



POLICY REPORT  
DEVELOPMENT AND BUILDING

Report Date: October 2, 2017  
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Meeting Date: November 1, 2017

TO: Standing Committee on Policy and Strategic Priorities

FROM: General Manager, Planning, Urban Design and Sustainability, in consultation with the General Manager, Development, Buildings and Licensing

SUBJECT: Removing Regulatory Barriers to Passive House Buildings

**RECOMMENDATION**

- A. THAT the General Manager of Planning, Urban Design and Sustainability be instructed to make application to amend the Zoning and Development By-law to allow for relaxations to floor area, height, rear yard, and building depth requirements for buildings that meet the Passive House standard and achieve certification, as set out in Appendix A, and that the application be referred to Public Hearing;

FURTHER THAT the Director of Legal Services be instructed to prepare the necessary amendments to the by-law, generally in accordance with Appendix A, for consideration at Public Hearing.

- B. THAT Vancouver's Building By-law be amended to alter requirements for solar shades, to take effect March 1, 2018;

FURTHER THAT the Director of Legal Services be instructed to bring forward, at the time of enactment of the amendments to the Zoning and Development By-law, the amendment to Vancouver's Building By-law, generally in accordance with Appendix B.

- C. THAT the Encroachment By-law be amended to alter requirements for solar shades, generally in accordance with Appendix C, to take effect March 1, 2018;

FURTHER THAT the Director of Legal Services be instructed to bring forward, at the time of enactment of the amendments to the Zoning and Development By-law, the amendment to the Encroachment By-law, generally in accordance with Appendix C.

- D. THAT, subject to approval of the amendments to the Zoning and Development By-law in Recommendation A above, the General Manager of Planning, Urban Design and Sustainability be instructed to bring forward for Council's adoption, at the time of enactment of the by-law amendments, the "Passive House - Guidelines for Larger Projects" generally as set out in Appendix D, and the "Passive House - Guidelines for Residences in RS Districts", generally as set out in Appendix E.

### **REPORT SUMMARY**

Passive House construction provides more comfort, better air quality, lower greenhouse gases and lower operating costs than typical buildings. These features support multiple City of Vancouver priorities. However, there are regulatory barriers to Passive House construction that can discourage builders and developers from pursuing it.

The purpose of this report is to recommend amendments to the Zoning and Development By-law (the "Zoning By-law"), the Building By-law (the "BBL"), and Encroachment By-law that will help remove regulatory barriers to the construction of buildings that meet the Passive House standard.

This report proposes new amendments to allow conditional floor area, height, setback, yard and building depth relaxations in order to support applications that meet the Passive House standard and achieve Certification by allowing more flexibility in our regulations. These amendments follow on those approved in September 2015 for use in the RS-1 district.

This report also proposes amendments intended to make the process of providing solar shading easier for applicants by removing the requirement to obtain a legal encroachment agreement in cases where solar shades protrude over City property.

### **COUNCIL AUTHORITY/PREVIOUS DECISIONS**

November 2008: as part of the EcoDensity initiative, Council passed a resolution to remove specified barriers to new green building construction.

May 2009: Council endorsed the Passive Design Toolkit and the Passive Design Toolkit for Homes as official City of Vancouver publications, and directed staff to report back on ways to integrate this work in the City's regulatory framework.

January 2011: Council adopted the revised *Greenest City 2020* targets, which included the following target related to green buildings: all buildings constructed from 2020 onward will be carbon neutral in operations.

May 2011: Council approved amendments to the Zoning By-law to facilitate the removal of barriers to green building approaches.

March 2015: Council approved updated wall thickness exclusions for all building types to accommodate the extra thickness of additional insulation for buildings that voluntarily exceed the energy efficiency requirements of the BBL.

September 2015: Council approved Zoning By-law amendments to conditionally allow height, rear yard, and building depth relaxations for Passive House projects in RS-1 zones.

July 2016: Council approved the Zero Emission Building Plan, which laid out four action strategies that aim to ensure new buildings in Vancouver will have no operational greenhouse gas emissions by 2030. The fourth of these strategies focuses on capacity building and the removal of regulatory barriers to zero emissions building approaches such as Passive House.

### ***CITY MANAGER'S/GENERAL MANAGER'S COMMENTS***

Reducing red-tape and regulatory obstacles is key to supporting private sector leaders who are voluntarily pursuing near zero emission buildings in advance of City policy or by-law requirements. The City Manager supports the recommendations in this Report.

### ***REPORT***

#### ***Background/Context***

In 2015, Council approved amendments that allowed conditional height, rear yard and building depth relaxations for single-family homes in the RS-1 zone that met the Passive House standard and achieved Certification, effectively removing regulatory barriers to Passive House in the majority of single family home developments in the city.

Since that time staff have identified opportunities to more broadly remove barriers and facilitate the construction of near zero emission buildings that are designed to meet the Passive House standards, not only in the RS-1 zone but in detached housing, multi-family, and commercial building zones throughout Vancouver.

A Passive House building is an ultra-low energy building that meets the Passive House standard and achieves Certification (as verified by a Passive House Building Certifier). In essence, Passive House buildings use more insulation in walls, windows, doors and roofs to achieve cost effective structures that generally require 85% less heating energy and 60% less overall energy than typical buildings in Vancouver (those built to meet the requirements of Vancouver's 2014 BBL).

This level of performance for new buildings is not a requirement and is typically done voluntarily by leading developers and builders. The City wishes to support these private sector leaders who help to advance our Greenest City and Healthy City goals by removing barriers that currently make Passive House construction unnecessarily challenging.

## *Strategic Analysis*

Staff consulted a group of designers and builders who have local Passive House experience in order to gain understanding of current regulatory barriers. The proposed changes recommended in this report were developed in order to address the most significant remaining barriers in the identified By-laws.

The following section is organized into a review of each identified barrier followed by discussion of the proposed solution. In some cases the solution requires an amendment, while in others it can be addressed by flexibility in existing regulation.

### Height, Rear Yard and Building Depth Relaxations

The “super-insulation” required in Passive House means thicker assemblies at the walls, ceilings and floors. Maintaining a continuous, uninterrupted layer of insulation is important. When the building design includes overhangs, step-backs, or other envelope protrusions, additional insulation is needed not only at the uppermost roof and lowest floor, but at every panel of roof, wall, and floor created by corrugations in the building envelope. These assemblies can be many inches thicker than conventional assemblies, thus necessitating extra building space.

Buildings that incorporate more insulation than is required under the BBL are currently able to apply for a conditional floor area exclusion under Section 10.33 of the Zoning By-law. This exclusion ensures that industry leaders who voluntarily improve energy efficiency beyond what is mandated by the BBL do not lose floor space as a result of their leadership. For a building with only modest amounts of additional insulation, this excluded floor area can typically be accommodated within existing height, yard and building depth regulations so that usable floor space is not lost. Given the extraordinary amount of additional insulation required in a Passive House building, however, accommodating the excluded area within height, yard and building depth regulations can be challenging.

In order to address the need for extra building height, staff have proposed amending Section 10 of the Zoning By-law to allow the Director of Planning to conditionally permit a height increase to a maximum of 1.25 meters (4.1 feet) for a building that meets the Passive House standard and achieves Certification in all districts except for single-family homes and laneway houses. For single-family homes, an amendment is proposed to each RS district schedule, which would allow a conditional height increase to a maximum of .5 m (19.7 inches) for a house that meets the Passive House standard and achieves Certification. Laneway houses carry additional complexities that have not been resolved, and therefore staff do not recommend height increases for this form at this time.

In order to address the need for flexibility in yard and building depth requirements, staff propose allowing for a decrease in rear yard requirements and increase in building depth for houses that meet the Passive House standard and achieve Certification in relevant RS districts, with similar provisions in other zones.

Please refer to Appendix A for detailed information on height, rear yard, building depth, and area exemptions and the specific zones to which each change applies.

It should be noted that there are no proposed changes to the wall thickness exclusion in this report. Council has directed staff to bring forward recommendations to ensure that recent updates to the minimum insulation requirements for detached homes (2014 BBL) and for low-rise multi-family buildings (BBL amendments approved in March 2017 that take effect in March 2018) do not impact occupiable floor area. In order to meet this Council directive and at the same time ensure the process to administer wall thickness exclusions does not require additional processing time, staff will be recommending an amendment to Section 10.33 that is proposed for Council on the same day as this report.

#### Floor Space Exclusion for HRVs

This report also proposes a modest floor area exclusion for heat recovery ventilators (HRV) in Passive House buildings. Industry advised that the ability to recapture any floor area lost to HRV installation would be important. Amending regulations accordingly to allow flexibility and ensure that indoor habitable space remains similar to conventional buildings effectively would help encourage Passive House projects.

Staff propose an amendment to Section 10 of the Zoning By-law to allow the Director of Planning to conditionally exclude any increase in the floor area occupied by the larger, higher performing heat recovery ventilators and connected shafts in buildings that meet the Passive House standard and achieve Certification, to a maximum exclusion of 2% of permitted floor area.

Please refer to Appendix A for the proposed amendments to floor area exclusions.

#### Simplified Process for Solar Shading

One of the benefits of the Passive House standard is that unlike other energy standards, it requires that potential overheating is minimized. The use of solar shading devices can be an important way for buildings to avoid unwanted solar heat gain without needing to rely upon energy intensive mechanical solutions such as air conditioning. Registered encroachment agreements are currently required for any solar shades that extend past the property line over City streets. The current process for securing encroachment agreements adds complexity to the development permit process and cost to the developer and may discourage the incorporation of shading devices in building designs.

Staff from Sustainability, Engineering, and the City Surveyor's office have developed a simplified process to address this by revising the Encroachment By-law to remove the requirement for a registered encroachment agreement in straightforward uses of solar shades. Staff have also proposed an amendment to the Building By-law to ensure clarity on solar shades requirements. This new approach is modeled on how canopies are currently treated. Approval of solar shades from an urban design perspective will still be required as per current processes. It should be noted that this simplified process will benefit all applications for solar shading, not just those that meet the Passive House standard.

Please refer to Appendix C for detailed changes to the Encroachment by-law intended to simplify the installation of solar shading devices and refer to Appendix B for

detailed changes to the Building By-law that provide clarity on solar shade requirements.

Applicants are advised via the Guidelines in Appendix D and E that building encroachments onto City streets may inhibit subdivision by strata plan due to Section 244(1)(f) of the *Strata Property Act*.

#### Flexibility in Horizontal Angle of Daylight Requirements

Access to adequate daylight, external views, and ventilation are basic requirements in Vancouver's zoning regulations for habitable rooms in residential developments. In many districts these requirements are addressed by regulations that refer to the horizontal angle of daylight available to the window of a room.

Passive House professionals noted a potential issue that could make it difficult to achieve the horizontal angle of daylight regulation in zoning. To avoid creating thermal bridges in Passive House buildings, placement of windows within a wall depth-wise is very carefully considered. The combination of optimal thermal placement of the window combined with increased wall thickness could cause difficulty if the windows are so far back in the exterior wall that the wall itself gets in the way of the angles, especially if the design includes very narrow windows located close to an obstruction. In these cases, applicants may seek Director of Planning approval to decrease the angle of daylight requirement through the existing provision to relax the requirement found in Section 4.10.4 of most relevant zones such as the RM and C district schedules.

#### Guidelines

Staff have developed two draft documents: "Passive House - Guidelines for Larger Projects" and "Passive House - Guidelines for Residences in RS Districts", to provide information on the relaxations and to guide staff and applicants on the associated requirements and submission process. Staff are seeking Council adoption of these Guidelines, subject to enactment of the proposed amendments. The proposed draft Guidelines are attached in Appendices D and E.

These proposed by-law amendments, in conjunction with the associated guidelines, are intended to remove regulatory barriers and facilitate projects in all building types that meet the Passive House standard and achieve Certification. Ultimately these changes will support innovators and leaders, facilitate the construction of Passive House buildings, and foster overall industry capacity.

#### ***Implications/Related Issues/Risk (if applicable)***

##### ***Financial***

There are no financial implications.

##### ***Human Resources/Labour Relations***

There are no HR implications.

### *Environmental*

Removing regulatory barriers to zero emissions buildings is required to support industry leaders who are voluntarily pursuing higher than required levels of energy efficiency performance. This leadership is essential in developing industry capacity to meet the objectives of the Zero Emissions Building Plan.

### *Legal*

This report proposes amending the Zoning By-law, Vancouver's Building By-law, and the Encroachment By-law.

### **CONCLUSION**

Approving the recommendations in this report will build upon past efforts to remove barriers to the construction of highly efficient buildings and support private sector leaders who are voluntarily developing near-zero emission buildings in advance of City policy or by-law requirements. As the City of Vancouver continues to support zero emission design and better integrates these techniques into our regulations, the design and building communities - and homeowners - will be better able to respond and apply these measures more readily. All parties will be better positioned to increase the efficiency of new construction, and ultimately, will help move Vancouver closer to our Zero Emission Building Plan targets and toward being a truly renewable city.

\* \* \* \* \*

BY-LAW NO. \_\_\_\_\_

A By-law to amend  
Zoning and Development By-law No. 3575  
regarding relaxations for Passive House

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends or adds to the indicated provisions of the Zoning and Development By-law.

2. In section 2, Council strikes out the definitions of "Certified Passive House" "Passive House Certifier" and adds, in alphabetical order:

"**Passive House** means a building that has been designed to meet the Passive House standard and achieve certification by the Passive House Institute of Darmstadt, Germany, as verified by a Passive House Certifier."

"**Passive House Building Certifier** means a person internationally accredited by the Passive House Institute in Darmstadt, Germany for the purposes of certifying buildings as being designed in accordance with its Passive House standards."

3. In section 10.7, Council adds, in correct numerical order:

"**10.7.3 Setbacks for Passive House**

Notwithstanding any other provisions in this By-law, the Director of Planning may relax the yard, setback or building depth requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant;  
and
- (e) the relaxation does not exceed 1.25 m,

except that this relaxation shall not apply to district schedules with yard relaxation provisions for Passive House."

4. In section 10.10, Council adds, in correct numerical order:

"**10.10.4 Height for Passive House**



Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement or the definition of partial storey to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the height relaxation does not exceed 1.25 m,

except that this relaxation shall not apply to laneway houses or dwelling uses in an RS zoning district."

5. In Section 10, at the end, Council adds:

**"10.41 Floor Area Exclusion for Heat Recovery Ventilation in a Passive House**

The Director of Planning may exclude the area occupied by heat recovery ventilators and connected shafts in a Passive House, to a maximum exclusion of two percent of permitted floor area."

6. In the RS-1 District Schedule, Council strikes out section 4.3.6, and substitutes:

"4.3.6 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses."

7. In the RS-1A District Schedule, Council adds, in correct numerical order:

"4.3.2 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;

- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”

8. In the RS-1B District Schedule, Council adds, in correct numerical order:

“4.3.6 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”

9. In the RS-2 District Schedule, Council adds, in correct numerical order:

“4.3.2 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”

10. In the RS-3 and RS-3A District Schedule, Council adds:

(a) in section 4.3, in correct numerical order:

“4.3.4 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;

- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”; and

- (b) in section 4.16, in correct numerical order:

“4.16.6 Notwithstanding section 4.16.2 of this schedule, the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a Passive House to a maximum of 45 percent of the depth of the site, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development; and
- (d) the submission of any advisory group, property owner or tenant.”

- 11. In the RS-4 District Schedule, Council adds, in correct numerical order:

“4.3.2 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”

- 12. In the RS-5 District Schedule, Council adds:

- (a) in section 4.3, in correct numerical order:

“4.3.6 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;

- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”; and

- (b) in section 4.16, in correct numerical order:

“4.16.4 Notwithstanding section 4.16.2 of this schedule, the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a Passive House to a maximum of 45 percent of the depth of the site, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development; and
- (d) the submission of any advisory group, property owner or tenant.”

- 13. In the RS-6 District Schedule, Council adds:

- (a) to section 4.3, in correct numerical order:

“4.3.7 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses.”; and

- (b) to section 4.6, in correct numerical order:

“4.6.7 Notwithstanding any other provisions in this By-law, the Director of Planning may decrease the rear yard requirement to accommodate building features designed to reduce energy consumption in a Passive House to a minimum of 35 percent of the depth of the site, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development; and
- (d) the submission of any advisory group, property owner or tenant."

(c) to section 4.16, in correct numerical order:

"4.16.8 Notwithstanding any other section of this schedule, the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a Passive House by 5 percent, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development; and
- (d) the submission of any advisory group, property owner or tenant."

14. In the RS-7 District Schedule, Council adds:

(a) to section 4.3, in correct numerical order:

"4.3.2 Notwithstanding any other provisions in this By-law, the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a Passive House, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development;
- (d) the submission of any advisory group, property owner or tenant; and
- (e) the relaxation does not exceed .5 m,

except that this relaxation shall not apply to laneway houses." ; and

(b) to section 4.16, in correct numerical order:

"4.16.4 Notwithstanding section 4.16.2 of this schedule, the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy

consumption in a Passive House to a maximum of 45 percent of the depth of the site, if the Director of Planning first considers:

- (a) the intent of the relevant schedule;
- (b) all applicable Council policies and guidelines;
- (c) the relationship of the development to nearby residential development; and
- (d) the submission of any advisory group, property owner or tenant."

15. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of the By-law.

16. This By-law is to come into force and take effect on the date of its enactment.

ENACTED by Council this \_\_\_\_\_ day of \_\_\_\_\_, 2017

\_\_\_\_\_  
Mayor

\_\_\_\_\_  
City Clerk

BY-LAW NO. \_\_\_\_\_

**A By-law to amend Building By-law No. 10908  
Regarding definition of and requirements for ornamental projections,  
requirements for canopies, and definition of and  
requirements for solar shading device**

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This by-law amends the indicated provisions of Building By-law 10908.
2. In Book I, Division C, Part 1, and Book II, Division C, Part 1, Council:
  - (a) after Clause 1.8.6.1(1)(b) adds "and";
  - (b) at the end of Clause 1.8.6.1(1)(c), strikes out ",and" and substitutes ".";
  - (c) strikes out Clause 1.8.6.1.(1)(d); and
  - (d) strikes out Sentences 1.8.6.3.(1) and (2) and substitutes:
    - "1) For the purposes of this Article 1.8.6.3., the height of an ornamental projection shall be determined by vertical measurement from the lowest point of the encroachment to the *street* level immediately below.
    - 2) Subject to the provisions of Sentence 1.8.6.3.(3), an ornamental projection may encroach into a *street* which is at least 10 m wide, no more than:
      - a) 75mm for a projection located below 2.75m above the *street*,
      - b) 500mm for a projection located between 2.75m and 5.2m above the *street*,
      - c) 915mm for a projection located between 5.2m and 7.62m above the *street*,
      - and
      - d) 1370mm for a projection located more than 7.62m above the *street*.
    - 3) The provisions of Sentence 1.8.6.3.(2) do not apply to an existing encroaching ornamental projection which is designated by by-law as protected heritage property or is the subject of a heritage revitalization agreement.
    - 4) An ornamental projection may encroach in a *street* which is less than 10 m wide, if
      - a) it is located no less than 7.62 m above the *street*,
      - b) it does not encroach more than 915 mm beyond the property line, and
      - c) it does not interfere with overhead public utilities."

- (e) strikes out Sentence 1.8.8.1.(1) and substitutes:

"1) In this Subsection, a canopy means a structure encroaching in a *street*, that provides pedestrian weather protection and has a covering of glass, metal or other rigid material on a fixed detachable rigid frame that is attached to and entirely supported by a *building*."

- (f) strikes out Sentence 1.8.8.3.(2) and substitutes:

"2) The horizontal distance from the outer edge of a canopy to the outer face of the *street* curb shall be no less than 750 mm";

- (g) after Sentence 1.8.8.3.(4), adds:

"5) A canopy shall be no less than 600 mm from a utility pole or lamp standard."

- (h) after Article 1.8.8.6., adds:

**"1.8.8.7. Structural Design of Canopies**

- 1) A canopy shall be designed to
  - a) support the expected loads due to weather, and
  - b) withstand seismic design loads."

- (i) renumbers Subsections 1.8.9. and 1.8.10. as 1.8.10 and 1.8.11. respectively; and

- (j) after Subsection 1.8.8., adds:

**"1.8.9. SOLAR SHADING DEVICE**

**1.8.9.1. Solar Shading Device Defined**

1) In this Subsection, a solar shading device means a structure encroaching in a *street*, that prevents solar heat gain through windows and has a fixed detachable rigid frame that is attached to and entirely supported by a *building*.

**1.8.9.2. Requirements for Materials**

- 1) A solar shading device shall be
  - a) constructed of *noncombustible* materials, except as provided in Sentence (2) and Clause (3)(c),
  - b) supported entirely by the *building* to which the solar shading device is attached, and
  - c) constructed so that its removal conforms to Sentence 1.8.3.3.(1).



2) Despite Clause (1)(a), if the *building* or the exterior wall to which the solar shading device is attached is of *combustible construction*, a solar shading device may be constructed of *combustible* materials.

3) The solar shading device shall

a) if constructed of glass, use wired or laminated safety glass,  
b) if constructed of metal, shall be no less than 0.56 mm in thickness, or  
c) if constructed of wood plank, shall be no less than 60 mm in thickness, sheathed on the top and the soffit with metal or other noncombustible material, and constructed and fire stopped to the satisfaction of the Chief Building Official.

4) Solar shading devices shall be of *noncombustible* construction where installed on an exposing wall face required to be *noncombustible* in accordance with Division B, Subsection 3.2.3.7.

#### 1.8.9.3. Clearances

1) The horizontal distance from the outer edge of a solar shading device to the outer face of the *street* curb shall be no less than 750 mm.

2) For the purposes of this Article 1.8.9.3., the height of a solar shading device shall be determined by vertical measurement from the lowest point of the encroachment to the *street* level immediately below.

3) The maximum projection of a solar shading device into a *street* which is at least 10 m wide, shall be

a) 500mm for a solar shading device located between 2.75 and 5.2m above the *street*,  
b) 915mm for a solar shading device located between 5.2m and 7.62m above the street, and  
c) 1370mm for a solar shading device located more than 7.62m above the street except that a solar shading device must also conform to the requirements of Sentence 1.8.9.3.(1).

4) A solar shading device may encroach in a *street* which is less than 10 m wide, if

a) it is located no less than 7.62 m above the *street*,  
b) it does not encroach more than 915 mm beyond the property line, and  
c) it does not interfere with overhead public utilities.

5) A solar shading device shall be no less than 600 mm from an adjoining property line or from the production of the property line into the *street*, unless the solar shading device is constructed entirely of *noncombustible* materials.

6) Despite the provisions of Sentence (5), if a property line is adjacent to a *lane*, a solar shading device shall be located no less than 600 mm from the production of the property line into the *street*.

**1.8.9.4. Solar Shading Device Not to Span Unprotected Openings**

1) A solar shading device shall not span unprotected openings in separate fire compartments.

**1.8.9.5. Structural Design of Solar Shading Device**

- 1) A solar shading device shall be designed to
- a) support the expected loads due to weather,
  - b) withstand seismic design loads, and
  - c) shed snow and ice in a manner that minimizes risk to persons and property below."

3. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.

4. This By-law is to come into force and take effect on March 1, 2018.

ENACTED by Council this \_\_\_\_\_ day of \_\_\_\_\_, 2018

\_\_\_\_\_  
Mayor

\_\_\_\_\_  
City Clerk

BY-LAW NO. \_\_\_\_\_

A By-law to amend Encroachment By-law No. 4243  
regarding canopies and solar shades

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of By-law No. 4243.
2. In section 2, Council adds in alphabetical order:
  - “canopy” means canopy as defined in the Building By-law;”
  - “solar shading device” means solar shading device as defined in the Building By-law;”
3. In section 2A, council strikes out “which” and substitutes “to the extent that it”.
4. In section 3, at the end, Council adds:
  - “(4) Instead of the agreement specified in Section 5, the Engineer may grant permission for the placement of a canopy or solar shading device that projects into a street, if the Engineer is satisfied that the canopy or solar shading device complies with all applicable city by-laws.”
5. In section 9, Council strikes out “In the event of:” and substitutes “Subject to the provisions of section 9A, in the event of:”.
6. After section 9, Council adds:
  - “9A. Despite the provisions of section 9, the Engineer may revoke the permission granted under section 3 and require the immediate removal of an encroachment if, in the opinion of the Engineer, the encroachment or the placement, use, repair, maintenance or operation of the encroachment:
    - (a) obstructs or interferes with construction activity, street improvements, street work, or repair and maintenance related to transit or utilities; or
    - (b) interferes with or obstructs access to the street for any other municipal purpose.”
7. In the Fee Schedule, in section D, in alphabetical order, Council adds “solar shading devices”.
8. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.



# DRAFT

## Passive House – Guidelines for Larger Projects

Adopted by City Council on **Month Date, 2017**

### 1 Application and Intent

These guidelines are intended to explain the regulations and process related to Passive House developments. In particular, they should be used by applicants seeking relaxations within the Zoning and Development By-law for projects that meet the Passive House standard and achieve Certification. These guidelines apply to all uses and zones, except dwelling uses in the RS District Schedules (including laneway houses). For single-family homes, see the “Passive House - Guidelines for Residences in RS Districts” document. For more information on passive design, applicants may refer to the City of Vancouver’s two Passive Design Toolkits.

Applicants must demonstrate how the building envelope and mechanical system have been designed to meet the Passive House standard before seeking related relaxations, and adhere to the process and requirements in this document. **Buildings must meet the definition of a Passive House in the Zoning and Development By-law.**

These Guidelines are to be used in conjunction with the relevant District Schedule of the Zoning and Development By-law or Official Development Plan, as well as other applicable guidelines and bulletins. As this document addresses zoning considerations only, applicants are encouraged to obtain early advice on meeting the requirements of Vancouver’s By-law (BBL) from a Registered Professional.

### 2 Policy Context

Removing barriers to Passive House is important in Vancouver, and part of the City’s emerging policy context. The Zero Emissions Building Plan, a key component of Vancouver’s Renewable City Strategy, prioritizes removing regulatory barriers to the development of zero emission buildings such as those that meet the Passive House standard.

### 3 Passive House: Standard and Requirements

Passive House is a well-established ultra-low energy building performance standard and certification process. There are over 40,000 Passive House buildings built in a wide range of climates and typologies. Passive design is based on the principle that a high quality envelope can reduce most costs associated with heating and cooling. With thoughtful design, better energy efficiency can be achieved and costly heating and air conditioning systems are eliminated without sacrificing thermal comfort. Certifying a building built to the Passive House standard is a rigorous quality assurance process that determines whether a building meets all of the requirements of the Passive House standard, and confirms that the building has been designed to achieve high levels of occupant comfort with very low energy consumption.

### Criteria for Passive House Certification (summarized)

- Space Heat Demand: Maximum 15 kWh/m<sup>2</sup>a OR Heating load max. 10 W/m<sup>2</sup>
  - The building must be designed to have an annual heating and cooling demand as calculated with the Passive House Planning Package (PHPP) of not more than 15 kWh/m<sup>2</sup> per year in heating and 15 kWh/m<sup>2</sup> per year cooling energy OR to be designed with a peak heat load of 10W/m<sup>2</sup>.
- Pressurization Test Result: Maximum 0.6 ACH @ 50 Pa
  - The Passive House Standard demands a minimum tested airtightness level of 0.6 air changes per hour (ACH) @ 50 Pa (pascals), both for under pressure and overpressure during a blower door test. Must be conducted by a licensed technician.
- Total Primary Energy Demand: Maximum 120 kWh/m<sup>2</sup>a
  - The total energy to be used for all domestic applications (heating, hot water and domestic electricity) must not exceed 120 kWh per square meter of treated floor area per year.

All heating and cooling calculations are based on the net usable floor area of the building. If cooling (air conditioning) is required, the annual cooling energy demand must also not exceed 15 kWh/m<sup>2</sup>. For a description of the full criteria for certification or for more information, please see Passive House Canada's web site at: <http://www.passivehousecanada.com> and consult with a Certified Passive House Designer or Consultant.

## 4 Relaxation of Regulations– Discretionary Allowances

### 4.1 Floor Area and Height Relaxations

Achieving a low-energy, high-efficiency building through high quality thermal envelope design and better insulation will result in thicker walls and ceilings than a typical building.

Conditional height relaxations may be allowed to accommodate the additional thermal insulation required to achieve the Passive House standard. Floor area exclusions may be allowed to conditionally exclude the area occupied by heat recovery ventilators and connected shafts in a Passive House project. Applicants may apply for these relaxations provided that they demonstrate that they will achieve Passive House Certification. These relaxations may be granted at the discretion of the Director of Planning upon consideration of all applicable guidelines and policies.

The design of the development related to the relaxation should also address the development's urban design performance in its wider context. In particular, applicants must consider livability and impacts on neighbouring properties on such issues as privacy, massing, and shadowing in their application.

#### 4.1.1 Floor Area Exclusions

Section 10.33 of the Zoning By-law permits a floor area exclusion to accommodate the additional thickness of walls for thermal insulation beyond Building By-law requirements, by excluding some of the floor area used for insulation. The exclusion is intended to reduce the disincentive of "losing" floor area. For more information, please

see the Planning Administrative Bulletin titled: “Floor Space Exclusion to Accommodate Improved Building Performance (Envelope and Thermal Insulation)”.

As well, Section 10.41 permits a floor area exclusion for the area occupied by heat recovery ventilators and connected shafts, in a project that meets the Passive House standard and achieves Certification, to a maximum exclusion of 1% of permitted floor area. A heat recovery ventilator (HRV) is a mechanical device that exchanges stale indoor air with fresh outdoor air while recovering heat at the same time using a heat exchanger.

In order to achieve the exclusion, an HRV that is a Passive House “Certified Component” should be utilized, as these HRV’s have a high degree of filtration; are more energy efficient in operation; have automatic balancing; are relatively air tight; have an effective heat recovery of 75% or greater; and provide thermal comfort to -10 degrees.

#### *4.1.2 Relaxation of Height*

The extra insulation required in Passive House means thicker assemblies, not only at the walls, but also at ceilings and floors. When the building design includes overhangs, step-backs, or other envelope protrusions, it becomes necessary to insulate not only the uppermost ceiling and lowermost floor, but also each panel of ceiling and floor created by these corrugations in the building envelope. These assemblies are usually thicker than conventional assemblies, leading to extra building height.

Applicants building a Passive House project may apply for a relaxation of height via Section 10.10.4 in the Zoning and Development By-Law. The Director of Planning may permit a height increase to accommodate building features designed to reduce energy consumption in a building that meets the Passive House standard and achieves Certification, to a maximum of 1.25 meters (4 feet), if he or she first considers: the intent of the relevant schedule and all applicable Council policies and guidelines; the relationship of the development with nearby residential areas; and the submission of any advisory group, property owner, or tenant. The Director of Planning may also consider negligible intrusions into angled height envelopes, bearing in mind the intent of the regulations to preserve light and privacy, and to mitigate shadowing.

## **4.2 Simplified Process for Solar Shading Devices**

(The process identified below applies to all applications, not just Passive House projects).

The use of solar shading devices can be a key way for buildings to avoid unwanted solar heat gain. Solar shading devices are expected to be located and designed to provide a significant decrease in solar heat gain and they are included in the normal development permit review of applicable policies and guidelines.

Solar shading devices are currently permitted to project into a required yard within a private property site, per the revised Section 10.7.1 of the Zoning and Development By-law. Applicants and staff can refer to the “Shading Devices and Yard Projections” bulletin for more information on shades located in yards.

There is no requirement for solar shading devices projecting into side yards to be demountable, but applicants should consider if being demountable is necessary for building maintenance or

window cleaning access. Applicants should use thermal breaks for best building practice. A thermal break is an element of low thermal conductivity placed in an assembly to reduce or prevent the flow of thermal energy between conductive materials.

Vancouver's Building By-law has also been amended to provide clarity on how solar shading devices can meet building code requirements, in Division C, Part 1, Section 1.8.9

In some cases, the optimal dimensions of a solar shade extend beyond the private property site. Solar shading devices proposed over City streets previously required a registered encroachment agreement. Revisions to the process to further support the use of effective shading devices in building designs now allow staff to issue a "Permit to Use City Property" instead of securing an encroachment agreement.

Applicants are advised that building encroachments onto City street may inhibit subdivision by strata plan due to Section 244(1)(f) of the Strata Property Act. The City of Vancouver may not support the provision of easements for any parts of the building on City Street.

#### *4.2.1 Simplified Process for Solar Shading Device Encroachments over City Property*

- A) If solar shading devices are to be considered, staff will require notation on drawings from the Registered Professional of record that the design complies with appropriate requirements of the Building By-law.
- B) Staff will review designs to ensure solar shading devices have appropriate clearances and are demountable. Applicants must supply (make separate application to Engineering Services) and receive approval within the DP process by submitting the following:
  - Completed "Permit to Use City Property" application form.
  - Supporting documents, including drawings of the proposed solar shading devices that clearly show dimensions of the shades, property lines, clearances, adjacent curb alignment and street poles, as well as method of demountability.
- C) Generally, solar shading device encroachments into City street can be accepted under a Permit to Use City Property if they are in compliance with the Building By-Law. In some instances, at the discretion of the General Manager of Engineering Services, a registered Easement and Indemnity Agreement prepared in accordance with the Encroachment By-law will be required.

#### **4.3 Flexibility re Horizontal Angle of Daylight Requirements**

For most Passive House applications, there should be no significant change in applicants' ability to meet the horizontal angle of daylight regulations. In cases where the basic angle cannot be met due to a Passive House design, such as very narrow windows in a thick wall that is located close to an obstruction, applicants may seek Director of Planning approval to reduce the angle of daylight requirement using the available relaxation clause. Daylight regulations are typically found in Section 4.10.4 of District Schedules.

#### **4.4 Other Relaxations**

The following table provides a general reference for conditional allowances that are available for Passive House larger projects and related green building features.



For more information, applicants may consult the relevant regulation (e.g. the District Schedule), related Administration Bulletins (e.g. “Passive Design: Natural Ventilation and Light”), and other applicable guidelines or policies. These documents can be found at [www.vancouver.ca](http://www.vancouver.ca)

<b>Conditional Allowance for Passive House and Green Building Features</b>	<b>Zoning By-law Section</b>
Allow increase in floor area for HRV’s and connected shafts	Section 10.41
Allow increase in building height	Section 10.10.4
Allow floor area exclusion for increased insulation	Section 10.33
Allow green walls to project into required yard	Section 10.7.1
Allow floor area exclusion for venting skylights, opening clerestory windows or other similar features	RT, RM, C-3A and I-C3: 4.7.2 or 4.7.3 or 4.7.4
Allow increase in building height for venting skylights, opening clerestory windows or other similar features	Section 10.11.1
Relax building height regulations for roof-mounted energy technologies and to provide access to green roofs	Section 10.11.1
Relax side yard and overhang requirements for fixed external shading devices	Section 10.7.1

The table below highlights standards for Passive House /energy efficiency in Vancouver’s Building By-law.

<b>Building Components</b>	<b>Requirement</b>
Fenestration	NAFS-08 rated and labelled (or letter demonstrating)
Exterior Accessible Doors	Passive House Certified
Heat Recovery Ventilator	CSA Certification or UL-C Certified

## 5 Submission Requirements

This section outlines submission requirements for Passive House projects seeking relaxations to the Zoning and Development By-law. These submission requirements are **in addition** to those of the typical development and building permit application process. These requirements – as well as typical requirements for a multi-family dwelling application in a particular District Schedule - must be adhered to.

Please note the different roles and responsibilities of the:

1. Certified Passive House Designer (CPHD) or Certified Passive House Consultant (CPHC);
2. Passive House Building Certifier (Building Certifier).

See definitions of these terms in Section 6 of this document.

The documentation required at each of the stages listed below will include, but may not be limited to:

### Prior to Pre-Application Meeting

When requesting a meeting through the Planner Appointment Request system or with a Project Facilitator, the Registered Professional should:

- first consult this document and other applicable policies and guidelines
- note that the application will be for a project that meets the Passive House standard and will achieve Certification, and that the project team will be requesting related relaxations
- request assignment of a Development Planner or Facilitator with Passive House experience

#### Pre-Application Meeting

The Registered Professional must provide:

- a letter from a CPHD/ CPHC confirming their engagement to model (PHPP) and advise on the project
- supporting documents and conceptual drawings identifying which PH related relaxations they will be seeking with respect to the Zoning and Development By-law
- identify anticipated requested alternative solutions to Building By-law requirements
- documents and/or drawings that indicate how the design addresses impacts on neighbouring properties on such issues as privacy, massing, and shadowing

#### Development Permit Application

Applicants must submit:

- documents and materials that specify and document the Passive House relaxations being sought with respect to the Zoning and Development By-law. Permit drawings must identify the project as Passive House and state any relaxations.
- documents and materials that specify alternative solutions being sought with respect to Building By-law requirements (this is a separate process)
- preliminary project models using the PHPP software, demonstrating how the Passive House Classic requirements as maintained by the Passive House Institute will be met, including:
  - the pre-construction PHPP model (an electronic copy of the Excel file)
  - a printout of the “verification” page and relevant notes

**Please note: if specific known challenges to meeting Passive House targets are identified, these must be resolved before applying for a Development Permit.**

- if solar shades that encroach over City property have been approved as part of the design, submit to Engineering Services a “Permit to Use City Property” application form with supporting documents (drawings of the proposed solar shading devices that clearly show dimensions of the shades, property lines, clearances, adjacent curb alignment and street poles, as well as method of demountability).

#### Building Permit Application

Applicants must submit:

- information and documentation regarding any requested alternative solutions to Building By-law regulations
- the project’s compliant PHPP model together with a Passive House Design Summary report that details critical assemblies, components, and strategies
- a letter from a Passive House Building Certifier noting specifications (assemblies, building components), and stating that the project design and specifications have been reviewed and, in the opinion of the Building Certifier, the project is capable of achieving Passive House certification. **Please note: if specific known challenges to meeting**

**Passive House targets are identified, these must be resolved before applying for a Building Permit.**

- A written Passive House Commissioning Plan, with fronting checklist. The Plan will be used to verify construction assemblies, components, insulation, air barrier, air tightness performance etc., and is designed to be a similar step to the ASHRAE checklists provided by Registered Professionals at this point in the permit process for projects not pursuing Passive House. The Plan will be prepared by the project team and approved by the Building Certifier (as part of his/her design stage review). This plan will be managed and verified by a Registered Professional on behalf of the project team, and must include, *at a minimum*:
  - The name and credentials of the Registered Professional who will document and verify construction to plan.
  - The number of planned site visits, and at what intervals.
  - A written plan for monitoring and grading insulation installation in all assemblies - including inspections of insulation layers below-grade and insulation installation within assemblies - to verify that all assemblies, insulation materials, and components (including windows, doors and ventilation equipment) are installed as per the specifications provided in the Building Certifier's letter.
  - A written plan for monitoring and verifying continuous air barrier in all assemblies and components.
  - A written plan for verifying all key components and assemblies specified in the Building Certifier's letter.
  - A written plan for air tightness testing, including who will conduct mid-construction and final blower door tests to the protocol prescribed by the Passive House Institute
  - Written plan for ventilation commissioning, including who will conduct.
  - Written plan for occupant training, including who will conduct.
- **If, at any point, any element of the plan should become non-compliant, this must be immediately brought to the attention of the City of Vancouver.**

Prior To Final Inspection

Buildings may be certified by any of the Passive House Institute Accredited Building Certifiers operating worldwide. In addition to the documents already required at final inspection, applicants must provide the City with:

- a sealed letter from a Registered Professional, confirming that work implemented was as prescribed in the Passive House Commissioning Plan and that they are not aware of any reason the project will fail to certify.
- a letter from the Building Certifier stating that the final PHPP and relevant documentation have been received and are being reviewed for final certification. The Building Certifier's letter must include a suggested date by which the City may expect to be notified of final certification to the Passive House Institute standard.

Building Certification

Certification to the Passive House standard must be achieved to support the relaxations noted. The Building Certifier will review the project documentation, including the PHPP model, building envelope drawings, mechanical systems and other information. Once the project is certified by the Passive House Institute, a copy of the certificate must be provided to the City of Vancouver.

## 6 Glossary of Terms

### **ACH**

ACH, or air changes per hour, is a metric of building air tightness. ACH is often expressed as ACH50, which is the air changes per hour when a space is pressurized and depressurized by 50 pascals during a blower door test.

A different metric, ACH<sub>n</sub> or NACH, refers to natural air changes per hour, meaning the rate of air leakage without pressurization. ACH<sub>n</sub> or NACH is used in the residential HVAC industry for system sizing calculations.

### **Building Envelope**

A building's envelope is the structure separating the interior space from the environment.

### **Certified Passive House Designer (CPHD)**

A CPHD is a person with significant professional and educational experience in architecture or building that has been certified by the Passive House Institute as an accredited Certified Passive House Designer. The CPHD or CPHC helps design a building to meet the PH standard.

### **Certified Passive House Consultant (CPHC)**

A CPHC is a person certified by the Passive House Institute as an accredited Passive House Consultant.

### **Heat Recovery Ventilator (HRV)**

An HRV is a mechanical device that exchanges stale indoor air with fresh outdoor air while recovering heat at the same time using a heat exchanger.

### **Passive House (PH)**

In these guidelines, a Passive House building is one that meets the definition in the Vancouver Zoning & Development By-law.

For a general description, see Section 3 of this document.

### **Passive House Building Certifier (Building Certifier)**

In these guidelines, a Passive House Building Certifier is one that meets the definition in the Vancouver Zoning & Development By-law.

A general description is a person accredited by the Passive House Institute in Darmstadt, Germany for the purpose of certifying buildings as being designed in accordance with its Passive House standards.

### **Passive House Planning Package (PHPP)**

PHPP is software used to determine whether a building meets Passive House standards. The package, available through the Passive House Institute, assists with house design and window planning to test how different designs will affect energy use.

### **Registered Professional**

In these guidelines, a Registered Professional is one that meets the definition in Vancouver's Building By-Law.

A general description is a person a person who is registered or licensed to practice as an architect under the Architects Act, or a person who is registered or licensed to practice as a professional engineer under the Engineers and Geoscientists Act.

**Relaxation**

For readability, this guideline refers to discretionary allowances to accommodate the Passive House standard as relaxations, including clauses in Section 4 of district schedules and Section 10 of the Zoning & Development By-law.

# DRAFT

## Passive House - Guidelines for Residences in RS Districts

Adopted by City Council on **Month Date**, 2017

### 1 Application and Intent

These guidelines are intended to explain the regulations and process related to Passive House developments for residences. In particular, they should be used by applicants seeking relaxations within the Zoning and Development By-law for projects that meet the Passive House standard and achieve Certification. These guidelines apply to dwelling uses in the RS District Schedules, except laneway houses. For all other zones and uses, see the “Passive House - Guidelines for larger Projects” document. For more information on passive design, applicants may refer to the City of Vancouver’s two Passive House Design Toolkits.

Applicants must demonstrate how the building envelope and mechanical system have been designed to achieve the Passive House standard before seeking related relaxations, and adhere to the process and requirements in this document. **Buildings must meet the definition of a Passive House in the Zoning and Development By-law.**

These Guidelines are to be used in conjunction with the relevant District Schedule of the Zoning and Development By-law or Official Development Plan, as well as other applicable guidelines and bulletins. As this document addresses zoning considerations only, applicants are encouraged to obtain early advice on meeting the requirements of Vancouver’s Building By-law from a Registered Professional.

### 2 Policy Context

Removing barriers to the Passive House standard is important in Vancouver, and part of the City’s emerging policy context. The Zero Emissions Building Plan, a key component of Vancouver’s Renewable City Strategy, prioritizes removing regulatory barriers to the development of zero emission buildings such as Passive House buildings.

### 3 Passive House: Standard and Requirements

Passive House is a well-established ultra-low energy building performance standard and certification process. There are over 40,000 Passive House buildings built in a wide range of climates and typologies. Passive design is based on the principle that a high quality envelope can reduce most costs associated with heating and cooling. With thoughtful design, better energy efficiency can be achieved and costly heating and air conditioning systems are eliminated without sacrificing thermal comfort. Certifying a building to the Passive House standard is a rigorous quality assurance process that determines whether a building meets all of the requirements of the Passive House standard, and confirms that the building has been designed to achieve high levels of occupant comfort with very low energy consumption.

### 3.1 Criteria for Passive House Certification (summarized)

- Space Heat Demand: Maximum 15 kWh/m<sup>2</sup>a OR Heating load max. 10 W/m<sup>2</sup>
  - The building must be designed to have an annual heating and cooling demand as calculated with the Passive House Planning Package (PHPP) of not more than 15 kWh/m<sup>2</sup> per year in heating and 15 kWh/m<sup>2</sup> per year cooling energy OR to be designed with a peak heat load of 10W/m<sup>2</sup>.
- Pressurization Test Result: Maximum 0.6 ACH @ 50 Pa
  - The Passive House Standard demands a minimum tested airtightness level of 0.6 air changes per hour (ACH) @ 50 Pa (pascals), both for under pressure and overpressure during a blower door test. Must be conducted by a licensed technician.
- Total Primary Energy Demand: Maximum 120 kWh/m<sup>2</sup>a
  - The total energy to be used for all domestic applications (heating, hot water and domestic electricity) must not exceed 120 kWh per square meter of treated floor area per year.

All heating and cooling calculations are based on the net usable floor area of the building. If cooling (air conditioning) is required, the annual cooling energy demand must also not exceed 15 kWh/m<sup>2</sup>. For a description of the full criteria for certification or for more information, please see Passive House Canada's web site at: <http://www.passivehousecanada.com> and consult with a Certified Passive House Designer or Consultant.

## 4 Relaxation of Regulations– Discretionary Allowances

Achieving a low-energy, high-efficiency home through high quality thermal envelope design and better insulation will result in thicker walls and ceilings than a typical building, which affects floor area.

Conditional relaxations may be allowed to accommodate the additional thermal insulation required to meet the Passive House standard, and the additional space required in installing a superior heat recovery ventilator. Applicants may apply for relaxations of floor area, height, yard, and building depth, depending on the applicable District Schedule and provided that they demonstrate that they will achieve Passive House Certification. These relaxations may be granted at the discretion of the Director of Planning upon consideration of all applicable guidelines and policies.

The design of the development related to the relaxation should also address the development's urban design performance in its wider context. In particular, applicants must consider livability and impacts on neighbouring properties on such issues as privacy, massing, and shadowing in their application.

### 4.1 Floor Area Exclusions

Section 10.33 of the Zoning By-law permits a floor area exclusion to accommodate the additional thickness of walls for thermal insulation beyond Building Code requirements, by excluding some of the floor area used for insulation. The exclusion is intended to reduce the disincentive of "losing" floor area. For more information, please see the Planning

Administrative Bulletin titled: “Floor Space Exclusion to Accommodate Improved Building Performance (Envelope and Thermal Insulation)”.

If an applicant is seeking a floor area exclusion to accommodate increased insulation, it is currently required that a Building Envelope Professional must be retained to calculate and verify the exclusion. However in the case of a home meeting the Passive House standard and achieving Certification, this requirement may be waived, as the use of PHPP energy modelling and the retention of a Certified Passive House Designer or Consultant satisfies the same requirement.

As well, Section 10.41 permits a floor area exclusion for the area occupied by heat recovery ventilators and connected shafts, in a project that meets the Passive House standard and achieves Certification, to a maximum exclusion of 1% of permitted floor area. A heat recovery ventilator (HRV) is a mechanical device that exchanges stale indoor air with fresh outdoor air while recovering heat at the same time using a heat exchanger.

In order to achieve the exclusion, an HRV that is a Passive House “Certified Component” should be utilized, as these HRV’s have a high degree of filtration; are more energy efficient in operation; have automatic balancing; are relatively air tight; have an effective heat recovery of 75% or greater; and provide thermal comfort to -10 degrees.

#### **4.2 Relaxation of Height**

Applicants building a Passive House home may apply for a relaxation of height via the relevant RS District Schedule. This relaxation is anticipated to remove a barrier to better insulated roofs.

This relaxation states that the Director of Planning may relax the height requirement to accommodate building features designed to reduce energy consumption in a building that meets the Passive House standard and achieves Certification, if the Director of Planning first considers: the intent of the relevant schedule and all applicable Council policies and guidelines; the relationship of the development with nearby residential areas; the submission of any advisory group, property owner, or tenant; and the relaxation does not exceed .5 m.

The Director of Planning may consider negligible intrusions into the height (primary and secondary) envelopes bearing in mind that the intent of the regulation is to pull the bulk and massing away from the side property lines in order to preserve light and privacy and mitigate shadowing of adjacent properties.

#### **4.3 Relaxation of Rear Yard Setback**

Applicants building a Passive House may also apply for a relaxation of rear yard setbacks in many RS District Schedules. This relaxation is anticipated to remove a barrier to building thicker walls; and enable the use of excluded floor area, applied for under Section 10.33 of the Zoning By-law, to be used onsite.

This relaxation states that the Director of Planning may decrease the rear yard requirement to accommodate building features designed to reduce energy consumption in a building that meets the Passive House standard and achieves Certification; if the Director of Planning first considers: the intent of the relevant schedule and all applicable Council policies and guidelines; the relationship of the development with nearby residential areas; and the submission of any advisory group, property owner, or tenant. The specific amount of relaxation allowed depends on the District Schedule. Please consult the relevant RS District Schedule.



For those RS District Schedules that do not contain a relaxation option for rear yard setbacks for Passive House, it was determined that existing regulations provided sufficient flexibility that a relaxation was not required.

#### 4.4 Relaxation of Building Depth

Applicants building a Passive House may also apply for a relaxation to increase permitted building depth in many RS District Schedules. This relaxation is anticipated to remove a barrier to building thicker walls, that is: having some floor area excluded, and not being able to use all of the floor area on site.

This relaxation states that the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a building that meets the Passive House standard and achieves Certification, if the Director of Planning first considers: the intent of the relevant schedule and all applicable Council policies and guidelines; the relationship of the development with nearby residential areas; and the submission of any advisory group, property owner, or tenant. The specific amount of relaxation allowed depends on the District Schedule. Please consult the relevant RS District Schedule.

For those RS District Schedules that do not contain a relaxation option for building depth for Passive House, it was determined that existing regulations provided sufficient flexibility that a relaxation was not required.

It should be noted that the rear yard compatibility depth provision in RS-1 would not apply if an applicant sought the increased building depth allowance for Passive House.

#### 4.5 Other Relaxations

The following table provides a general reference for conditional allowances that are available for Passive House and related green building features.

For more information, applicants may consult the relevant regulation (e.g. the District Schedule), related Administration Bulletins (e.g. “Passive Design: Natural Ventilation and Light”), and other applicable guidelines or policies. These documents can be found at [vancouver.ca](http://vancouver.ca)

<b>Conditional Allowance for Passive House and Green Building Features</b>	<b>Zoning By-law Section</b>
Allow increase in floor area for HRV's and connected shafts	Section 10.41
Allow increase in building height	All RS zones, and Section 10.10.4
Allow decrease in required rear yard depth	several RS zones
Allow increase in permitted building depth	several RS zones
Allow floor area exclusion for increased insulation	Section 10.33
Allow green walls to project into required yard	Section 10.7.1
Allow floor area exclusion for venting skylights, opening clerestory windows or other similar features	RS, RT, RM, C-3A and I-C3: Section 4.7.2 or 4.7.3 or 4.7.4
Allow increase in building height for venting skylights, opening clerestory windows or other similar features	Section 10.11.1
Relax building height regulations for roof-mounted energy technologies and to provide access to green roofs	Section 10.11.1

Relax side yard and overhang requirements for fixed external shading devices	Section 10.7.1
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The table below highlights requirement equivalencies for Passive House/energy efficiency in the Building By-law.

Building Components	Requirement
Fenestration	NAFS-08 rated and labelled (or letter demonstrating)
Exterior Accessible Doors	Passive House Certified
Heat Recovery Ventilator	CSA Certification or UL-C Certified

## 5 Submission Requirements

This section outlines submission requirements for Passive House projects in RS District Schedules seeking relaxations. These submission requirements are **in addition** to those of the typical development and building permit application process. These requirements – as well as typical requirements for a single family dwelling application in a particular District Schedule - must be adhered to.

Please note the different roles and responsibilities of the:

- Certified Passive House Designer (CPHD) or Certified Passive House Consultant (CPHC);
- Certified Energy Advisor (CEA); and
- Passive House Building Certifier (Building Certifier).

See definitions of these terms in Section 6. Also note that it is possible to engage a *CPHD* or *CPHC* who is also a *CEA*, and can thus serve in both roles.

- Before scheduling a pre-application appointment with the Housing Review branch, applicants should consult this document and all typical application documents (such as the “Intake Checklist”). When scheduling the appointment, applicants should note that the application will be for a home that meets the Passive House standard and will achieve Certification, and that the project team will be requesting related relaxations.
- At the pre-application meeting, applicants must provide the City of Vancouver with a letter from a *CPHD* or *CPHC* (see definitions in Appendix B) confirming that he/she has been engaged to model and advise for the project. A member of the project team - such as designer, builder or *CEA* - may serve in this role provided that they are a credentialed *CPHD* or *CPHC*.

Applicants must also identify which relaxations they will be seeking, and provide the City with supporting documents and conceptual drawings. City staff may then direct applicants and provide feedback at the pre-application meeting that will inform their application. It should be noted that applicants must consider impacts on neighbouring houses on such issues as privacy, massing, and shadowing in their application.

If an applicant is seeking a floor area exclusion to accommodate increased insulation, it is currently required that a Building Envelope Professional must be retained to calculate and verify the exclusion. However in the case of a home meeting the Passive House standard

and achieving Certification, this requirement may be waived, as the use of PHPP energy modelling and the retention of a *CPHD* or *CPHC* satisfies the same requirement.

- (c) Following the pre-app meeting, applicants are advised to model the project using a current version of the Passive House Planning Package (PHPP) software, and to revise the design as necessary to meet or exceed the “Passive House Classic” requirements as maintained by the Passive House Institute.

The applicant must engage a *CEA* (see definition in Appendix B). Again, it is possible to engage a *CEA* who is also a *CPHD* or *CPHC*, and can thus serve in both roles. The *CEA* must review the proposed assemblies, submit a detailed copy of the City of Vancouver’s “Pre-Permit Checklist”, and otherwise comply with pre-permit requirements for one- and two-family housing.

It should be noted that Passive House applicants are not required to prepare a Hot 2000 model or to submit a “P-file” number. Instead applicants must submit the pre-construction PHPP model (an electronic copy of the Excel file) along with a printout of the “verification” page and relevant notes.

In addition to the PHPP file, applicants must provide the Housing Review Branch with a letter from a *Building Certifier* (see definition in Section 6) stating that the project design and specifications have been reviewed and, in the opinion of the *Building Certifier*, the project is capable of achieving Passive House certification if built to the design and specifications noted in the *Building Certifier*’s letter.

Once the design, assemblies and components have been identified, and all of the above satisfied, applicants may submit their Development Building (DB) permit application to the Housing Review Branch. Applicants must provide typical application materials and drawings, in addition to the materials and drawings that specify and document which relaxations are being sought as a Passive House home.

- (d) At mid-construction, before drywall has been installed, a *CEA* will conduct a site visit in accordance with requirements for all one- and two-family permit applications. The *CEA* will verify that all assemblies, insulation materials, and components (including windows, doors and ventilation equipment) are installed as per the specifications provided in the *Building Certifier*’s letter. The *CEA* will conduct a mid-construction blower door test to the EN 13829 protocol, with modifications as prescribed by the Passive House Institute, in lieu of the Hot 2000 protocol. The *CEA* will provide the applicant with documentation verifying the construction details and the EN 13829 blower door test results as attachments to the typical “Pre-Drywall Checklist”, so that it may be submitted to the City.

In addition to the typical *CEA* review, the applicant must also at this time provide the City with a letter from the retained *CPHD* or *CPHC* that contains:

- a statement that the *CPHD/C* attended and inspected the construction of the house and that the installed assemblies and components match those specified in the *Building Certifier*’s letter;
- the results of the *CEA*’s mid-construction blower door test; and
- a statement that there are no known barriers to the project achieving “Passive House Classic” certification by the Passive House Institute.

Again, please note that it is possible to engage a *CPHD* or *CPHC* who is also a *CEA*, and can thus serve in both roles.

- (e) Prior to final inspection, the *CEA* must conduct a review and final door blower test. This test must be conducted to the EN 13829 protocol, with modifications as prescribed by the Passive House Institute (e.g. both pressurization and depressurization). The *CEA* will provide the applicant with documentation of mechanical and other construction details, as well as a report on the results of the EN 13829/PHI blower door test, so that it may be submitted to the City.

In addition to the *CEA* review, applicants must provide the City with a letter from a *Building Certifier* stating that the final PHPP and relevant documentation have been received and are being reviewed for final certification. The *Building Certifier's* letter must include a suggested date by which the City may expect to be notified of final certification to the Passive House Institute standard. Once the project is certified by the Passive House Institute, a copy of the certificate must be provided to the City of Vancouver.

#### Building Certification

The project must meet the Passive House standard and achieve Certification to support the relaxations noted. The Certifier will review the project documentation, including the PHPP model, building envelope drawings, mechanical systems and other information. Once the project is certified by the Passive House Institute, a copy of the certificate must be provided to the City of Vancouver.

## 6 Glossary of Terms

### **ACH**

ACH, or air changes per hour, is a metric of building air tightness. ACH is often expressed as ACH50, which is the air changes per hour when a space is pressurized and depressurized by 50 pascals during a blower door test.

A different metric, ACH<sub>n</sub> or NACH, refers to natural air changes per hour, meaning the rate of air leakage without pressurization. ACH<sub>n</sub> or NACH is used in the residential HVAC industry for system sizing calculations.

### **Building Envelope**

A building's envelope is the structure separating the interior space from the environment.

### **Certified Energy Advisor (CEA)**

A CEA is a licensed professional who conducts home energy evaluations. A CEA can evaluate a home, and provide the modeling and testing required for the final certification of a home under EnerGuide. They are trained to use NRCAN's energy simulation software ("HOT2000") and to perform blower door air leakage testing.

### **Certified Passive House Designer (CPHD)**

A CPHD is a person with significant professional and educational experience in architecture or building that has been certified by the Passive House Institute as an accredited Certified Passive House Designer. The CPHD or CPHC helps design a building to meet the PH standard.

**Certified Passive House Consultant (CPHC)**

A CPHC is a person certified by the Passive House Institute as an accredited Passive House Consultant.

**Heat Recovery Ventilator (HRV)**

An HRV is a mechanical device that exchanges stale indoor air with fresh outdoor air while recovering heat at the same time using a heat exchanger.

**Passive House (PH)**

In these guidelines, a Passive House building is one that meets the definition in the Vancouver Zoning & Development By-law.

For a general description, see Section 3 of this document.

**Passive House Building Certifier (Building Certifier)**

In these guidelines, a Passive House Building Certifier is one that meets the definition in the Vancouver Zoning & Development By-law.

A general description is a person accredited by the Passive House Institute in Darmstadt, Germany for the purpose of certifying buildings as being designed in accordance with its Passive House standards.

**Passive House Planning Package (PHPP)**

PHPP is software used to determine whether a building meets Passive House standards. The package, available through the Passive House Institute, assists with house design and window planning to test how different designs will affect energy use.

**Registered Professional**

In these guidelines, a Registered Professional is one that meets the definition in Vancouver's Building By-Law.

A general description is a person a person who is registered or licensed to practice as an architect under the Architects Act, or a person who is registered or licensed to practice as a professional engineer under the Engineers and Geoscientists Act.

**Relaxation**

For readability, this guideline refers to discretionary allowances to accommodate the Passive House standard as relaxations, including clauses in Section 4 of district schedules and Section 10 of the Zoning & Development By-law.