



BOMA - EV Charging Stations

Engineering Considerations

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IOQM
CERTIFIED

Introductions

Prism Engineering provides consulting services to address technical, behavioural and organizational aspects of Energy Management

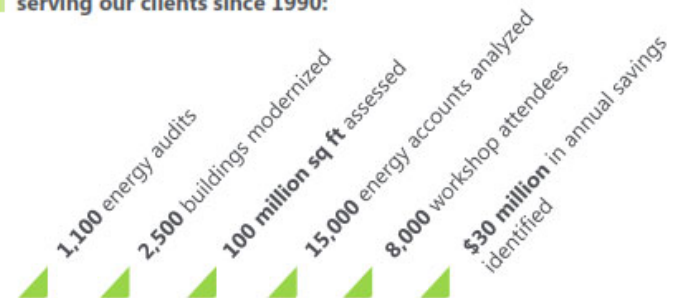
We design and implement cost effective approaches to address comfort, efficiency and reliability.



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Our Work By the Numbers

We've had the privilege of serving our clients since 1990:



Overview



- Code Requirements
- Engineering Considerations
- Other Considerations
- Limitations
 - Issues & Solutions

Code Requirements

- Section 86 – Electric Vehicle Charging Systems

2015 (Current)	2018 (Not Yet Adopted)
<p>Control and protection</p> <p>Δ 86-300 Branch circuits (see Appendix B)</p> <p>(1) Electric vehicle supply equipment shall be supplied by a separate branch circuit that supplies no other loads except ventilation equipment intended for use with the electric vehicle supply equipment.</p> <p>(2) Notwithstanding Subrule (1), electric vehicle supply equipment shall be permitted to be supplied from a branch circuit supplying another load(s), provided that control equipment prevents simultaneous operation of the electric vehicle supply equipment with other circuit loads such that the calculated demand of the circuit is not exceeded.</p> <p>(3) For the purposes of Subrule (2), the calculated demand shall be determined in accordance with Section 8.</p> <p>© 2015 CSA Group</p>	<p>Section 86 <i>Electric vehicle charging systems</i></p> <p><i>C22.1-18</i></p> <p>Control and protection</p> <p>86-300 Branch circuits (see Appendix B)</p> <p>1) Electric vehicle supply equipment shall be supplied by a separate branch circuit that supplies no other loads except ventilation equipment intended for use with the electric vehicle supply equipment.</p> <p>Δ 2) Notwithstanding Subrule 1), electric vehicle supply equipment shall be permitted to be supplied from a branch circuit supplying another load(s), provided that an electric vehicle energy management system is installed in accordance with Subrule 8-106 1) or 12).</p> <p>3) For the purposes of Subrule 2), the calculated demand shall be determined in accordance with Section 8.</p> <p>86-302 Connected load</p> <p>The total connected load of a branch circuit supplying electric vehicle supply equipment and the ventilation equipment permitted by Rule 86-300 shall be considered continuous for the purposes of Rule 8-104.</p> <p>10) Where electric vehicle supply equipment loads are controlled by an electric vehicle energy management system, the demand load for the electric vehicle supply equipment shall be equal to the maximum load allowed by the electric vehicle energy management system.</p> <p>11) For the purposes of Rules 8-200 1) a) vi), 8-202 3) d), 8-204 1) d), 8-206 1) d), 8-208 1) d), and 8-210 c), where an electric vehicle energy management system as described in Subrule 10) monitors the consumer's service and feeders and controls the electric vehicle supply equipment loads in accordance with Rule 8-500, the demand load for the electric vehicle supply equipment shall not be required to be considered in the determination of the calculated load.</p>

Code Requirements

- Municipal Bylaws (New Construction)

- Minimum Charging Levels
- Provision for Future Expansion
- No. of Stall with Charging Capabilities

Up to 4 vehicles charging at 30A at the same time on a single 40A breaker



City of
Richmond

www.richmond.ca

Bulletin

Engineering Department

6911 No. 3 Road, Richmond, BC V6Y 2C1

Fax: 604.276.4222

Electric Vehicle Charging Infrastructure
Requirements – Richmond Zoning Bylaw
8500, Section 7.15

No.: ENGINEERING-05
Date: 2018-01-05

3.3 Meeting the Requirements in Multifamily Developments with Shared Parking Areas

Apartments, and some townhouses, typically feature shared parking areas. These parking areas are typically in enclosed, though some may be non-enclosed.

Each residential parking stall, excluding visitor parking, must feature an energized outlet capable of providing Level 2 charging. Two strategies may be used to meet the requirements:

1. Dedicated Circuits

Projects can meet the requirement by providing a dedicated circuit capable of providing Level 2 charging (i.e. 208V – 240V, 16A – 80A) to an outlet at each parking stall at each parking stall. Attachment 1 illustrates such a configuration.

2. EV Energy Management Systems

“EV energy management systems” refers to a variety of technologies that can control the electrical load associated with charging EVs. These systems are also variously referred to as “load sharing”, “load management”, “smart charging”, etc. Many EV energy management systems for multifamily developments entail multiple EVSE connected to one electrical circuit, with EVSE with communications capabilities able to control their collective load so as not to exceed the capacity of a circuit. Designing for EV energy management systems can reduce the load for which the buildings’ electrical systems must be constructed, and thereby lower costs, relative to dedicated circuits.

Per Richmond Zoning Bylaw 8500, Section 7.15.3, the Director of Engineering can establish a performance standard for projects that are designed for EV energy management systems. The performance standard is:

The system must be capable of supplying a minimum performance level of 12 kWh per parking space over an eight (8) hour overnight period, assuming that all parking spaces are in use by a charging EV.

The intention of the performance standard is to ensure that sufficient electricity is available to EV drivers to ensure a reasonable rate of overnight recharging. A variety of electrical infrastructure configurations are capable of meeting this performance standard. One configuration is to provide 4 or fewer outlets on a 208V 40A circuit (see Attachment 2).

Engineering Considerations

- New Construction or Existing Building
- Types of chargers (Level 1 / Level 2 / DC Fast Charger)
 - Charging Time
- Number of chargers
- Charging Time (Level of Charging)
- Mounting Requirements (Wall / Pedestal)
- Load Balancing (Single Phase Loads)

Other Considerations

- Who has access
- Payment Required or Free to Use
- Advertising
- Protection

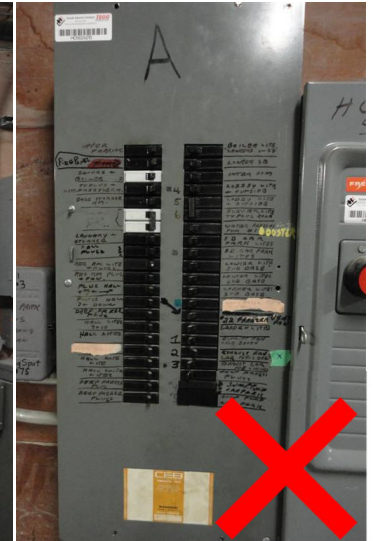
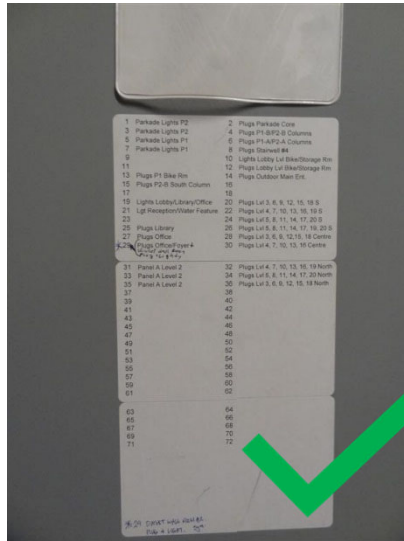


Limitations

- Physical Space
- Capacity of Electrical System
- Proximity of Electrical Vault
- Configuration of Parkade/Parking Lot
- Cellular Reception

Limitations

- Physical Space
 - 40A 2 Pole Breaker (Level 2)

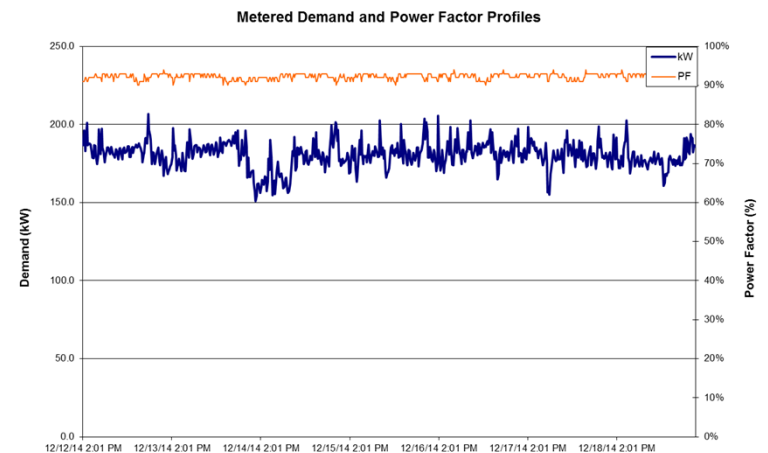


Limitations

- Issue: No Space in Existing Panels
- Solution: Install New EV Dedicated Panels (\$ Increased Installation Cost \$)
- If installing large number of chargers this should be done anyways

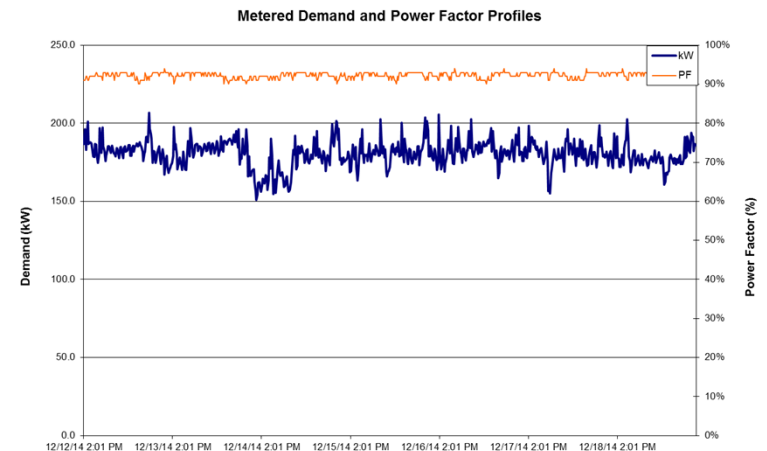
Limitations

- Capacity of Electrical System (Existing Buildings)
 - 10 Level 2 Chargers = 62.4 kW
 - 100 Level 2 Chargers = 624 kW
 - Typical Transformer Size for MURB: 1,000 – 2,000 kVA



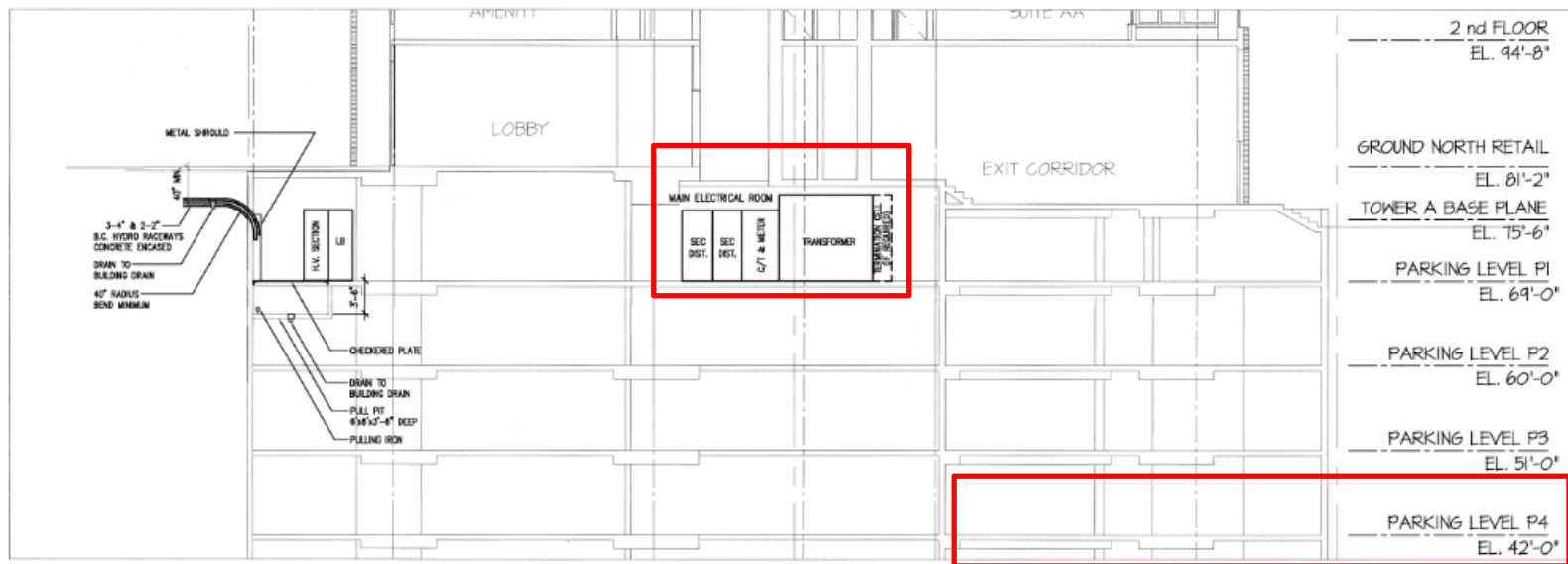
Limitations

- Capacity of Electrical System
 - Issue: Charging Load Exceeds Building Capacity
 - Solution: Load Sharing Chargers (\$)
Energy Management Controls (\$\$)
Increase Transformer Size (\$\$\$)
 - Can meter service to determine actual capacity and load profile



Limitations

- Proximity of Electrical Vault
- Configuration of Parkade/Parking Lot



Limitations

- Issue: No Existing Conduit
- Solution: Xray & Coring (Increased Cost \$\$)



Limitations

- Cellular Reception
 - Issue: No Cellular Reception on Lower Levels of Parkade
 - Solution: Install Cellular Repeaters/Boosters



Q & A



Thank you.

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