Classified — poles graded according to strength whereby the minimum circumferential dimensions are determined so that all poles of the same class, regardless of length, will withstand the same horizontal force applied 0.6 m from the top of the pole when supported 1.8 m from the butt end in accordance with CSA O15 series.

CMS — Central Metering System.

Distribution system — the system by which electrical power or energy is distributed to the receiving equipment and includes components such as primary line, secondary line, services, distribution transformers, distribution equipment, and other equipment of a similar nature.

Free-standing pole — a pole structure and base assembly that is installed with engineering direction without the use of guys.

Lines —

Primary line — a distribution system operating at more than 750 V but not more than 50 000 V phase-to-phase.

Secondary line — a distribution system operating at 750 V or less.

Neutral-supported cable — two or three insulated conductors and a bare neutral.

Open wire bus — a secondary line conductor with a weatherproof covering on the phase conductors and includes a bare neutral.

Penta — wood poles treated with pentachlorophenol.

Δ **Pole-mounted lighting systems** — a system of luminaires, poles, sign luminaires, underpass illumination, cables, power supply equipment, control system, and associated materials required to provide illumination on a roadway or associated appurtenances on private premises.

Power conductor — a conductor that conveys electrical power or energy and is not part of a communication circuit.

Δ **Roadway lighting systems** — a system of luminaires, poles, sign luminaires, underpass illumination, cables, power supply equipment, control system, and associated materials required to provide illumination on a roadway or associated appurtenances on a Municipal or a Provincial right of way.

Δ 75-004 General requirements

(1) Every installation under this Section shall be inspected in accordance with Section 2 of this Code.

(2) Where the work consists of the installation of a service, the contractor shall consult the supply authority as to the layout of the service and the location of the transformer and meter, regarding compliance with applicable codes or standards under a rule or by-law of the supply authority.

(3) Where the work consists of the installation of conductors over or under a railway, the contractor shall submit to the inspection department a plan of the crossing endorsed by the railway company with an approval of the work.

(4) Where approval is required from the supply authority by this Rule, such approval shall be obtained prior to commencement of any work with respect to the installation.

(5) Where a consumer desires to install the conductors of a primary or secondary line across a public road, the crossing shall not be made without written permission from both the supply authority and the authority having jurisdiction over the road and shall have the minimum clearance as specified in Rule 75-310(1).

CE Code, Part I © CSA / Ontario Electrical Safety Code © ESA

EXHIBIT J

O. Reg 22/04

See attached.

Electricity Act, 1998
Loi de 1998 sur l'électricité

ONTARIO REGULATION 22/04

ELECTRICAL DISTRIBUTION SAFETY

Consolidation Period: From May 11, 2005 to the e-Laws currency date.

Last amendment: O.Reg. 149/05.

This Regulation is made in English only.

Interpretation

1. In this Regulation,

"Authority" means the Electrical Safety Authority;

"authorized person" means a competent person authorized by a distributor to have access to areas containing, or structures supporting, energized apparatus or conductors;

"barriered" means separated by clearances, burial, separations, spacings, insulation, fences, railings, enclosures, structures and other physical barriers, signage, markers or any combination of the above;

"competent person" means a person who,

(a) is qualified because of knowledge, training and experience,

(i) to perform specific work, or

(ii) to organize work and its performance,

(b) has knowledge of any potential or actual danger to health or safety in the workplace in relation to the work, and

(c) is familiar with section 113 of the Act and the regulations made under it, and with the *Occupational Health and Safety Act* and the regulations made under that Act, that apply to the work;

"contractor" means any person who performs work on electrical equipment or an electrical installation;

"disconnecting means" means a device, group of devices or other means whereby the conductors of a circuit can be disconnected from their source of supply;

"distribution line" means an electricity distribution line, transformers, plant or equipment used for conveying electricity at voltages of 50,000 volts or less;

"distribution station" means an enclosed assemblage of equipment, including but not limited to switches, circuit breakers, buses and transformers, through which electrical energy is passed for the purpose of transforming one primary voltage to another primary voltage;

"effectively grounded" means permanently connected to earth through a ground connection of sufficiently low impedance and having sufficient current-carrying capacity to prevent the building up of voltages that may result in undue hazard to persons;

"electrical equipment" means any apparatus, appliance, device, instrument, fitting, fixture, machinery, material or thing used in or for, or capable of being used in or for, the distribution, supply or utilization of electric power or energy, and, without restricting the generality of the foregoing, includes any assemblage or combination of materials or things which is used, or is capable of being used or adapted, to serve or perform any particular purpose or function when connected to an electrical installation, notwithstanding that any of such materials or things may be mechanical, metallic or non-electric in origin;

"electrical installation" means the installation, repair, replacement, alteration or extension of any wiring or electrical equipment that forms part of a distribution system;

"ESC" means the Electrical Safety Code referred to in Ontario Regulation 164/99;

"live" means electrically connected to a source of voltage difference or electrically charged so as to have a voltage different from that of the earth;

"ownership demarcation point" means the point,

(a) at which the distributor's ownership of a distribution system, including connection assets, ends at the customer, and

(b) that is not located beyond,

(i) the first set of terminals located on or in any building, or

(ii) an electrical room or vault in a building where the electrical room or vault is of tamperproof construction, bears a sign to indicate that it is an electrical room or vault and is accessible only to authorized persons;

"primary distribution line" means a distribution line conveying electricity at more than 750 volts but not more than 50,000 volts phase to phase;

"professional engineer" means a person who holds a licence or a temporary licence under the *Professional Engineers Act*;

"secondary distribution line" means an electricity distribution line conveying electricity at 750 volts or less phase to phase;

"vault" means an isolated enclosure, either above or below ground, with fire-resistant walls, ceilings and floors in which transformers and other electrical equipment are housed. O. Reg. 22/04, s. 1.

Application

2. (1) Subject to subsection (2), this Regulation applies with respect to distribution systems regardless of when they came into existence. O. Reg. 22/04, s. 2 (1).

(2) Sections 3, 4, 5, 6, 7, 8, 9 and 13 apply with respect to distribution systems that are designed or come into existence on or after February 11, 2004 and with respect to distribution systems that existed before that date in respect of repairs, alterations or extensions made to those systems. O. Reg. 272/04, s. 1.

(3) This Regulation applies with respect to a distribution system as far as the ownership demarcation point and no further. O. Reg. 22/04, s. 2 (3).

(4) The ESC, and not this Regulation, applies with respect to,

(a) electrical installations and electrical equipment located beyond the ownership

demarcation point, except for revenue metering equipment and associated equipment, current transformers, voltage transformers and remote terminal units;

(b) electrical installations and electrical equipment that are located in buildings, or rooms in buildings, used as offices, washrooms, cafeterias, warehouses, garages, machine shops and recreational facilities if the installations and equipment belong to the distributor. O. Reg. 22/04, s. 2 (4).

(5) This Regulation, and not the ESC, applies to distributors who are licensed to own or operate a distribution system under Part V of the *Ontario Energy Board Act, 1998*. O. Reg. 149/05, s. 1.

(6) The ESC, and not this Regulation, applies to distributors, other than distributors who are licensed to own or operate a distribution system under Part V of the *Ontario Energy Board Act, 1998*. O. Reg. 149/05, s. 1.

Same, change of ownership

3. (1) If there is a change to the ownership demarcation point or a transfer of ownership of a distribution system, or part thereof, to a person that is not a distributor, the system or part transferred shall be, on completion of the transfer, subject to the requirements of the ESC. O. Reg. 22/04, s. 3 (1).

(2) Prior to the change to the ownership demarcation point or the transfer of ownership, the distributor shall,

(a) notify the Authority of the proposed change or transfer; and

(b) notify the non-distributor transferee that, on completion of the change or transfer, the distribution system or part transferred becomes subject to the requirements of the ESC. O. Reg. 22/04, s. 3 (2).

(3) Prior to the change to the ownership demarcation point or the transfer of ownership, a report identifying any modifications to the distribution system or part to be transferred that are required to ensure that the system or part will be in conformance with the requirements of the ESC shall be provided to the non-distributor transferee and to the Authority. O. Reg. 22/04, s. 3 (3).

Safety standards

4. (1) All distribution systems and the electrical installations and electrical equipment forming part of such systems shall meet the primary safety standard set out in subsection (2) by meeting the safety standards set out in subsections (3), (4), (5) and (6). O. Reg. 22/04, s. 4 (1).

(2) All distribution systems and the electrical installations and electrical equipment forming part of such systems shall be designed, constructed, installed, protected, used, maintained, repaired, extended, connected and disconnected so as to reduce the probability of exposure to electrical safety hazards. O. Reg. 22/04, s. 4 (2).

(3) All electrical installations operating at 750 volts or below that are not a direct part of a distribution system shall meet the following safety standards:

1. Operating electrical equipment shall be maintained in proper operating condition.

2. Adequate space shall be provided around electrical equipment for proper operation and maintenance.

3. Live conductors shall be adequately insulated or barriered to prevent inadvertent contact.

4. Persons who have reason to work on electrical wiring or touch live conductors shall have ready access to a means to disconnect the live conductors before working on the wiring or touching the conductors.

5. Disconnecting means shall effectively disconnect and be operable without undue hazard.

6. Metal parts of an installation that are not intended to be energized shall be effectively grounded.

7. Electrical installations shall be carried out so as to minimize the possibility of contributing to or causing a fire or explosion.

8. Electrical installations shall be carried out so as to minimize the possibility of insulation damage or deterioration. O. Reg. 22/04, s. 4 (3).

(4) All overhead distribution lines, including secondary distribution lines, shall meet the following safety standards:

1. Operating electrical equipment shall be maintained in proper operating condition.

2. Adequate space shall be provided around electrical equipment for proper operation and maintenance.

3. Energized conductors and live parts shall be barriered such that vegetation, equipment or unauthorized persons do not come in contact with them or draw arcs under reasonably foreseeable circumstances.

4. Metal parts of the installation that are not intended to be energized and that are accessible to unauthorized persons shall be effectively grounded.

5. Structures supporting energized conductors and live parts shall have sufficient strength to withstand the loads imposed on the structure by electrical equipment and weather loadings. O. Reg. 22/04, s. 4 (4).

(5) All underground distribution lines, including secondary distribution lines, shall meet the following safety standards:

1. Operating electrical equipment shall be maintained in proper operating condition.

2. Adequate space shall be provided around electrical equipment for proper operation and maintenance.

3. Energized conductors and live parts shall be barriered such that equipment or unauthorized persons do not come into contact with them or draw arcs under reasonably foreseeable circumstances.

4. Metal parts of the installation that are not intended to be energized and that are accessible to unauthorized persons shall be effectively grounded.

5. Parts of the distribution system in proximity to the inside walls of a swimming pool shall be installed in such a way as to minimize the possibility of voltage gradients in the swimming pool.

6. Parts of a distribution system in proximity to propane tanks and natural gas pipelines

shall be installed in such a way as to minimize the possibility of explosions under normal circumstances and operating conditions. O. Reg. 22/04, s. 4 (5).

(6) Distribution stations shall meet the following safety standards:

1. Operating electrical equipment shall be maintained in proper operating condition.
2. Adequate space shall be provided around electrical equipment for proper operation and maintenance.
3. Metal parts of the installation that are not intended to be energized and that are accessible to unauthorized persons shall be effectively grounded.
4. Energized conductors and live parts shall be barriered such that equipment or unauthorized persons do not contact them or draw arcs under reasonably foreseeable circumstances.
5. Structures supporting energized conductors and live parts shall have sufficient strength to withstand the loads imposed on the structure by equipment and weather loadings. O. Reg. 22/04, s. 4 (6).

(7) In this section,

"weather loadings" means loads due to temperature, ice or wind acting on conductors and structures. O. Reg. 22/04, s. 4 (7).

When safety standards met

5. (1) Electrical installations operating at 750 volts or below that are not a direct part of a distribution system that meet the requirements set out in Rules 2-100 to 86-402 of the ESC are deemed to meet the safety standards set out in subsections 4 (2) and (3). O. Reg. 22/04, s. 5 (1).

(2) Overhead distribution lines that meet the requirements of CSA Standard C22.3 No. 1-01 Overhead Systems or the requirements set out in Rules 2-100 to 2-404 of section 2 and in sections 3, 4, 10, 12, 14, 18, 26, 28, 36, 75, 80 and 84 of the ESC are deemed to meet the safety standards set out in subsections 4 (2) and (4). O. Reg. 22/04, s. 5 (2).

(3) Underground distribution lines that meet the requirements of CSA Standard C22.3 No. 7-94 Underground Systems (Reaffirmed 1999) or the requirements set out in Rules 2-100 to 2-404 of section 2 and in sections 3, 4, 10, 12, 14, 18, 26, 28, 36, 75, 80 and 84 of the ESC are deemed to meet the safety standards set out in subsections 4 (2) and (5). O. Reg. 22/04, s. 5 (3).

(4) Distribution stations that meet the requirements set out in Rules 2-100 to 2-404 of section 2 and in sections 3, 4, 10, 12, 14, 18, 26, 28, 36, 75, 80 and 84 of the ESC or that meet the requirements of National Electrical Safety Code C2-1997 are deemed to meet the safety standards set out in subsections 4 (2) and (6). O. Reg. 22/04, s. 5 (4).

Approval of electrical equipment

6. (1) Electrical equipment that is part of a distribution system is approved if,

(a) its design and construction meet any of the standards for approval of equipment set out in Rule 2-024 of the ESC; or

(b) its design and construction comply with a code or standard under a rule of the distributor that provides an assurance of safety of the equipment that is the equivalent of the assurance of safety provided by the standards referenced in clause (a). O. Reg. 22/04, s. 6 (1).

(2) For the purpose of establishing whether electrical equipment is approved under clause (1) (b), the equipment shall be tested and inspected in accordance with testing and inspection procedures that are adequate for that purpose. O. Reg. 22/04, s. 6 (2).

Approval of plans, drawings and specifications for installation work

7. (1) Before beginning work on an electrical installation that is or may form part of a distribution system, a distributor shall ensure that the installation work is based,

(a) on plans that have been prepared by a professional engineer and that the plans have been reviewed and approved in accordance with subsections (2) to (7); or

(b) on the distributor's standard design drawings or standard design specifications that have been assembled by a professional engineer, by an engineering technologist certified by the Ontario Association of Certified Engineering Technicians and Technologists or by another competent person and that those standard drawings and specifications have been reviewed and approved in accordance with subsections (2) to (7). O. Reg. 22/04, s. 7 (1); O. Reg. 272/04, s. 2.

(2) Review and approval of plans, standard design drawings and standard design specifications under this section shall be carried out,

(a) by a professional engineer, who may or may not be the professional engineer who prepared the plans or assembled the standard design drawings or standard design specifications; or

(b) by the Authority at the request of the distributor. O. Reg. 22/04, s. 7 (2).

(3) Where, after reviewing the plans, standard design drawings or standard design specifications under clause (2) (a), a professional engineer is satisfied that the safety standards set out in section 4 are met, he or she shall prepare a certificate and provide it to the distributor. O. Reg. 22/04, s. 7 (3).

(4) A certificate under subsection (3) constitutes approval of the plans, standard design drawings or standard design specifications. O. Reg. 22/04, s. 7 (4).

(5) Where, after reviewing the plans, standard design drawings or standard design specifications under clause (2) (b), the Authority is satisfied that the safety standards set out in section 4 are met, it shall approve them and provide a certificate of approval to the distributor. O. Reg. 22/04, s. 7 (5).

(6) The plans, standard design drawings or standard design specifications, along with the certificate, shall be kept by the distributor and made available to the Authority upon request. O. Reg. 22/04, s. 7 (6).

(7) This section does not apply with respect to work on an electrical installation that involves the replacement of one piece of electrical equipment with another piece of electrical equipment of the same voltage and characteristics. O. Reg. 22/04, s. 7 (7).

Inspection and approval of construction

8. (1) Before putting a distribution system into use, a distributor shall ensure that the construction of the system has been inspected and approved in accordance with this section. O. Reg. 22/04, s. 8 (1).

(2) An inspection under this section shall be carried out,

(a) by a professional engineer on behalf of the distributor;

(b) by qualified persons identified in a construction verification program developed by the distributor and approved by the Authority; or

(c) by the Authority at the request of the distributor. O. Reg. 22/04, s. 8 (2).

(3) A professional engineer who carries out an inspection under clause (2) (a) shall prepare a record of the inspection. O. Reg. 22/04, s. 8 (3).

(4) Where the professional engineer is satisfied on the inspection that the safety standards set out in section 4 are met, he or she shall prepare a certificate to that effect and provide it, along with the record of inspection, to the distributor. O. Reg. 22/04, s. 8 (4).

(5) A person who carries out an inspection under clause (2) (b) shall inspect the system in accordance with the methods and techniques described in the approved construction verification program referred to in that clause and prepare a record of the inspection. O. Reg. 22/04, s. 8 (5).

(6) Where the person carrying out the inspection under clause (2) (b) is satisfied on the inspection that the safety standards set out in section 4 are met, he or she shall prepare a certificate to that effect and provide it, along with the record of inspection, to the distributor. O. Reg. 22/04, s. 8 (6).

(7) A distributor who obtains a certificate pursuant to an inspection under clause (2) (a) or (b) shall keep the certificate and record of inspection and make them available to the Authority on request. O. Reg. 22/04, s. 8 (7).

(8) Where the Authority is satisfied on an inspection carried out under clause (2) (c) that the safety standards set out in section 4 are met, the Authority shall prepare a certificate to that effect and provide it, along with the record of inspection, to the distributor. O. Reg. 22/04, s. 8 (8).

(9) A certificate under subsection (4), (6) or (8) constitutes approval that the system may be put into use. O. Reg. 22/04, s. 8 (9).

Deviations from required standards

9. (1) Where a distributor upgrades the distribution lines of a distribution system such that the system does not meet the standards for clearances and separations in respect of distribution lines referred to in subsection 5 (2) or (3), the distributor may still put the system into use if a professional engineer certifies that,

(a) the reason for failing to meet the standards was a lack of space; and

(b) the failure to meet the standards will not materially affect the safety of any person or property. O. Reg. 22/04, s. 9 (1).

(2) If a distributor replaces a part or portion of an existing distribution system with a part or portion that is similar to the part or portion being replaced but that part or portion does not meet the safety standards set out in section 4, the distributor may put the system into use as long as no undue hazard to the safety of any person is created by doing so. O. Reg. 22/04, s. 9 (2).

Proximity to distribution lines

10. (1) Despite section 4 of CSA Standard C22.3, No. 1-01 Overhead Systems, a person may place an object closer to an energized conductor forming part of a system of overhead distribution lines than the required minimum separations from energized conductors forming

part of such a system if the person first obtains an authorization from the distributor responsible for the energized conductor. O. Reg. 22/04, s. 10 (1).

(2) Despite sections 4 and 5 of CSA Standard C22.3, No. 7-94 Underground Systems (Reaffirmed 1999), a person may place an object closer to an energized conductor forming part of a system of underground distribution lines than the required minimum separations from energized conductors forming part of such system if the person first obtains an authorization from the distributor responsible for the energized conductor. O. Reg. 22/04, s. 10 (2).

(3) Before digging, boring, trenching, grading, excavating or breaking ground with tools, mechanical equipment or explosives, a contractor, owner or occupant of land, buildings or premises shall, in the interests of safety, ascertain from the distributor responsible for the distribution of electricity to the land, building or premises the location of any underground distribution line that may be interfered with in the course of such activities. O. Reg. 22/04, s. 10 (3).

(4) The distributor shall provide reasonable information with respect to the location of its underground distribution lines and associated plant within a reasonable time. O. Reg. 22/04, s. 10 (4).

Disconnection of unused lines

11. (1) A distributor shall disconnect and ground distribution lines of 750 volts or more that have not been in use for a prolonged period of time. O. Reg. 22/04, s. 11 (1).

(2) Prior to disconnecting and grounding the lines, the distributor shall de-energize them. O. Reg. 22/04, s. 11 (2).

(3) A distributor is not required to comply with subsection (1) where the lines, although unused, act as back-up or emergency lines. O. Reg. 22/04, s. 11 (3).

(4) A distributor is not required to comply with subsection (1) where the distributor provides the Authority with a report from, and a certificate signed by, a professional engineer indicating that,

(a) disconnecting and grounding the lines is not practical in the circumstances; and

(b) no undue danger to the safety of any person will be caused if the lines are not disconnected and grounded. O. Reg. 22/04, s. 11 (4).

Condition of an approval: reporting of serious electrical incidents

12. (1) It is a condition of an approval issued to a distributor for the use of a distribution system that the distributor, or any contractor or operator acting on the distributor's behalf, report to the Authority any serious electrical incident of which they become aware within 48 hours after the occurrence. O. Reg. 22/04, s. 12 (1).

(2) Where a serious electrical incident has occurred, a distributor, contractor or operator shall not interfere with or disturb, except in the interests of safety, saving life, relieving human suffering, continuity of service or preservation of property, any wreckage, article or thing at the scene of the incident that is connected to it and, in no case, shall wreckage, an article or a thing be carried away or destroyed unless an inspector so permits. O. Reg. 22/04, s. 12 (2).

(3) Where a serious electrical incident involving workers only is reported to the Ministry of Labour as required under the *Occupational Health and Safety Act* and that the Ministry has taken control of the scene of the incident, subsections (1) and (2) do not apply. O. Reg. 22/04,

s. 12 (3).

(4) In this section,

"critical injury" means an injury of a serious nature that,

(a) places life in jeopardy,

(b) produces unconsciousness,

(c) results in a substantial loss of blood,

(d) involves the fracture of a leg or arm but not a finger or toe,

(e) involves the amputation of a leg, arm, hand or foot but not a finger or toe,

(f) consists of burns to a major portion of the body, or

(g) causes the loss of sight in an eye;

"serious electrical incident" means,

(a) any electrical contact that caused death or critical injury to a person,

(b) any inadvertent contact with any part of a distribution system operating at 750 volts or above that caused or had the potential to cause death or critical injury to a person,

(c) any fire or explosion in any part of a distribution system operating at 750 volts or above that caused or had the potential to cause death or critical injury to a person, except a fire or explosion caused by lightning strike;

"worker" means a person who performs work or supplies services for monetary compensation but does not include an inmate of a correctional institution or like institution or facility who participates inside the institution or facility in a work project or rehabilitation program. O. Reg. 22/04, s. 12 (4); O. Reg. 272/04, s. 3.

Same: audit

13. (1) It is a condition of an approval issued to a distributor for the use of a distribution system that the distributor engage an auditor to audit on an annual basis the distributor's compliance with sections 4, 5, 6, 7 and 8 and to prepare an audit report. O. Reg. 22/04, s. 13 (1).

(2) To conduct the audit and prepare the audit report, the distributor shall engage an organization that is,

(a) accredited by the Standards Council of Canada to register quality management systems whose scope of accreditation includes engineering services, construction and electricity supply; or

(b) acceptable to the Authority. O. Reg. 22/04, s. 13 (2).

(3) The distributor shall provide the audit report to the Authority on request. O. Reg. 22/04, s. 13 (3).

Same: declaration of compliance

14. It is a condition of an approval issued to a distributor for the use of a distribution system that the distributor submit to the Authority an annual statement of compliance with sections 3, 9, 10, 11 and 12 signed by a professional engineer or an officer or director of the distributor. O. Reg. 22/04, s. 14.

Compliance

15. (1) A distributor that is notified by the Authority that the distributor is not in compliance with any or all provisions of this Regulation shall remedy the non-compliance within the time set out in the notice. O. Reg. 22/04, s. 15 (1).

(2) If a distributor fails to remedy non-compliance with section 6 as required under subsection (1), the distributor shall immediately apply to the Authority for approval of equipment in accordance with Rule 2-024 of the ESC and the distributor may not use any other means available to obtain the approval. O. Reg. 22/04, s. 15 (2).

(3) If a distributor fails to remedy non-compliance with section 7 as required under subsection (1), the distributor shall obtain approval of plans, standard design drawings and standard design specifications by the Authority under clause 7 (2) (b) and subsection 7 (5) and the distributor may not use any other means available to obtain the approval. O. Reg. 22/04, s. 15 (3).

(4) If a distributor fails to remedy non-compliance with section 8 as required under subsection (1), the distributor shall obtain inspection and approval of construction by the Authority under clause 8 (2) (c) and subsection 8 (8) and the distributor may not use any other means available to obtain the approval. O. Reg. 22/04, s. 15 (4).

16. Omitted (provides for coming into force of provisions of this Regulation). O. Reg. 22/04, s. 16.

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