



## **WIREMAN'S PROCEDURES FOR ELECTRICAL DESIGN SUBMISSIONS**

### **GENERAL:**

#### **I. What is an Electrical Design Submission:**

Set of drawings & calculations comprising the design of an electrical system for use in residential, commercial or industrial applications. Design must ensure practical safeguarding of persons and property from hazards arising from the use of electrical energy.

#### **II. Why are Electrical Design Submissions Mandatory:**

By law the PUC is required to regulate the consumption sector of the electrical industry. Section of the Electricity Act (Ch 221, rev 2000) that speaks to this includes:

- **Section 6(2)(g)** – protects the public from dangers arising from the generation, transmission or supply of electricity
- **Section 7(1)(d)**- the protection of electrical installations
- **Section 7(1)(e)** – the conditions under which fixtures and fittings may be installed
- **Section 7(1)(f)** – matters generally connected with the electric light and power service which are not otherwise provided for in preceding sections

An electrical system starts with a design that must be based on PUC approved installation standards. Mandating that the design of any such systems be reviewed by the PUC will ensure PUC meets its regulatory obligation under the law.

#### **III. When must an Electrical Design Submission be made:**

An electrical design submission must be made to the PUC whenever there is:

- Installation of an electrical system for a new residential/commercial/industrial application
- Alteration/modification/upgrade of an existing electrical system

#### **IV. Who can make Electrical Design Submission:**

Only a PUC licensed wireman can make a submission. Note that any such submission must be done in accordance with the licensed category of that wireman. Also, only PUC licensed wiremen can engage in any electrical installations works at a project site.

#### **V. Where must Electrical Design Submissions be made:**

All submissions must be made to PUC. Method to use:

1. Online by emailing to [submissions@puc.bz](mailto:submissions@puc.bz) (please follow PUC online submissions procedures).

## VI. Rules/Regulations/Codes governing Electrical Design Submissions:

All electrical drawing submissions must follow the code of practice adopted by the PUC, The National Electrical Code (NEC) and PUC addendums. Other relevant codes include the BEL Service Installation Manual and Standard metering Arrangements. As the local authority having jurisdiction, PUC regulations and guidelines supersede all other codes in the event of any material differences.

## VII. Wiremen Categories, Design & Installations Limits:

Table I outlines the design and installation limits as per wireman category.

Category	Design limits	Installation limits
<b>Electrician</b>	Can submit designs of electrical systems up to 24 kVA, single phase, residential.	can work alone on electrical systems up to 30 kVA, 600V <, single phase, residential; systems above must be supervised by <b>Electrical Technician</b> or above.
<b>Electrical Technician</b>	Can submit designs of electrical systems up to 150 kVA, 600V<; residential or commercial.	can work alone on electrical systems up to 500 kVA, 1000V<, residential or commercial; systems above must be supervised by <b>Engineer</b> .
<b>Engineer</b>	Can submit designs of electrical systems of any size and voltage	can work on electrical systems up to any size and voltage

## SPECIFICS:

### VIII. Features of Electrical Design Submissions:

- Must be emailed to [submissions@puc.bz](mailto:submissions@puc.bz)
- Formatting of Submission:
  - If computer generated (preferred) must be in PDF format; minimum font size is Arial 11.
    - If hand drawn with pen and ruler; must be **neat** and **legible**. Submission must be scanned and converted to PDF.
  - The preferred size for drawings is 11” x 17” paper. Must **ensure the contents are legible**.
  - Drawings should only show outlines of structures (floor plan) overlaid with electrical details of the design.
  - Entire Electrical Design PDF document under 25MB or 25,000KB.
  - Every page must bear a title block to include:
    - Name of the drawing of the individual sheet,
    - Project Name
    - Project address
    - Project Owner/developer,
    - Submitting Wireman’s name/address/phone/license number/type,
    - Space with wireman signature.



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## **IX. Components of Electrical Design Submissions:**

The typical submission must have the following components:

### **A. COVER PAGE**

- Must include project owner name and contact (email and phone), and complete project address.
- Must include details of wireman doing submission.

### **B. LOCATION MAP & SITE PLAN**

- Location Map must include project area and nearby areas, GPS Coordinates of project location, and any other details to allow for site inspection.
- Site Plan details must including:
  - Must show project compound relative to property lines, existing buildings/structures, roads, location of BEL's HV (High Voltage) and/or LV (Low Voltage) lines nearby relative to project building.
  - Must show proposed structure/building footprint with project compound, location and distance of proposed meter(s) and proposed electrical panels, and any existing electricity meter on property, and any existing building on property.
  - Must show direction and cable run distance of any UG (Underground) network from meter point to all points within the property.

### **C. FLOOR PLAN WITH POWER CIRCUITS**

- Must label all spaces within the floor plan.
- Must include electrical legend of all symbols used.
- Must have circuit reference numbers to identify each circuit within the panel schedule.
- Clearly indicate location of convenience, GFCI, Dedicated and weather-proof outlets.
- Must show location of control/distribution panel (s).
- Must include space dimensions.

### **D. FLOOR PLAN WITH LIGHTING CIRCUITS**

- A separate drawing required if these circuits will result in a cluttered floor plan as per (C).
- Must include electrical legend of all symbols used.
- Must have circuit reference numbers to identify components of each circuit with the panel schedule.
- Must show control devices of each component as part of the circuitry.
- Must include space dimensions.

***E. BREAKER PANEL DETAILS & LOAD SHEET CALCULATION:***

- Must show panel details for the main breaker panel and every sub-panel in the design. Details include bus rating, voltage, breaker position, breaker size, cable sizes, mounting location, etc.
- Double or triple pole breakers must be properly shown between phases in load schedule.
- Panel details must clearly indicate the calculated phase loads (kVA and Amps), and phase imbalance as a percentage.
- All panels must be properly and uniquely labelled.

***F. NEC LOAD CALCULATIONS***

- Electrical load calculations as per the applicable NEC method (whether dwelling, multi-dwelling, non-dwelling or combination) is required.
- NEC load calculations are required for all panels, including subpanels. Areas and loads being served by sub-panel(s) must be accounted for in the NEC calculation of supplying panel.
- NEC load calculations are to be done per panel, and properly titled/labeled according to the same unique panel label.

***G. SERVICE ENTRANCE DIAGRAM & RESPECTIVE SINGLE LINE DRAWING (SLD)***

- Must show from BEL's transformer to main breaker using standard electrical symbols and single lines labelled with conduit/cable size, voltage, current, # of phases, rating (kVA).
- Must show supply side and load side wire size(s) (line, neutral, ground).
- Must show the weather-head details inclusive of structural strength and minimum height clearances as per BEL's Service Installations Manual for OH (Overhead) feed; or drawing with UG (Underground) route, type/size of ducts used, depth of trench, backfill and demarcation.
- Must include a disconnecting means once there is an underground section from the BEL supply to the main breaker.
- Must show grounding details including size/type/length of rod, size/type ground cable. Projects requiring grounding grids must show all such details.
- Must show breaker panels and subpanels; specifying voltage, current, phase and location. Specify weather-proof where appropriate. Clearly indicate size of main isolating breaker in each panel.
- Must include electrical legend of all symbols used.

## **H. OTHER REQUIRED CALCULATIONS**

- Voltage Drop Calculations
  - Voltage drop percentage must be in accordance to NEC recommendations.
  - Voltage drop must be calculated based on the request service or main breaker rating, and not on based on the calculated NEC load (by code the calculated NEC load is the minimum requirement).
  - Voltage drop percentage must be provided from each BEL meter to main panel. Projects with Meter banks must show the voltage drop for all meters to main panels.
  - In case of a BEL meter feeding a customer owned meter bank, then the voltage drop calculation is from the BEL meter to each main panel.
  - Multiple voltage drop percent can be presented in a tabular form, properly labeled to identify the respective section of the design (including the cable run, cable size, and voltage).
  - Voltage drop from a panel to a sub-panel must also be provided.
- Short-Circuit Calculations (Basic Point-to-Point Calculation):
  - For any service above 200Amps, short-circuit calculation from utility transformer to first protection device.
  - For any non-utility transformers within the internal electrical system.
  - For all generators of any capacity within any electrical system, short-circuit calculation from generator(s) to first protection device.
  - For motor loads or special equipment (such as medical machines or industrial machines) within any electrical system.
- Alternative Sources of Power:
  - Calculations related to the sizing of the capacities for the selection of electrical hardware, based on power and energy requirements of the project. Consideration system autonomy to be considered in calculation if required for project.
  - Short circuit calculations with in the alternative source system and at the first point of protection after the alternative source.
  - Hardware specifications (data sheets) to be provided, based on the sizing calculations.
  - Complete Single line diagram inclusive of the alternative source of power including conductor sizes and breaker sizes, based on the sizing calculations.
  - Complete Single line diagram of grounding design.
  - Electrical configurations of hardware.
  - Location of hardware related to the alternative source of power and up to main panels and sub-panels, with all distances.

- Example: For Solar Power Systems calculations include for energy requirements considering day & night load calculations and autonomy, solar array sizing, cable sizing, energy storage sizing, protection devices sizing, inverter and charger sizing, site plan showing location of solar array and other electrical hardware, distances to charger and inverter, single line showing all hardware with cable sizes, and breaker sizes, all related data sheets for the recommended hardware.

**I. SPECIFICATIONS, NOTES, LEGEND**

- All relevant details required by the NEC but not shown in any of the above listed drawing must be noted in the specifications sheet.
- The attached specification sheet must be included in each submission; additions may be made as required by specific design.

**J. COMPLETED FORM: Submission Data Sheet for No Objection of Design**

**K. COMPLETED FORM: Declaration by Wireman and No Objection by PUC for Project Construction (completed by constructing wireman)**

**X. SUBMISSION REQUIREMENTS BASED ON PROJECT TYPE:**

Table I: Specific sheets to be included for the different project types

Service type	Required sheets for Design approval	Required sheets for Inspection
<b>New Service or TCC (construction)</b>	A, B, C, D, E, F, G, H, I, J	K, Approved Design (Submission #), and Electrical Installation Form completed by wireman. Note that As-built design are required if installation differs from Approved Design.
<b>Add to existing (no change to service size)</b>	A, B, C, D, E, F, G, H, I, J	K and Approved Design (Submission #)
<b>Meter relocation (no change to service size)</b>	A, B, G, I, J	K, Approved Design (Submission #), and Electrical Installation Form completed by wireman. Note that As-built design are required if installation differs from Approved Design.
<b>Service Upgrade (change in service size)</b>	A, B, C, D, E, F, G, H, I, J	K, Approved Design (Submission #), and Electrical Installation Form completed by wireman. Note that As-built design are required if installation differs from Approved Design.
<b>Social TC (events)</b>	A, B, G, I, J	K, Approved Design (Submission #), and Electrical Installation Form completed by wireman. Note that As-built design are required if installation differs from Approved Design.



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