



Webinar:
Ontario's 2012 Building Code: Electric Vehicle Charging
Presented by the Ministry of Municipal Affairs

Notice

- This presentation is intended for general information purposes related to electric vehicle charging infrastructure requirements in Ontario's Building Code which came into effect on January 1, 2018.
- Code users are advised to consult the source documents, including:
 - The Building Code Act, 1992; and
 - The 2012 Building Code (O. Reg. 332/12 as amended).
- These documents are available from the Province of Ontario's e-laws website (www.ontario.ca/laws).

Purpose

- The purpose of this webinar is to:
 - Provide information about Building Code amendments related to electric vehicle (EV) charging in buildings that came into effect January 1, 2018.
- Topics covered in this webinar include:
 - Building Code technical amendments related to EV charging;
 - Building Code transition rules; and
 - Alternative solutions for EV charging.

Context:

Building Code Requirements for EV Charging

- Interim amendments to the 2012 Building Code were filed in May 2017 as O.Reg. 139/17:
 - Apply where building permits are applied for on or after January 1, 2018.
- A further Building Code amendment (O.Reg. 563/17) was filed in December 2017 which included transition rules governing which buildings would be subject to the new EV requirements.
 - The transition regulation applies to certain projects where a building permit application is made before January 1, 2020.
- The amendments to the 2012 Building Code which are the focus on this presentation do not address EV charging in multi-unit residential buildings:
 - Requirements in this area have been consulted on and are being considered for the proposed Next Edition of the Building Code.

Building Code Technical Amendments: Division A 1.4.1.2.(1)(c)

EV Charging Definition:

New definition of electric vehicle supply equipment (EVSE) added:

...means *electric vehicle supply equipment* as defined in Rule 86-100 of the Electrical Safety Code adopted under Ontario Regulation 164/99 (Electrical Safety Code) made under the Electricity Act, 1998.

Building Code Technical Amendments: Division B Subsections 3.1.21. & 9.34.4.

Requirements Related to EV Charging:

- Part 3 and Part 9 includes new Subsections:
 - Electric Vehicle Charging – Subsection 3.1.21.
 - Electric Vehicle Charging – Subsection 9.34.4.

Note: EV charging requirements set out in Part 3 and Part 9 are the same with respect to workplaces and houses.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(1) & 9.34.4.1.(1)

Requirements Related to EV Charging in Workplaces:

Sentences 3.1.21.1.(1) and 9.34.4.1.(1):

Except for *houses* and apartment buildings, if vehicle parking spaces located within a building are provided, not less than 20% parking spaces must be provided with *electric vehicle supply equipment* installed in accordance with Section 86 of the Electrical Safety Code, O.Reg. 164/99 made under the Electricity Act, 1998.

Commentary:

3.1.21.1.(1) & 9.34.4.1.(1)

The 20% Requirement for Workplaces:

- Applies to buildings **other than apartment buildings or houses** with parking spaces in the buildings.
- EVSE is to be installed in at least 20% of the parking spaces located in the building.
- Section 86 of the Ontario Electrical Safety Code defines EVSE as “a complete assembly consisting of conductors, connectors, devices, apparatus, and fittings installed specifically for the purpose of power transfer and information exchange between the branch circuit and electric vehicle”.
- The Building Code does not designate the location or distribution of the relevant parking spaces in a building (whether they are to be clustered, located on the same level, etc.).
- The building owner or designer will establish the charging level, based on the operational needs of the building; this may include the installation of “Level 1” (e.g. 120v; 20amp) EVSE or a different type of EVSE.

Commentary:

3.1.21.1.(1) & 9.34.4.1.(1)

The 20% Requirement for Workplaces (cont'd):

- Role of the building inspector is to determine if EVSE is installed in at least 20 % of parking spaces in the Building.
- Role of the electrical safety inspector is to verify the electrical installation complies with the Electrical Safety Code.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(2) & 9.34.4.1.(2)

Future EV Charging in Workplaces:

Sentences 3.1.21.1.(2) and 9.34.4.1.(2):

Except for *houses* and apartment buildings, the remaining 80% parking spaces located in a building must be designed to permit future installation of *electric vehicle supply equipment* that conforms to Section 86 of the Electrical Safety Code.

Commentary:

3.1.21.1.(2) & 9.34.4.1.(2)

Future EV Charging in Workplaces (cont'd):

- Applies to buildings (other than apartment buildings or houses) with parking spaces in the building.
- Applies to the remaining 80% of parking spaces - i.e., those not covered by Sentence 3.1.21.1.(1) or 9.34.4.1.(1)
- This requirement relates to building elements that would facilitate future EV charging, but does not require additional electrical capacity to be in place at the time of construction.
- There are no prescriptive requirements for “rough-in”; for example, the Building Code does not mandate that specific panels, conduits and outlet boxes be installed.

Commentary:

3.1.21.1.(2) & 9.34.4.1.(2)

Future EV Charging in Workplaces (cont'd):

- Plans submitted as part of the Building Code permit application should consider issues such as:
 - Space for the installation of future transformers or electrical panelboards, and other equipment to ensure the proper functioning of future EVSEs; and
 - The routing of future conduits to minimize future structural/construction changes required, including:
 - The provision of sleeves to avoid the need to bore through concrete at a future point, and
 - Providing space between floors (or within a floor) to allow future wiring to be run between the electrical service and individual parking spaces (e.g. chases capped and labelled).
- The electrical permitting process addresses other electrical design issues (e.g., how many charging units are to be installed on a circuit) and any potential electrical or fire safety hazards arising from EVSE installation.
- Larger workplaces generally must be designed by an architect and/or professional engineers.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(3) & 9.34.4.1.(3)

Requirements for Houses:

Sentences 3.1.21.1.(3) and 9.34.4.1.(3):

Every *house* served by a garage, carport or driveway, shall be provided with:

- (a) a minimum 200 amp panelboard;
- (b) a conduit that is not less than 27 mm trade *size* and is equipped with a means to allow cables to be pulled into the conduit; and
- (c) a square 4-11/16 in. trade *size* electrical outlet box.

Commentary:

3.1.21.1.(3) & 9.34.4.1.(3)

Requirements for Houses (cont'd):

- Applies to EV charging in houses served by garages, carports or driveways.
- The requirements apply to each house (for example, where townhouse units each have their own driveway, each townhouse unit would need to meet the requirements).
- The intent of these requirements is to put in place the infrastructure to allow for the future installation of EVSE as defined in Section 86 of the Ontario Electrical Safety Code.
- The Building Code does not require a specific brand or type of EVSE. However, the provisions are intended to support Level 2 charging (see discussion below related to objectives, functional statements and alternative solutions).

Commentary:

3.1.21.1.(3) & 9.34.4.1.(3)

Requirements for Houses (cont'd):

- The conduit is intended to run from the vicinity of the panel to the outlet box.
 - This is the case regardless of whether the walls (e.g., in the basement or the garage) are finished or not.
 - The conduit should terminate reasonably close to the panel, to allow for easy connection.
- It is possible that a house may have two or more panels with a cumulative capacity of at least 200 amps (e.g., a separate panel in a garage):
 - This may be seen as being Building Code compliant provided that the panel associated with the conduit and electrical box has sufficient capacity to support Level 2 charging.
 - It is intended that a panel in a garage would still need a conduit from the panel to the outlet box.

Commentary:

3.1.21.1.(3) & 9.34.4.1.(3)

Requirements for Houses (cont'd):

- If the building permit applicant proposes a 200 amp panel **and**, instead of an empty conduit, chooses to provide an energized receptacle that delivers Level 2 charging (e.g. 240V; 40amp), that installation would exceed the minimum requirements in the Building Code.

Commentary:

3.1.21.1.(3) & 9.34.4.1.(3)

Requirements for Houses (cont'd):

- Role of the building official is to determine if a minimum 200 amp panelboard, minimum 27 mm conduit and 4-11/16” trade size electrical outlet box have been installed.
- Role of the electrical safety inspector is to verify that the electrical installation (i.e. the panelboard added at the time of construction) complies with the Ontario Electrical Safety Code.
- The electrical safety inspector would inspect the EVSE and any infrastructure supporting it when it is installed.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(4) & 9.34.4.1.(4)

Requirements for Houses (cont'd):

Sentences 3.1.21.1.(4) and 9.34.4.1.(4):

The square 4-11/16 in. trade size electrical outlet box shall be installed in the garage or carport or adjacent to the driveway.

Commentary:

3.1.21.1.(4) & 9.34.4.1.(4)

Requirements for Houses (cont'd):

- Only requires one outlet box per house for the future installation of EVSE.
- The outlet box is to be installed in the garage or carport or adjacent to the driveway serving the house.
- If a house has both a garage and a driveway, the outlet box can be installed either in the garage or adjacent to the driveway.
- The physical location of the outlet box in the garage or carport or adjacent to the driveway is not specified in the Building Code but would be determined by the designer, builder, or owner.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(5) & 9.34.4.1.(5)

Requirements for Houses (cont'd):

Sentences 3.1.21.1.(5) and 9.34.4.1.(5):

The electrical conduit and square electrical outlet box in Clauses 3(b) and (c) shall be provided with an effective barrier against the passage of gas and exhaust fumes.

Commentary:

3.1.21.1.(5) & 9.34.4.1.(5)

Requirements for Houses (cont'd):

- The outlet box is required to be sealed to prevent the passage of gas and exhaust fumes into the dwelling.
- No ventilation requirements for EV charging are being added to the Building Code:
 - This would be something considered by the electrical safety inspector at the time the EV equipment is installed.
 - The Ontario Electrical Safety Code does not require special venting for Level 2 charging.

Building Code Technical Amendments: Division B Sentences 3.1.21.1.(6) & 9.34.4.1.(6)

Requirements for Houses (cont'd):

Sentences 3.1.21.1.(6) and 9.34.4.1.(6):

A *house* need not comply with the EV charging requirements if it:

- a) is not connected to a distribution system, as defined in subsection 2 (1) of the *Electricity Act, 1998*, or
- b) is used or intended to be used as a seasonal recreational building described in Section 9.36.

Commentary:

3.1.21.1.(6) and 9.34.4.1.(6)

Requirements for Houses (cont'd):

Clarification of where the house requirements do **not** apply:

- Houses not served by their own garages, carports or driveways;
- Houses where parking spaces are not adjacent to the house, and the installation of future EVSE would not be enabled by electrical infrastructure in the house (e.g. row houses served by a separate parking garage or surface lot);
- Multi-unit residential buildings that do not fall under the definition of *house* in the Building Code;
- “Off-grid” houses; and
- Seasonal recreational buildings.

Commentary:

3.1.21.1.(6) and 9.34.4.1.(6)

Requirements for Houses (cont'd):

Application of EV charging house requirements to renovations:

- The provisions are intended to apply in new construction of a house; the application to renovation is governed by general Building Code principals in this regard.
- As a consequence, the EV requirements generally do not apply to a renovation of a house – although an exception may be situations where a major renovation is underway (e.g., the entire electrical system is being replaced).
- The EV requirements also would not apply where the only work proposed involves constructing or renovating a garage/carport or otherwise altering parking arrangements.

Commentary:

3.1.21.1.(6) and 9.34.4.1.(6)

Requirements for Houses (cont'd):

Seasonal dwellings exemption:

- EV charging requirements do not apply to seasonal recreational buildings.
- Determining whether a residential use is seasonal in nature is an issue for the application of the Building Code in a range of situations (e.g., application of energy efficiency requirements) and the same consideration may apply.
- Factors that might be considered by a principal authority include the declared use; whether the building is otherwise constructed in accordance with Div B, Section 9.36.; the building official's understanding of the intended use; and the zoning of a property (e.g., whether the zoning by-law allows seasonal use, or restricts residential use to seasonal dwellings).

Building Code Transition: Division B Sentence 3.1.21.1.(2.1) & 9.34.4.1.(2.1)

Electric Vehicle Charging -Transition

Sentences 3.1.21.1.(2.1) and 9.34.4.1.(2.1):

Parking spaces located in a *building* need not comply with Sentence (1) where,

- a) before January 1, 2018,
 - i. an agreement was entered into between the owner of the land on which the *building* is to be constructed and a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, that sets out the conditions for the connection of the *building* to a distribution system, as defined in subsection 2 (1) of that Act, or
 - ii. a plan for the land on which the *building* is to be constructed respecting the siting and sizing of lines, transformers or other equipment used for conveying electricity was approved by a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, and
- b) an application for a permit to *construct* the *building* was made before January 1, 2020.

Building Code Transition: Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Electric Vehicle Charging - Transition

Sentences 3.1.21.1.(7) and 9.34.4.1.(7):

A *house* need not comply with Sentence (3) where,

- a) before January 1, 2018,
 - i. an agreement was entered into between the owner of the land on which the *building* is to be constructed and a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, that sets out the conditions for the connection of the *building* to a distribution system, as defined in subsection 2 (1) of that Act, or
 - ii. a plan for the land on which the *building* is to be constructed respecting the siting and sizing of lines, transformers or other equipment used for conveying electricity was approved by a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, and
- b) an application for a permit to *construct* the *house* was made before January 1, 2020.

Commentary:

Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Transition Provisions

What is meant by an “agreement” or “approved plan”?

- A pre-construction agreement or approved plan may be a composite plan but could also take other forms, depending on a particular Local Distribution Company’s (LDC’s) policies and practices.
- The approved plan or pre-construction agreement or similar document from the LDC would establish that electrical servicing for the proposed new construction has been previously drafted and approved.
- The form of the approved plan or agreement in a particular circumstance is based on the operational policies of the LDC; building officials, designers and builders are advised to consult with the applicable LDC.

Commentary:

Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Transition Provisions (cont'd):

Application of transition provisions to infill development:

- Transition provisions are intended to apply if the infill development is being undertaken under an existing plan or agreement described in Sentences 3.1.21.1.(2.1) and 9.34.4.1.(2.1); this might be the case where:
 - A long-established plan or agreement that does not require replacement, amendment or modification for the infill development to proceed or;
 - A new plan or agreement covering the infill development was entered into prior to January 1, 2018.
- The transition provisions would **not** apply where a new plan or agreement is needed and was not entered into prior to January 1, 2018.

Commentary:

Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Transition Provisions (cont'd):

Infill scenario # 1 for discussion: Where one detached house on an existing street or in an existing subdivision is being replaced with a new detached house:

- The new house would likely be **exempt based on the previously approved utility plan** for the street or subdivision.
- A house in that location would have been contemplated in the previously approved utility plan for the street or subdivision. The existence of a previously approved utility plan may be inferred based on the presence of existing electrical infrastructure on the street.
- A new utility plan or approval may not be required for the replacement house.
- Such infill development will be exempt from the requirements in Sentence (3) if the **previous** utility plan or agreement was approved prior to Jan 1, 2018 and the building permit application is made before Jan 1, 2020.

Commentary:

Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Transition Provisions (cont'd):

Infill scenario # 2 for discussion: Where one house on an existing street or in an existing subdivision is being replaced by **more** than one house:

- The new houses might **not be exempt** based on the previously approved utility plan for the street or subdivision.
- New land use planning approvals will likely be required (i.e. consents, plan of subdivision, plan of condominium).
- The new houses in this case may not have been contemplated in the previously approved utility plan for the street or subdivision (which would have contemplated the one previous house on the lot).
- If it is a municipality's practice to circulate an application for intensification to the LDC (an application to create new lots), and the new lots trigger the reconsideration of siting and sizing of lines and other infrastructure for the new lots, then this might constitute a "new" utility plan rather than one that is already approved.
- Such infill development will only be exempt from the requirements in Sentence (3) if the **new** utility plan or agreement was approved prior to Jan 1, 2018 and the building permit application is made before Jan 1, 2020.

Commentary:

Division B Sentence 3.1.21.1.(7) & 9.34.4.1.(7)

Transition Provisions (cont'd):

Application of transition provisions to lots where 200 amp service is already planned or provided:

- If the utility plan or agreement was approved prior to Jan 1, 2018 and the building permit application is made before Jan 1, 2020, houses are exempt from **all** of the EV charging requirements whether they have 200 amp service or not.
- Note that some LDCs are in the process of reconsidering the assumptions they make about how much electricity a neighbourhood will use because of the new EV charging requirements in the Building Code.
- If the LDC changes its assumptions based on EV charging increasing demand at a certain time of day (at 6pm, if everyone on the street plugs in their EV, for example), then the electrical infrastructure needed to service that demand may need to be upgraded.
- Therefore, even though the house has 200 amp service provided to it, the LDC may not have assumed the impact, characteristic of EV charging, that the new potential load may have on the electrical infrastructure.

Alternative Solutions under the Building Code

- The Building Code is an objective-based document
- A Building permit applicant can propose:
 - A prescriptive or performance-based “acceptable solution” set out in Division B of the Code;
or
 - An alternative solution.
- For an alternative solution to be approved by a Chief Building Official under Division A Clause 1.2.1.1.(1)(b), the solution must achieve the same or better level of performance required by the acceptable solutions set out in Division B with respect to the relevant “objectives” and “functional statements”.
- The evaluation of alternative solutions is supported by Supplementary Standard SA-1 to the Building Code (Objectives and Functional Statements Attributed to the Acceptable Solutions).

Alternative Solutions: Updated Supplementary Standard SA-1

- As set out in SA-1, the requirements of sentences 3.1.21.1.(1) to (3) and 9.34.4.1.(1) to (3) are tied to the following objective and functional statements:

Objective:

- to limit the probability that, as a result of the design or construction of a building, the natural environment will be exposed to an unacceptable risk of degradation due to emissions of greenhouse gases into the air

Functional Statement:

- to limit excessive emissions of greenhouse gasses into the air

Alternative Solutions: EV Charging in Houses

- The new appendix notes related to EV charging in houses refer to the amended SA-1 in order to describe considerations for alternative solutions related to EV charging.
- The level of performance of the house for evaluating a potential alternative solution is intended to be the ability for a house to enable future EV charging to an equal or greater extent than the acceptable solution in Sentence 9.34.4.1.(3).
- Based on the required amperage of the panelboard and size of the conduit required by Sentence 9.34.4.1.(3), the intent of the requirements is to enable the future installation of “Level 2” EVSE.
 - “Level 2” charging uses 240 volts and can be expected to require 40 amps at the panelboard.

Alternative Solutions: EV Charging in Houses (cont'd)

- Depending on other anticipated electrical load demand, available **EVSE** and EV charging options available to occupants, it is possible that certain **houses** might reasonably be expected to achieve “Level 2” performance through a combination of measures other than those set out in Clauses 9.34.4.1.(3)(a) through to (c).
 - For example, a 200 amp panelboard may not be required in a particular house to support “Level 2” charging and other reasonably anticipated load demand (e.g. a smaller house without significant loading demands and/or where load sharing technology would limit peak loading).
 - The availability of electric panelboards with amperages greater than the standard 100 amp level, but less than 200 amps, increases the feasibility of such alternative solutions.

Alternative Solutions: EV Charging in Houses (cont'd)

- Building officials assessing applications for alternative solutions may wish to consider the following types of documents to demonstrate that a 240 volt/ 40 amp energized receptacle could be installed while meeting the house's anticipated electrical demand:
 - Electrical demand or loading calculations provided by a qualified person that conform to Section 9 of the Ontario Electrical Safety Code, or
 - An electrical design or plan that has been signed by a qualified person, and which includes information about electrical loading.
- “Qualified person” in this context could include a professional engineer.

Alternative Solutions: EV Charging in Houses (cont'd)

- In certain cases, a building permit applicant may propose that an energized receptacle capable of delivering a “Level 2” charge to an electric vehicle be installed at the time of construction rather than providing for the installation of infrastructure to enable future charging. This may be seen as meeting Sentence 9.34.4.1.(3) regardless of the amperage of the panelboard, or the presence of a conduit.
 - This would require electrical design demand or loading calculations that demonstrate that the house’s electrical system is capable of supporting Level 2 charging and other expected electrical loads.
- Installing an energized receptacle or electric vehicle supply equipment capable of delivering a “Level 1” charge would not be seen as achieving the level of performance required by Sentence 9.34.4.1.(3).

Available Resources

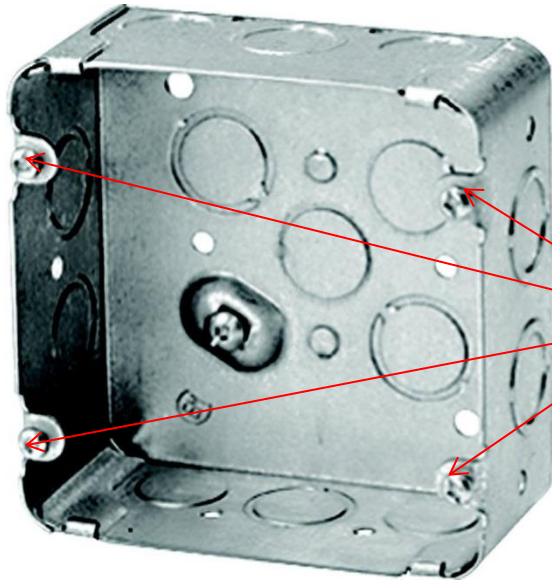
- CodeNews 260, issued on March 8, 2018 included:
 - Updated SA-1
 - Appendix Notes
 - Revised Questions and Answers documents from CodeNews 255, issued on December 20, 2017.

More Information

- www.ontario.ca/BuildingCode.
- Sign up for CodeNews.
- Follow us on Twitter.
- View the Building Code regulation on e-laws.
- Updated Building Code Compendium(for subscribers) and free download of the most recent amendment package, both from Publications Ontario.
- Contact the Building and Development Branch of MMA at codeinfo@ontario.ca or by dialling 416-585-6666 (TTY 1-866-220-2290 for the hearing impaired).

Questions?

Square 4-11/16 inch trade size electrical outlet box



This type of box is also typically used for stove and dryer outlets.

Look for 4 screws