



**POLICY REPORT
DEVELOPMENT AND BUILDING**

Report Date: September 4, 2015
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Meeting Date: September 15, 2015

TO: Vancouver City Council

FROM: General Manager of Planning and Development Services, in consultation with the Director of Sustainability and the Director of Legal Services

SUBJECT: Amendments to the Zoning and Development By-law to Remove Barriers to Building to the Certified Passive House Standard in the RS-1 District

RECOMMENDATION

- A. THAT the General Manager of Planning and Development Services be instructed to make application to amend the Zoning and Development By-law, to authorize the Director of Planning to relax requirements for height, rear yards and building depths for homes that meet the Certified Passive House standard in the RS-1 District, and that the application be referred to public hearing;
- FURTHER THAT the Director of Legal Services be instructed to prepare the necessary amending by-law, generally in accordance with Appendix A, for consideration at public hearing.
- B. THAT, subject to approval of the proposed amendment to the Zoning and Development By-law after the public hearing, the General Manager of Planning and Development Services be instructed to bring forward for consideration by Council, at the time of enactment of the amending by-law, the Passive House Guidelines for RS-1, generally as set out in Appendix B.

REPORT SUMMARY

The purpose of this report is to recommend amendments to Zoning and Development By-law (the "Zoning By-law") that will help remove barriers to the construction of homes that meet the Certified Passive House standard in the RS-1 District.

A Certified Passive House is an ultra-low energy home that meets the Certified Passive House standard as verified by a Building Certifier who has been certified by the Passive House Institute.

There are over 40,000 Certified Passive House buildings around the world, the majority of which are in temperate climates similar to Vancouver. These buildings use more insulation in walls and ceilings to achieve cost effective homes that generally use 55-60% less energy than homes built to meet the requirements of Vancouver's 2014 Building By-law.

In order to accommodate increases in insulation, walls are often significantly thicker and roofs higher than would otherwise be required to meet the Building By-law effectively reducing habitable space. While the Zoning By-law allows floor space occupied by added wall thickness to be excluded from the floor space ratio (FSR), building set back and site coverage limits can restrict builders' ability to utilize this exemption.

The proposed amendments to the Zoning By-law and adoption of associated Guidelines for Certified Passive House in the RS-1 District are intended to allow applicants to better use excluded floor area by allowing modest increases to height and site coverage. Ultimately these changes will support voluntary innovators and leaders, make passive homes more available to Vancouver citizens, and foster industry capacity to build more energy-efficient homes.

This report further describes a targeted staff education program to enable understanding of new materials and technologies and help train City staff to process Certified Passive House projects without delay.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

July 2007: Council adopted targets to reduce community greenhouse gas (GHG) emissions to 33% below current levels by 2020 and 80% below current levels by 2050. Council also adopted the target of all new construction in Vancouver becoming GHG neutral by 2030.

November 2008: as part of the EcoDensity initiative, Council passed a resolution to remove specified barriers to new green building construction and directed staff to report back when other barriers were identified and could be removed.

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.

May 2010: Council enacted By-law No. 10041 to adopt the Official Development Plan Regarding Reduction of Greenhouse Gas Emissions which stated Council's target to require that all new construction be carbon neutral by 2030.

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

May 2011: Council approved amendments to the Zoning By-law to promote the implementation of passive design approaches, and facilitate the removal of barriers to green building approaches.

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The General Manager of Planning and Development Services recommends approval of the foregoing.

REPORT

Background/Context

One- and two-family homes make up over 40% of all new development (by area) in Vancouver, and removing barriers to building ultra-low energy homes is an important part of meeting the City's green building goals.

In 2011, Council approved amendments to the Zoning By-law to promote the implementation of several passive design approaches, with the intent to make it easier to build using these strategies. These included: allowing for construction of thicker walls without losing floor area, installing green walls, increasing shading overhangs, promoting natural ventilation, and limiting the use of bay windows due to their energy inefficiency. As well, amendments provided opportunities to relax building height regulations for roof-mounted energy technologies (e.g. solar) and to provide access to green roofs.

Subsequently, home builders and the Canadian Passive House Institute advised the City that regulatory barriers still impeded construction of ultra-low energy homes in Vancouver. In response, staff identified additional opportunities to remove barriers and facilitate the construction of ultra-low energy homes that are designed to meet Certified Passive House standards.

Strategic Analysis

Proposed Certified Passive House Standard

Staff reviewed a number of ultra-low energy design standards and concluded that the Passive House standard was preferred as it is a globally recognized and proven standard for ultra-low energy buildings, enables compliance verification in the design and construction stages, and is more likely to be utilized, both for its overall achievement in reducing energy use (55-60% better than the Building By-law) and its simplicity in achieving this through highly efficient building envelope design.

Proposed Zoning By-law Amendments

Intent of Proposed Amendments

The intent of the proposed amendments to the Zoning By-law is to allow for opportunities to increase height and site coverage for homes that meet the Certified Passive House standard in order to effectively use excluded floor area to accommodate Certified Passive House features.

In order to remove barriers and increase market uptake of homes that meet the Certified Passive House standards, staff from Sustainability and Planning & Development Services met with industry and then worked together to develop a recommended approach. This approach will initially apply only to applications for construction of new single-family dwellings with or without secondary-suites in the RS-1 District (excluding laneway houses), that are designed to meet the Certified Passive House standard. Staff will monitor the impact of the proposed amendments with a view to allowing relaxations beyond RS-1 to include multi-family dwellings. Staff intend to report back to Council on this in the spring of 2016.

Rationale

The Certified Passive House standard requires extremely well insulated wall and ceiling assemblies, which would result in a loss of indoor habitable space under current zoning regulations. For example, approximately 2 to 3 feet of the height of a Certified Passive House ceiling is required to accommodate the insulated ceiling assembly. In addition, a minimum 6" of extra wall thickness beyond the Building By-law requirement is required for Certified Passive House walls in order to accommodate the required insulation.

Currently, a portion of the floor area used for insulation can be excluded pursuant to the wall thickness floor area exclusion found in Section 10.33 of the Zoning By-law whereby applicants can apply to exclude up to 330mm (13") of the floor area occupied by extra insulation required to exceed Building By-law requirements. For a typical RS-1 home, this excluded floor area must be used within existing height, rear yard and building depth regulations, which is challenging.

Consequently, the current zoning makes it difficult for a well-insulated low-energy home to achieve the same habitable floor area as a conventionally insulated home. Applicants have advised that the ability to recapture any floor area "lost" to insulation is important. Regulations that would allow for more space for this (via a relaxation of height/site coverage requirements) would encourage Certified Passive House design by ensuring that no indoor habitable space is lost.

Staff propose allowing for opportunities to use this floor area within increased building height, a decreased rear yard, and increased building depth - only for homes that are designed to meet the Certified Passive House standard.

Key Amendments to the Zoning By-law

The key recommendation is to amend the Zoning By-law in the RS-1 District to conditionally allow the following relaxations, for homes that are designed to meet the Certified Passive House standard:

- building height may be increased by 1.2m to a maximum of 10.7m (current limit is 9.5m);
- the rear yard may be decreased from 45% of the depth of the site to 40%; and
- building depth may be increased from 35% of the site to 40%.

The RS-1 District Schedule already permits certain rear yard relaxations which would not apply if an applicant was to seek the rear yard relaxation for a Certified Passive House.

The proposed draft amendments are attached in Appendix A.

Staff have also developed detailed *Passive House Guidelines for RS-1* to provide information on the relaxations and to guide staff and applicants on the associated requirements and submission process. Staff are seeking Council approval of these Guidelines as part of this report, subject to enactment of the proposed amendments. The proposed Guidelines are attached in Appendix B.

Processing Applications

Passive houses use specialized design approaches and building materials in order to significantly reduce energy use. Lack of familiarity with these approaches and materials may cause delays in application processing and inspection timing, as staff learn more about what is acceptable within our regulatory framework. To facilitate the timely processing of applications for construction of homes that meet the Certified Passive House standard, City staff that are involved in the development/building permitting process will be provided with training on passive design and construction approaches, and on the Certified Passive House standard to ensure that staff are confident in their knowledge of acceptable practice.

Giving staff the opportunity to better understand these features, and to ask questions and discuss typical situations and materials that they might encounter, will reduce hold-ups in processing and approval. It should be noted that this training would not expedite the permit process but rather staff would be able to understand technical specifications more readily and thus avoid unnecessary delays. The training is intended to be provided to staff primarily in Housing Review and Inspections, but also in Development Review, Development Planning, and Building Review. While the proposed amendments focus on homes in the RS-1 District, there is value in terms of capacity building in offering group training to staff at several stages of the permit process.

As well, staff have created a draft specialized application process for Certified Passive House projects in RS-1 that is intended to again, reduce unnecessary delays for these homes.

Implications/Related Issues/Risk (if applicable)

Environmental

The proposed amendments to the Zoning By-law outlined in this report should support increased uptake in homes that meet the Certified Passive House standard, which will help influence broader market practices in building design and construction to reduce overall energy use and greenhouse gas emissions.

CONCLUSION

Approving the recommendations in this report will build upon past efforts to remove barriers to the construction of ultra-low energy homes.

The approach outlined in this report will create opportunities (initially focussed on the RS-1 District) for applicants to utilize passive design strategies to achieve the ultra-low energy Certified Passive House standard. As the City continues to support ultra-low energy design and better integrates these techniques into policy and regulation, the design and building communities - and homeowners - will be better able to respond and apply energy-efficient measures more readily. As well, staff intend to apply the lessons learned from this experience to applying Passive House to other building forms, including multi-family housing, and will report back to Council on this in the spring of 2016. As we move forward, all parties will be acting to increase the efficiency of new construction, and ultimately, this will help move Vancouver closer to our green building efficiency targets and toward being the greenest city in the world.

* * * * *

Zoning & Development By-law
Miscellaneous amendments
regarding Certified Passive House
in the RS-1 District Schedule

Draft for Public Hearing

BY-LAW NO. _____

A By-law to amend
Zoning and Development By-law No. 3575
Regarding Certified Passive House in the RS-1 District Schedule

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, in alphabetical order, Council adds:

“**Certified Passive House** means a building that is designed to meet the Passive House standards developed by the Passive House Institute in Darmstadt, Germany, as verified by a Passive House Certifier.”; and

“**Passive House 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 the RS-1 District Schedule, Council:
 - (a) after section 4.3.5, adds:

“4.3.6 Notwithstanding section 4.3.1 of this schedule, the Director of Planning may permit a height increase to accommodate building features designed to reduce energy consumption in a Certified Passive House to a maximum of 10.7 m, if the Director of Planning first considers the intent of this schedule and all applicable Council policies and guidelines.”;
 - (b) after section 4.6.5, adds:

“4.6.6 Notwithstanding section 4.6.1 of this schedule, the Director of Planning may decrease the rear yard requirement to accommodate building features designed to reduce energy consumption in a Certified Passive House to a minimum of 40 percent of the depth of the site, if the Director of Planning first considers the intent of this schedule and all applicable Council policies and guidelines.”; and

(c) after section 4.16.3, adds:

"4.16.4 Notwithstanding section 4.16.1 of this schedule, the Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a Certified Passive House to a maximum of 40 percent of the depth of the site, if the Director of Planning first considers the intent of this schedule and all applicable Council policies and guidelines.

4.16.5 Where the permitted building depth is increased in accordance with section 4.16.4, sections 4.6.1 (a), (b), (c) and (d) of this schedule do not apply."

4. 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.

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

ENACTED by Council this day of , 2015

Mayor

Land Use and Development Policies and Guidelines

Planning and Development Services, 453 W. 12th Ave Vancouver, BC V5Y 1V4 F 604.873.7344 fax 604.873.7060
planning@vancouver.ca

DRAFT Passive House Guidelines for RS-1

August 28, 2015



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Land Use and Development Policies and Guidelines

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1. Application and Intent

These guidelines are intended to inform applicants seeking to build a home that meets the Certified Passive House standard in any RS-1 District Schedule zone, and seek related relaxations. A Certified Passive House is one that meets the definition for Certified Passive House in the City of Vancouver Zoning and Development By-law as verified by a Passive House Institute Accredited Building Certifier, as also defined in the Zoning and Development By-law (the “Zoning By-law”). Applicants are required to meet the Certified Passive House standard and make appropriate provisions in building envelope and mechanical design to enable them to achieve Certified Passive House standards in order to seek any related relaxations.

Applicants should review the process and requirements articulated in this document. These guidelines are to be used in conjunction with: typical residential permit application documents; the RS-1 District Schedule of the Zoning and Development By-law; and the City of Vancouver’s “Passive House Design Toolkit for Homes” (see www.vancouver.ca). As this guide is intended to advise on zoning considerations under the Zoning By-law, applicants are also encouraged to obtain guidance on Vancouver’s Building By-law No. 10908 (the “Building By-law”) from an experienced professional.

2. Context

Council approved revised Greenest City Action Plan (GCAP) targets in 2011, which included a target stating that all buildings constructed from 2020 onward would be carbon neutral in operations.

Greenhouse gas (GHG) emissions from buildings account for nearly 55% of GHG emissions in Vancouver. Reducing building energy use through rigorous building envelope design like that of Passive House buildings (instead of relying on more complicated mechanical means), presents a powerful and relatively straightforward opportunity to reduce future GHG emissions from buildings.

The City recognizes its role in working towards improving building standards to increase energy efficiency and reduce greenhouse gas emissions. These guidelines are provided to assist applicants in achieving Certified Passive House design, which is consistent with the City of Vancouver’s energy efficient building construction goals.

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 every climate, in every typology.

Passive design is based on the principle that a higher quality thermal envelope can reduce or eliminate 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.

Passive House Certification 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 and energy performance.

3.1. Main/Summary Criteria for Certification

- Space Heat Demand: max. 15 kWh/m²a OR Heating load max. 10 W/m²
- Pressurization Test Result: max. 0.6 ACH @ 50 Pa (pressurizing and depressurizing)
- Total Primary Energy Demand: max. 120 kWh/m²a

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/m².

3.1.1. Space Heat Demand

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/m² per year in heating and 15 kWh/m² per year cooling energy OR to be designed with a peak heat load of 10W/m².

3.1.2. Air Sealing

The Passive House Standard demands a minimum tested airtightness level of 0.6 air changes per hour (ach) @ 50 Pa, both for under pressure and overpressure, during a blower door test, which must be conducted by a licensed technician.

3.1.3. Total Primary Energy Demand

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.

For a description of the full criteria for certification or for more information please see the Passivehaus Insitute website at <http://passiv.de/en> or the Canadian Passive House Institute's web site at: www.canphi.ca and consult with a Certified Passive House Designer or Consultant.

4. Relaxation of Regulations

Achieving a low-energy, high-efficiency home through high quality thermal envelope design and better insulation will result in thicker walls and ceilings, thus impacting floor area. The City of Vancouver currently has a floor area exclusion in Section 10.33 of the Zoning By-law related to wall thickness. Under this exclusion, applicants may apply to exclude some of the floor area used for insulation, provided that this floor area can be used on site within existing zoning regulations.

Several conditional relaxations have been developed to accommodate the additional thermal insulation required to achieve Certified Passive House. Applicants building new homes in the RS-1 District Schedule may apply for relaxations to increase height, decrease the rear yard, and increase permitted building depth requirements, provided that they achieve Passive House Certification for their new house. These relaxations will allow applicants that apply for the floor area exclusion in Sec 10.33 to use more of the excluded floor area, and build to a high standard of energy efficiency without "losing" floor area. These relaxations may be granted at the discretion of the Director of Planning.

It should be noted that applicants must consider impacts on neighbouring houses on such issues as privacy, massing, and shadowing in their application.

4.1. Floor Area Exclusion

The existing floor area exclusion for exterior wall thickness was developed to support applicants who built walls with enhanced insulation value. With more insulation, walls become thicker and this exclusion removes the disincentive of “losing” floor area because of building thicker walls. The exclusion can be found in Section 10.33 of the Zoning and Development By-law. For more information on the exclusion, 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 Certified Passive House home meeting Certified Passive House, this requirement may be waived, as the use of PHPP energy modelling and the retention of a Certified Passive House Designer or Consultant or satisfies the same requirement.

4.2. Relaxation of Height

Applicants building a Certified Passive House home may apply for a relaxation of height via Sec 4.3.6 of the RS-1 District Schedule in the Zoning By-law. The Director of Planning may permit a height increase to accommodate building features designed to reduce energy consumption in a Certified Passive House home to a maximum of 10.7 m. This relaxation is anticipated to remove a barrier to better insulated roofs.

4.3. Relaxation of Rear Yard Setback

Applicants building a Certified Passive House home may also apply for a relaxation of rear yard setbacks, via Sec 4.6.6 of the RS-1 District Schedule. The Director of Planning may decrease the rear yard requirement to accommodate building features designed to reduce energy consumption in a Certified Passive House home to a maximum of 40% of the depth of the site. 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.

4.4. Relaxation of Building Depth

Applicants building a Certified Passive House home may also apply for a relaxation to increase permitted building depth via Sec 4.16.4 of the RS-1 District Schedule. The Director of Planning may increase the permitted building depth to accommodate building features designed to reduce energy consumption in a Certified Passive House home to a maximum of 40% of the depth of the site. 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.

It should be noted that the rear yard compatibility depth provision in RS-1 would not apply if an applicant is seeking the increased building depth allowance of 4.16.4.

Figure 1: 33 ft lot section - RS-1 outright and Certified Passive House conditional relaxations for height

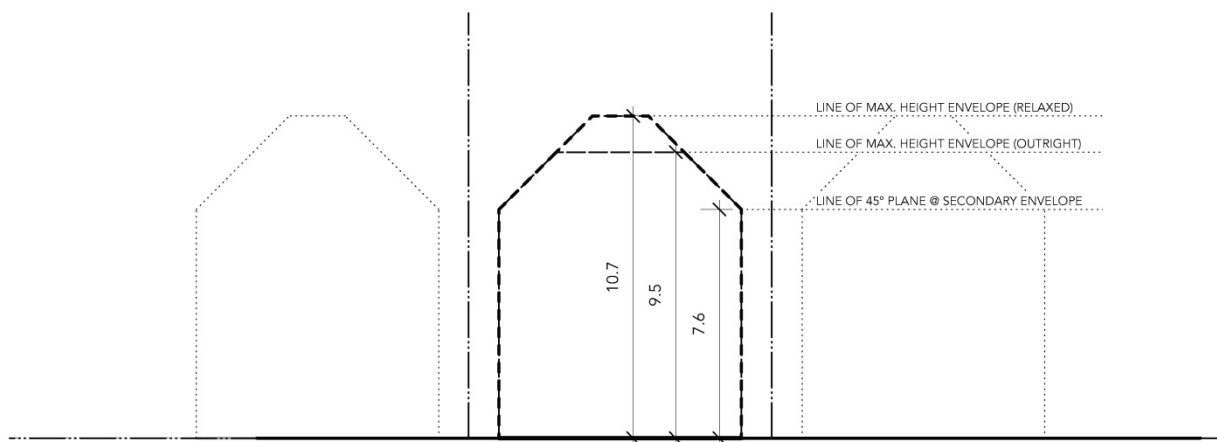


Figure 2: 33 ft lot isometric – RS-1 outright setbacks and building depth

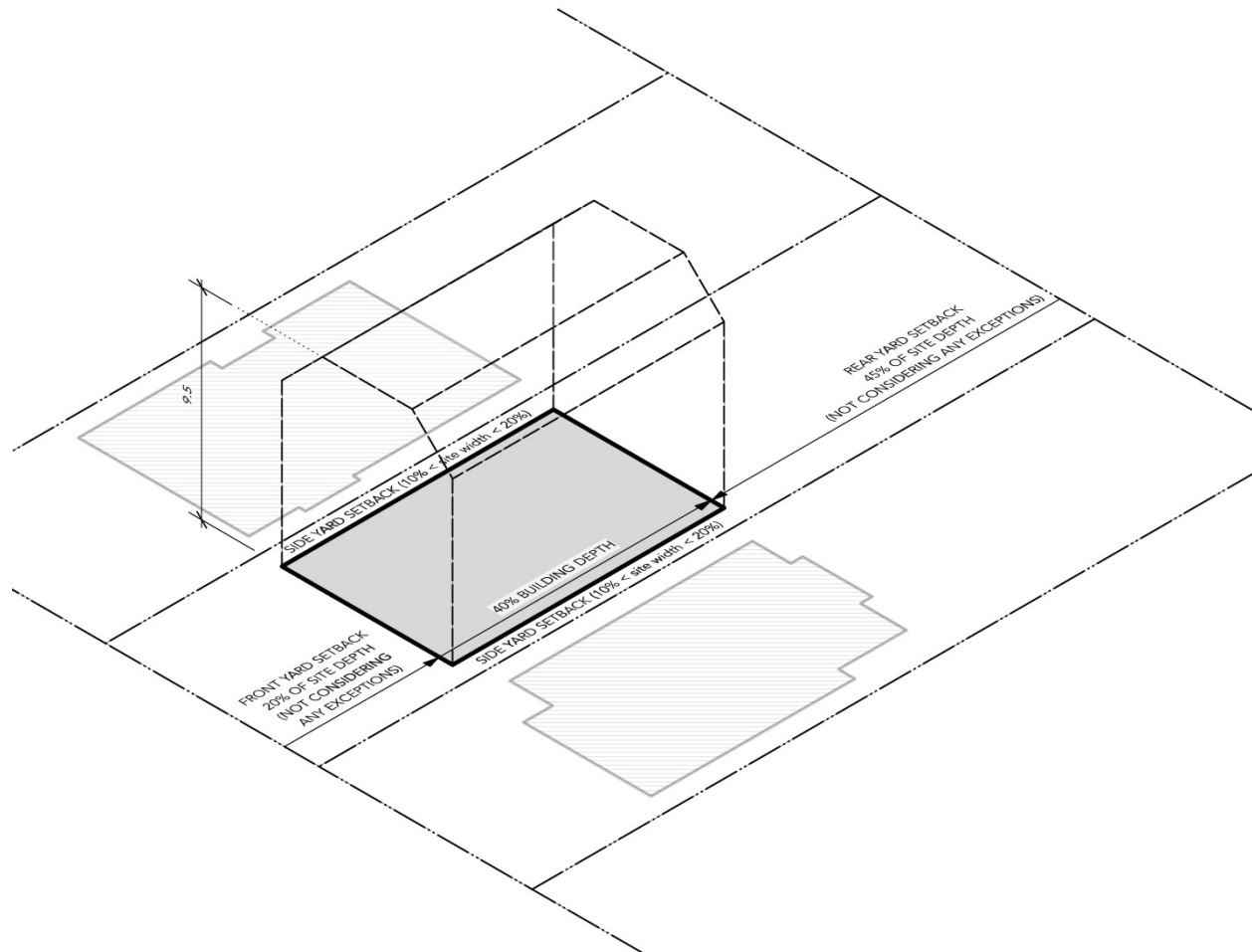


Figure 3: 33 ft lot isometric – Certified Passive House conditional relaxations

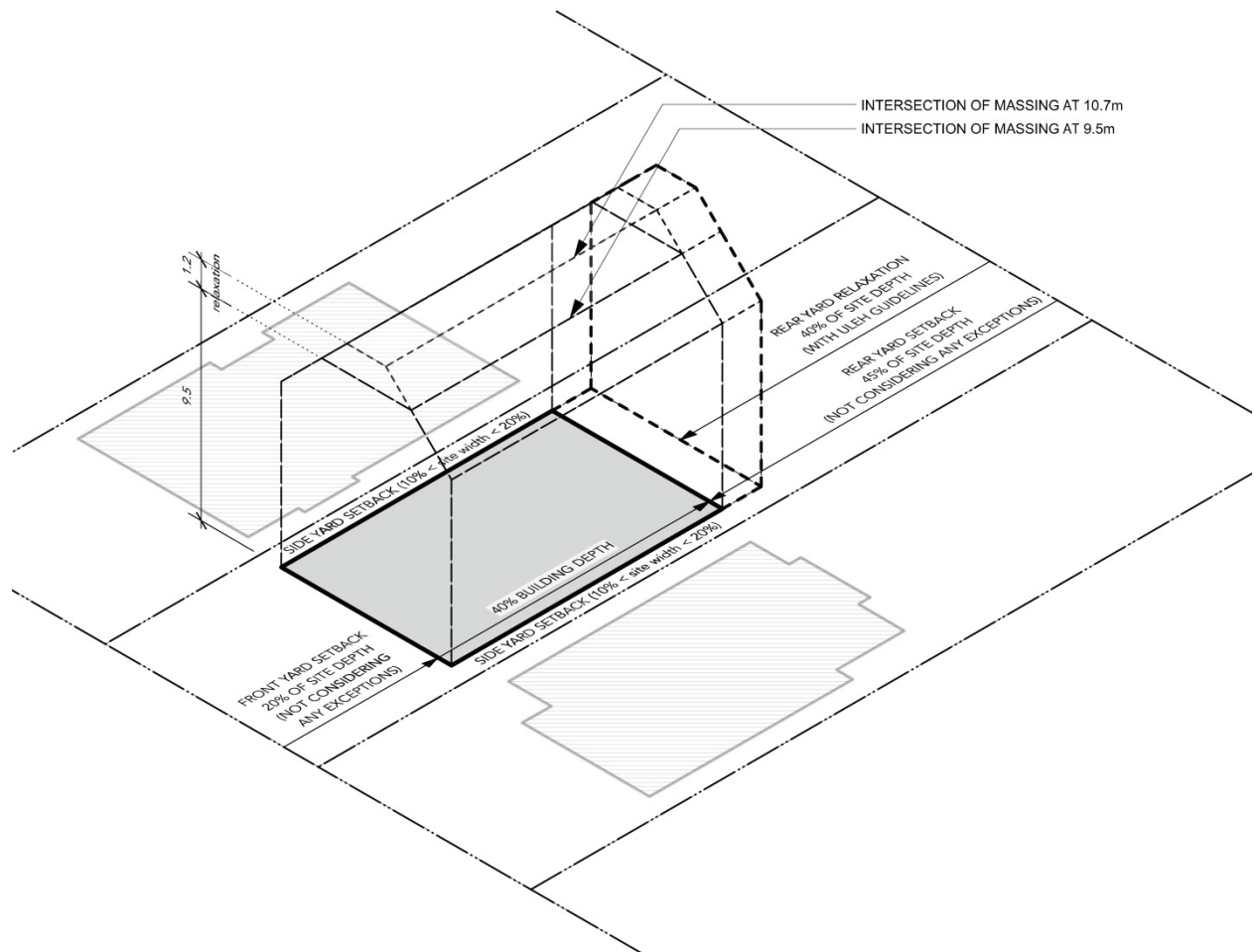


Figure 4: 33 ft lot plan - RS-1 outright and Certified Passive House conditional relaxations

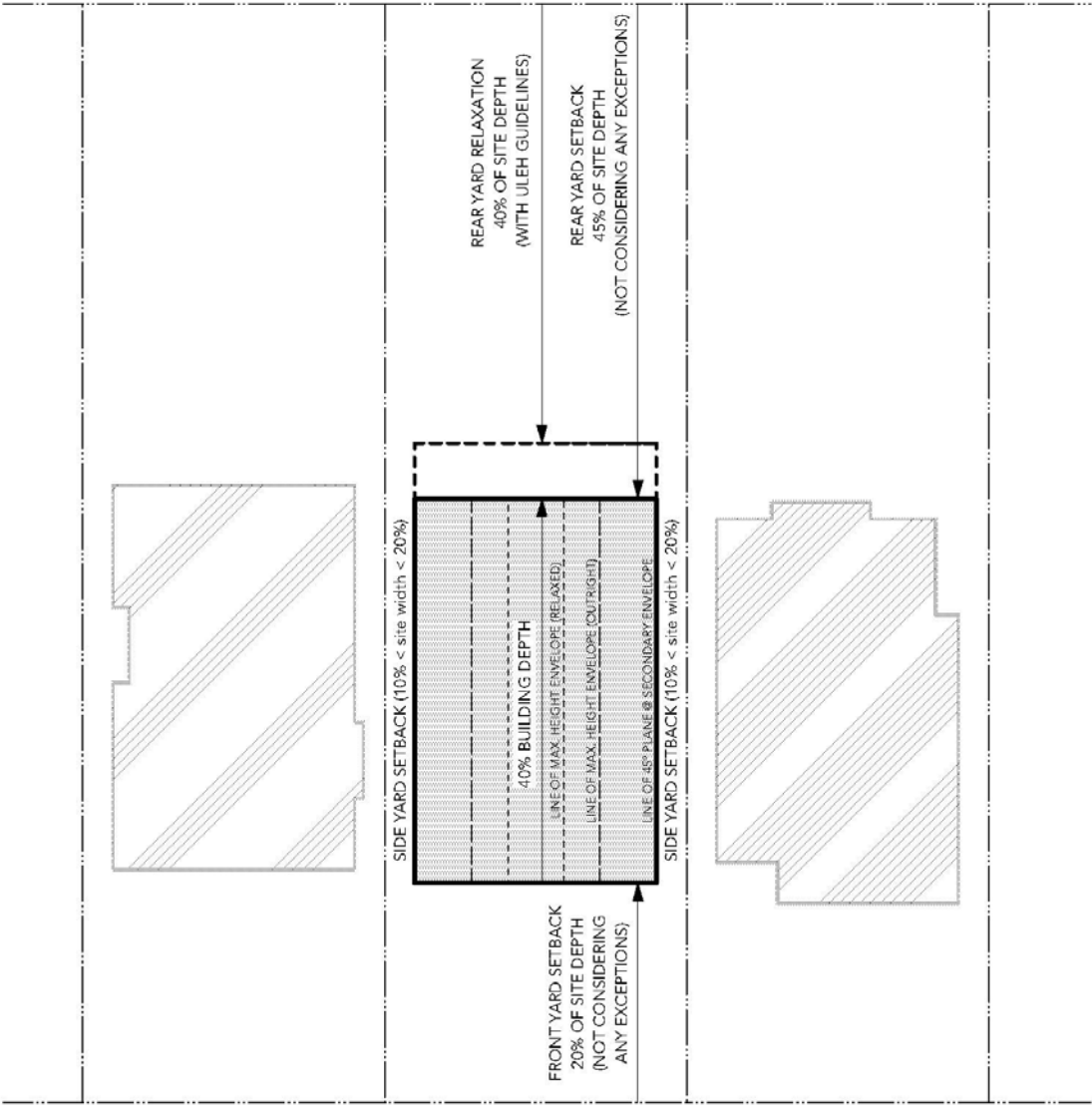


Figure 5: 50 ft lot section - RS-1 outright and Certified Passive House conditional relaxations for height

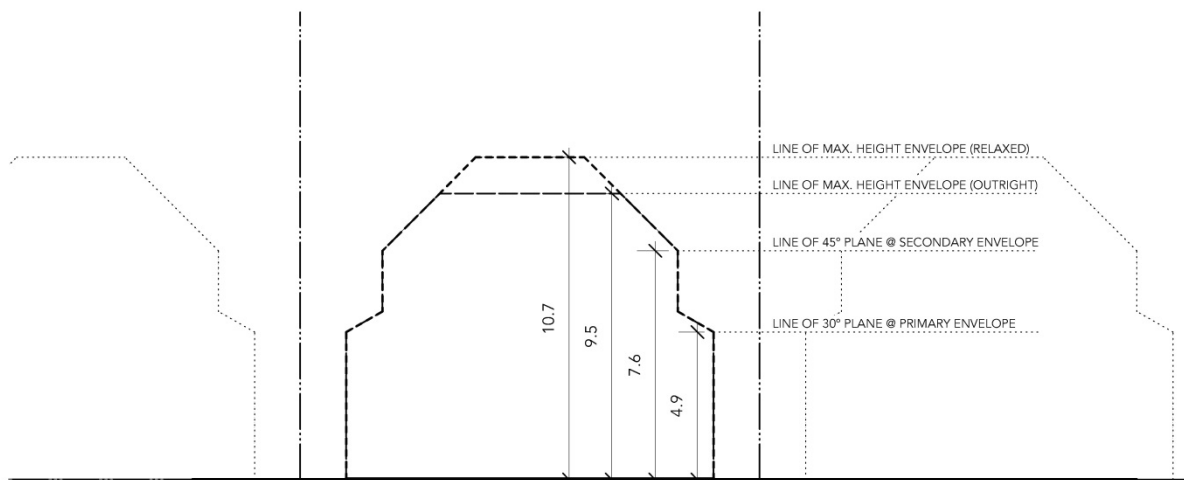


Figure 6: 50 ft lot isometric – RS-1 outright setbacks and building depth

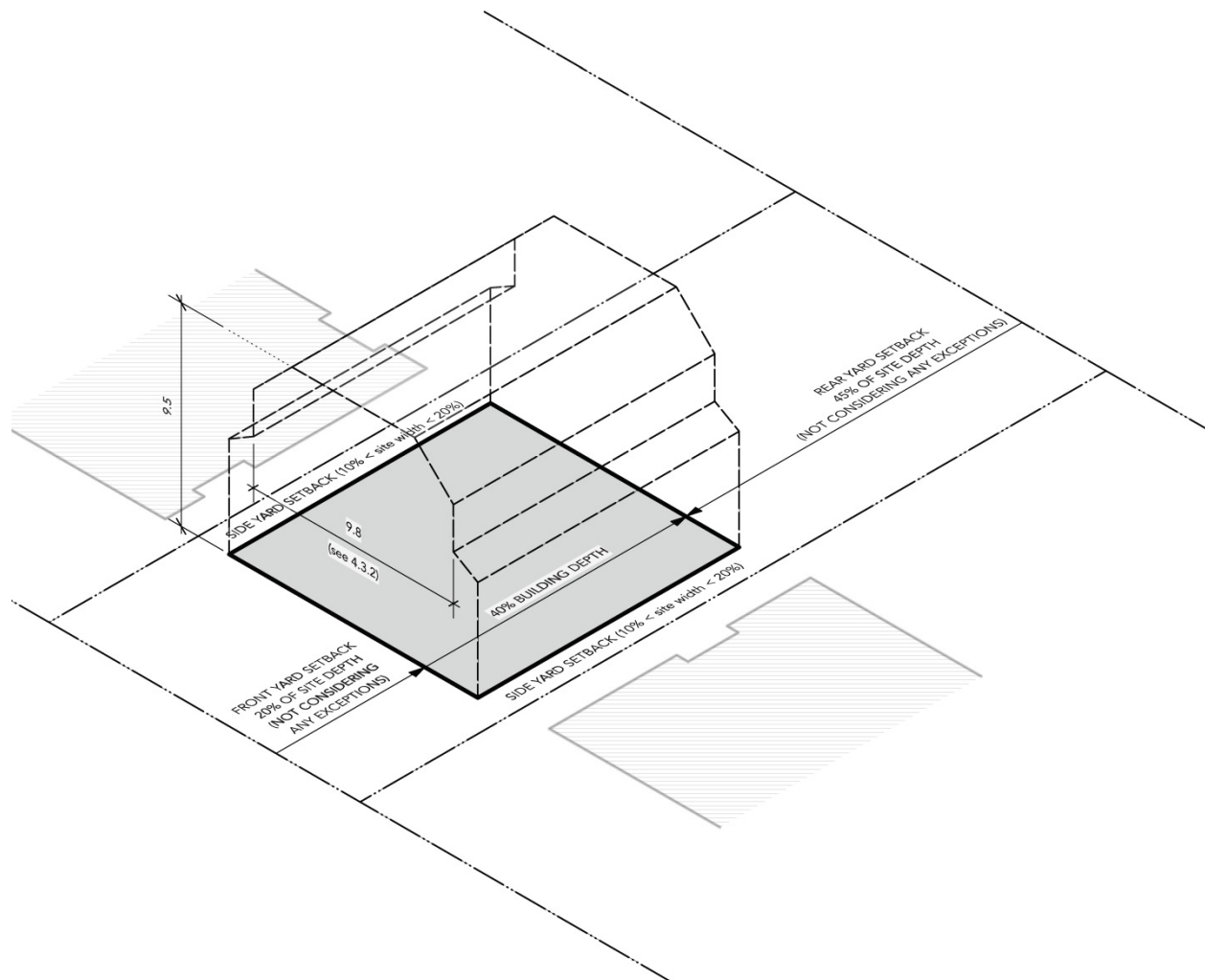


Figure 7: 50 ft lot isometric – Certified Passive House conditional relaxations

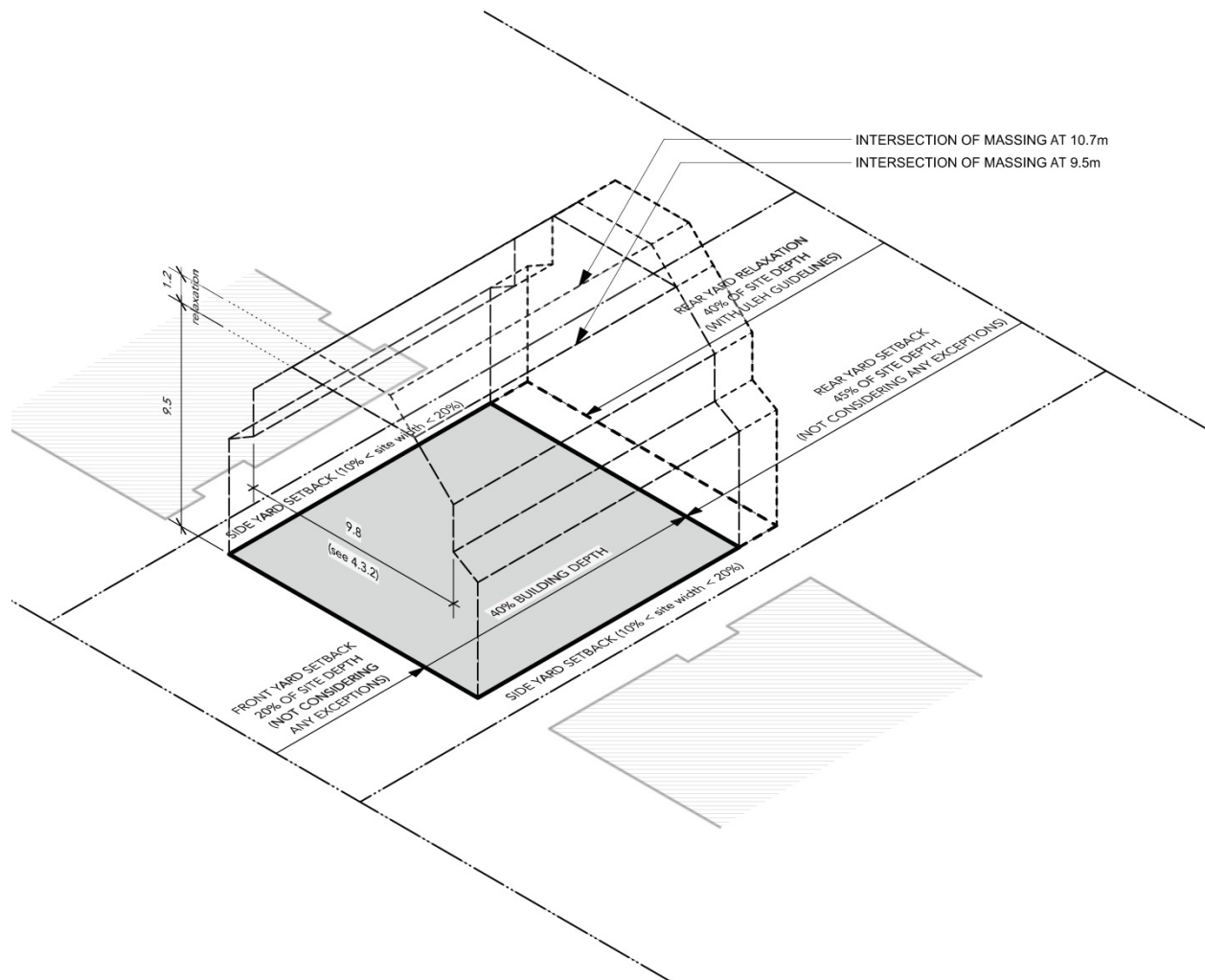
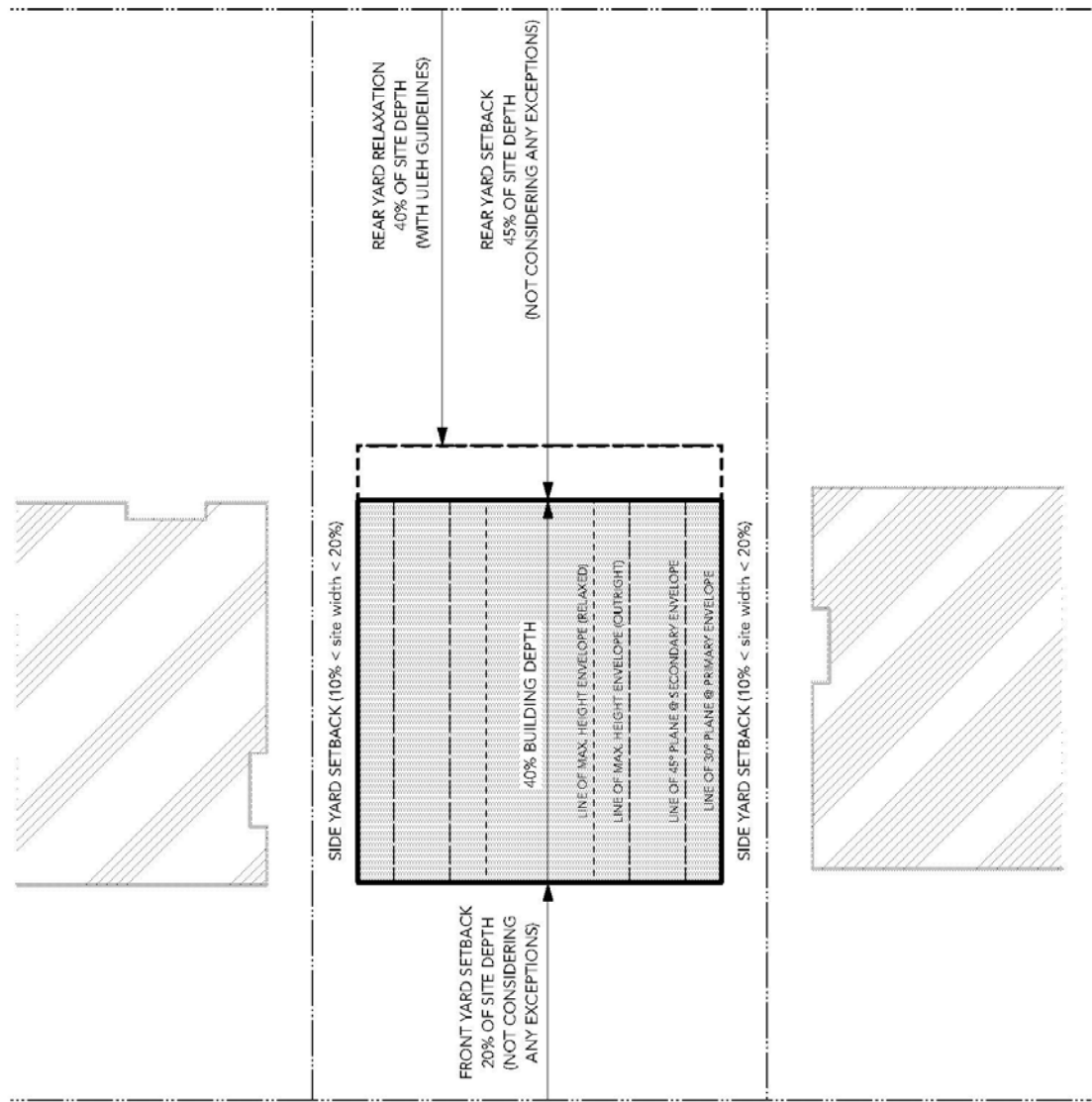


Figure 8: 50 ft lot plan - RS-1 outright and Certified Passive House conditional relaxations



4.5 Other Relaxations

The following table is a quick reference for existing conditional allowances that are available for Passive House or “green” building features, both the ones outlined in this guideline as well as other pre-existing relaxations.

For more information, applicants may consult the relevant regulation (eg: the RS-1 District Schedule), and also the related Zoning By-law Administration Bulletin (eg: *Passive Design: Natural Ventilation and Light*). All of the above can be found at vancouver.ca

Conditional Allowance for Passive House or “Green” Feature	Applicable Policy or Regulation
Allow increase in building height for Certified Passive House home	RS-1 District Schedule in Zoning By-law, Section, 4.3.6
Allow decrease in required rear yard depth for Certified Passive House home	RS-1 District Schedule in Zoning By-law, Section, 4.6.6
Allow increase in permitted building depth for Certified Passive House home	RS-1 District Schedule in Zoning By-law, Section, 4.16.4
Allow floor area exclusion for increased insulation	Zoning By-law, Section 10.33
Allow green walls to project into required yard	Zoning By-law, 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 District Schedules in Zoning By-law, 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	Zoning By-law, Section 10.11.1
Relax building height regulations for roof-mounted energy technologies and to provide access to green roofs	Zoning By-law, Section 10.11.1
Relax side yard and overhang requirements for fixed external shading devices	Zoning By-law, Section 10.7.1

The table below highlights requirement equivalencies for Passive House/energy efficiency in the Building By-law, valid until June 30, 2016.

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. Permit Application Process

The following process outlines the requirements of the application process. This process and associated requirements – as well as typical requirements for a single-family dwelling application in the RS-1 District Schedule - must be adhered to.

Please note the different roles and responsibilities of the:

- *Certified Passive House Designer (CPHD)*,
- *Certified Passive House Consultant (CPHC)*,
- *Certified Energy Advisor (CEA)*, and
- *Passive House Institute Accredited Building Certifier (Building Certifier)*.

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

1. 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 Certified Passive House home, and that the project team will be requesting related relaxations.
2. 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 Certified Passive House, this requirement may be waived, as the use of PHPP energy modelling and the retention of a *CPHD* or *CPHC* satisfies the same requirement.

3. 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 Certified 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 Appendix B) 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 via the typical process. Applicants must provide typical application materials and drawings, in addition to the materials that specify and document which relaxations are being sought as a Certified Passive House home.

4. At mid-construction, 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.

5. 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 (eg 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.

6. Building Certification Process

The permit application process described in the preceding section works in tandem with the process of Passive House Certification. In order to achieve a relaxation as discussed in Section 4 of this document, Passive House Certification must be achieved.

Homes meeting the Passive House certification criteria can be certified as Passive House buildings by any of the Passive House Accredited Building Certifiers operating worldwide. A *Building Certifier* must certify the project plans and the PHPP model. The calculations on which the construction of the building is based and the planning documentation for the building envelope and building services are examined by the *Building Certifier*, and inform part of the process of certification.

Please see section 3.1 of this document for information on the main criteria for certification. For more information on certification, please contact the Passivehaus Insitute at <http://passiv.de/en> or the Canadian Passive House Institute at <http://canphi.ca/>

7. Contact Information

If you have a question that is not answered in this document, please contact:
passivehouse@vancouver.ca

Appendix A: Resources

City of Vancouver Resources

Passive Design Toolkits

<http://vancouver.ca/home-property-development/passive-design-guidelines.aspx>

Administrative Bulletins Explaining Several Current “Green” Conditional Allowances

<http://vancouver.ca/home-property-development/zoning-bylaw-administrative-bulletins.aspx>

Other Resources

Passivehaus Insitute (International)

<http://passiv.de/en>

Canadian Passive House Institute

<http://canphi.ca/>

Passiv Haus system

www.passiv.de

*Note: Links provided are valid as of 2015. The precise links often change or are updated regularly over time. It is recommended that users enter the title provided into their internet search engine to source electronic copies of the documents if link becomes outdated.

Appendix B: Glossary of Terms

ACH

ACH stands for air changes per hour. This is a metric of house air tightness. ACH is often expressed as ACH50, which is the air changes per hour when the house is depressurized to -50 pascals during a blower door test. The term ACHn or NACH refers to "natural" air changes per hour, meaning the rate of air leakage without blower door pressurization or depressurization. ACHn or NACH is used by many in the residential HVAC industry for their system sizing calculations.

Building Envelope

A building's envelope describes the entire structure of the building, separating the house from the environment. A Passive House home should have an insulating envelope and an airtight envelope that excludes thermal bridges.

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.

Passive House (or Passivhaus)

A type of building that, by design, is extremely energy efficient. Passivhaus design originated in Germany in the 1970's. Some marked features of PH design include a tight building envelope, intentional placement with regard to sun and landscape features, efficient windows, energy recovery ventilation, and dense insulation. While promoting ecologic sustainability, PH also incorporates clean internal environmental standards, protecting inhabitants from mold and other toxicities.

Certified Passive House Designer (CPHD)

A CPHD is a person with significant professional and educational experience in architecture and/or building, that has been certified by the Passive House Institute as an accredited Certified Passive House Designer.

Certified Passive House Consultant (CPHC)

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

Passive House Institute Accredited Building Certifier (Building Certifier)

A person accredited by the Passive House Institute in Darmstadt, Germany for the purpose of certifying buildings according to Institute standards for Passive House buildings.

PHPP

Passive House Planning Package: software used to determine whether a building meets Passive House standards. The package assists with house design and window planning as well, to test how different scenarios will impact energy use. Available through the Passive House Institute.