

# Bulletin

## Building Height Technical Design Supplement

*Effective January 26, 2022*

*Last amended October 19, 2023*

*Authority: Director of Planning*

# Table of Contents

- Regulatory References..... 3
- Background and Context..... 3
- Navigating Applicable Sections of the Zoning and Development By-law ..... 3
- 1 Determining What Grades to Use in Measuring Building Height..... 4
  - 1.1 Existing Grades ..... 4
  - 1.2 Official Established Building Grades..... 4
  - 1.3 Finished Grades ..... 5
- 2 Base Surface - Planes to Measure Building Height From..... 5
  - 2.1 Base Surface..... 5
  - 2.2 Horizontal Datum Plane ..... 6
- 3 Determining When to Use Existing Grades or Building Grades ..... 6
- 4 Compatibility of Grades..... 6
- 5 Interpolation ..... 7
- 6 Where to Measure Maximum Heights on a Building ..... 8
- 7 Storeys, Envelopes, Roof Slopes ..... 10
- 8 Protrusions Beyond the Height Limitations (General Regulations- Section 10.1 Building Height) ..... 10
  - 8.1 Features that may Exceed Permitted Building Height (Section 10.1)..... 10
  - 8.2 Decorative Roofs..... 13
- 9 Height of Accessory Buildings..... 13
- 10 View Cones ..... 14
- 11 Questions..... 14
- Appendix A. Grading Plan Examples ..... 15
  - A1. Registered Survey Plan..... 15
  - A.2 Building Grades Plan ..... 16
  - A3. Finished Grades noted on Development Plans ..... 17
  - A4. Horizontal Datum Plane ..... 18
- Appendix B. Interpolation Calculation Example ..... 19
- Appendix C. Accessory Building Height ..... 21

## Regulatory References

- Zoning and Development By-law No. 3575

## Background and Context

This bulletin provides information on the interpretation and administration of regulations relating to building height in the Zoning and Development By-law (the By-law). It does not restate the regulations but clarifies how they are interpreted and applied in specific circumstances.

While building height is typically calculated as described in the definition in Section 2 of the By-law, there are variations to address unique site circumstances and forms of development. Individual district schedules provide specific details on the methods and requirements that apply in each district. As well, Section 10 of the By-law contains regulations that apply on a general basis across all zoning districts in the city.

## Navigating Applicable Sections of the Zoning and Development By-law

- Definitions for terms related to building height in the By-law are found in Section 2 - Definitions. These include building height, base surface, existing grade, finished grade, official established building grades, storey, partial-storey, and decorative roof.
- General regulations pertaining to building height can also be found in section 10.1 of the By-law.
- Within specific district schedules, building height regulations are found in Section 3 and 4 and in some districts provisions related to height are further described in district-specific guidelines.
- All zoning-related documents, including guidelines and bulletins, can be found in the [Zoning and Land Use Document Library](#) on [Vancouver.ca/zoning-library](https://vancouver.ca/zoning-library).

# 1 Determining What Grades to Use in Measuring Building Height

Throughout the By-law different terms are used to describe “grades” that are to be used as the basis for measuring building height. Generally they fall into the following categories (each is defined in Section 2 of the By-law):

## 1.1 Existing Grades

Existing grades are determined by a survey of the site and represent the elevation of the surface of the existing undisturbed ground on the proposed development site (and adjacent sites). Where existing grades are required for an application they must be documented by a Registered B.C. Land Surveyor who will plot them on a plan of survey that must be submitted with the development permit application, in order to assess the existing topography and to determine compatibility of grades (see registered survey plan example in Appendix A1). See [Section 2 - Definitions](#) in the Zoning and Development By-law for Existing Grades definition.

### Plans Submitted by Registered B.C. Land Surveyors

Registered B.C. Land Surveyors will know which elevations to plot on the survey for the development site and adjoining sites, depending on the zoning designation for the development site.

**Example:** if a development site is located in an R1-1 zone, the surveyor will plot the existing grades based on the height requirements specified in the R1-1 District Schedule. Additional grades on adjoining sites, streets and lanes will also be plotted and the survey will indicate the location of existing retaining walls, significant trees, or other features on the site that may be considered in the review of the development application.

## 1.2 Official Established Building Grades

Official established building grades (referred to as building grades in this bulletin) are established through application to the City Engineer and represent the intended elevations of the street and/or lane at the front and rear property lines of the site. These are necessary to ensure building entries and access points will align with existing and future sidewalks, streets, and lanes adjacent to a development site. The building grade plan will show these design grades at the four corners of the site, and at intermediate locations along the street and lane property lines (see building grades plan example in Appendix A2).

Building Grades are not defined in the Zoning and Development By-Law but are referred and are set in accordance with the requirements of the City Engineer. Refer also to the [Bulletin - Official Established Building Grades](#).

For information on Building Grade applications to the City Engineer, please refer to the [Building grades for sidewalk and street elevation webpage on Vancouver.ca](#).

Through the application process, Engineering staff will determine the required process for establishing these design grades. Fees for building grades will be collected by the Engineering department and are based on the process to determine them and on the street and lane frontage distances for the site in question.

**Note:** While a particular development site may be otherwise exempt from submitting City building grades, (see notes under section 3(a) below) if the Director of Planning determines that building grades are the most appropriate to use in order to maintain compatibility with nearby sites, the applicant may be required to apply for these design grades during the application process.

### 1.3 Finished Grades

Finished grades are the final grades proposed around the building upon completion of the development. These grades must be shown on development application drawings to ensure the final grades around the development will be compatible with adjoining sites. Finished grades are not used in the calculation of building height. However, in cases where it is necessary to determine whether the lowest level in a building is considered as a basement or cellar (for livability considerations in many zones), or for calculating the number of storeys, the finished grades proposed around a building are used (see attached sample of finished grades shown on a development application drawing in Appendix A3 and also refer to the definitions of finished grade, basement and cellar in [Section 2 of the By-law](#)).

## 2 Base Surface - Planes to Measure Building Height From

When measuring building height a base “plane” is established, from which measurement points are taken to determine the height of a building.

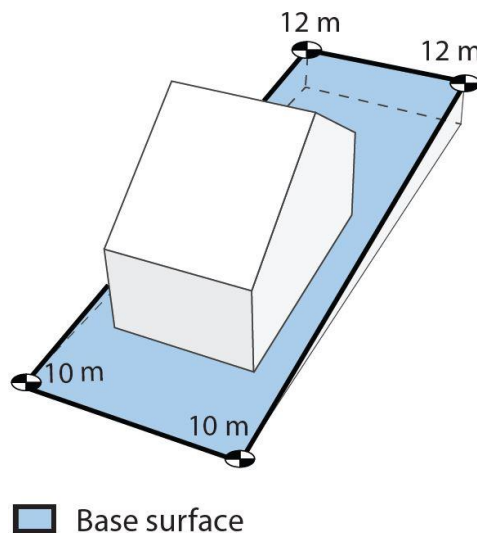
Generally, two types of planes are described in the By-law: base surface and horizontal datum plane.

**Note:** In some cases (C-2 for example), a combination of planes and measuring points could be referenced. Always refer to the height sections contained in the district schedules for specifics.

### 2.1 Base Surface

Base surface is the hypothetical surface determined by joining the grades (either building grades or existing grades) at all corners of the site. For the purposes of measuring the building height at any point, the elevation of the point on the base surface from which height is measured is determined by interpolating from the grades provided (see Figure 1 of base surface below and section 5 Interpolation in this bulletin).

Figure 1. Base surface



### 3 Determining When to Use Existing Grades or Building Grades

Whether to use existing grades or building grades to establish the base surface for measuring height is determined by the following:

- a) **As prescribed in district schedules:** Some district schedules prescribe the use of existing grades taken at specific points on the site, to measure building height. Also, some districts are excluded from the requirement for submitting building grades (see [Bulletin - Official Established Building Grades](#) for details).
  
- b) **Where existing grades are not prescribed in district schedules:** building grades will be used to determine the base surface and to measure building height from that surface, as noted above.

**Note:** In situations where the City Engineer is not able to provide building grades (i.e. sites with no lanes), existing grades, (or a combination of existing grades and building grades) may be used. Any existing grades must be submitted on a survey plan, prepared by a registered British Columbia Land Surveyor (BCLS).

### 4 Compatibility of Grades

Regardless of which grades are submitted with the development application, the Director of Planning has the final discretion on which grades to use in a given circumstance, based on a determination of compatibility with the existing grades of adjoining sites, or the general topography of the area.

If, for example, existing grades are determined to be **higher** than those that would result from City building grades, but are consistent with existing grades on adjoining sites, the Director of Planning may determine that the use of building grades to establish base surface is appropriate (see Figure 2).

**Figure 2. Example of existing grades higher than City building grades**



*Source: City of Vancouver*

Note: In the above image the sites are elevated above the level of the sidewalk/street

Alternatively, if existing grades are determined to be **lower** than those that would result from City building grades, the Director of Planning may determine that the use of building grades to establish the base surface is appropriate (see Figure 3).

**Figure 3. Example of existing grades lower than City building grades**



*Source: City of Vancouver*

Note: In the above image the sites are below the level of the sidewalk/street

The objective of the compatibility review is to ensure that once the development is completed, the finished grades around the project and the height of the completed building are consistent with buildings (existing, proposed, or that may be built in the future) on adjacent sites.

The Director of Planning will also consider the “general topography of the area” in the compatibility review. This is to ensure that a “one-off” situation does not occur, where the site immediately adjacent to the development site is determined to be not in keeping with the other sites on the streetscape. In this situation, the Director of Planning may decide that the more common streetscape conditions should govern the decision on what grades to use.

**Note:** Where there are existing retaining walls along property frontages or common property boundaries the Director of Planning will determine whether existing grades will be taken from the “top of wall “ (as per survey) or at the bottom of the walls.

## 5 Interpolation

Once it is decided which grades to use in establishing the base surface, the calculations can be done. For the purposes of measuring the height of a building at any point, the elevation at that point on the base surface is determined by interpolating from the grades provided. In this context, interpolation is the process of establishing unknown values that fall between known values. The process of interpolation is used to determine these values regardless of whether the base surface is determined by using existing grades or building grades (see interpolation calculation example in Appendix B).

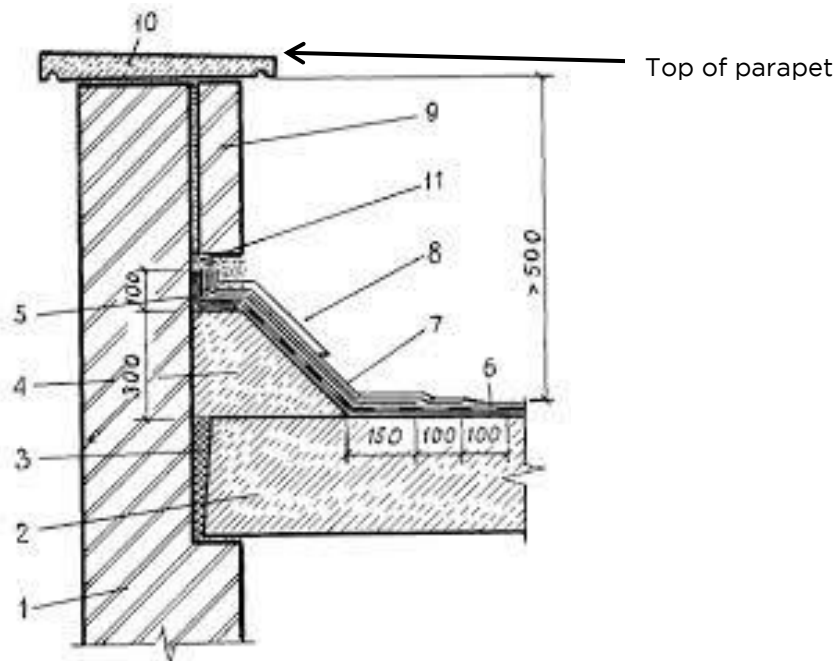
## 6 Where to Measure Maximum Heights on a Building

District schedules will specify the maximum building height that is permitted within the zone. For the numerical limit (e.g. 10.7 m), the height of a building must comply “at any point” on the site. This will normally be the highest point of the roof, relative to the grade elevation directly beneath this high point.

Some buildings (normally those with flat roofs) may have parapets attached to the roof. In these cases, the maximum building height will be measured to the top of the parapet (relative to the lowest grade elevation, see Figure 4). Generally, guards located adjacent to roof deck areas on a building must also comply with building height limitations (see Figure 5). Section 10.1 of the By-law lists features that can be considered on a discretionary basis when located on roof-tops beyond the allowable height limit prescribed within district schedules (see discussion on section 10.1 later in this bulletin).

The calculations required to determine that the building height complies with the maximum permitted height at any point on the site can be especially challenging where the site is sloping or where complex roof forms are proposed (see Figure 6). In these situations, building height measurements may be required at several points on the base surface beneath the highest points on the building to determine compliance [see sections on interpolation (section 5) and storeys, envelopes, roof slopes (section 7) in this bulletin].

Figure 4. Example of parapet roof



Note: Height measured to top of parapet



**Figure 5. Example of roof-top guard**



*Source: Flickr*

Note: Height measured to top of roof-top guard

**Figure 6. Example of complex roof design**



*Source: City of Vancouver*

Note: Height must comply at any point on the roof

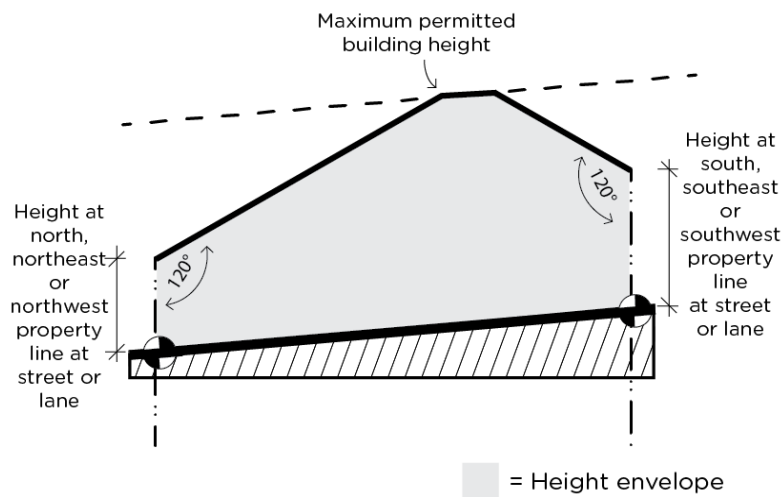
## 7 Storeys, Envelopes, Roof Slopes

In addition to specifying a maximum height limit, many district schedules include limitations on the number of storeys (or partial storeys). See storey definitions and diagrams in Section 2 of the By-law.

Also, some district schedules require compliance to “building envelopes”, within which any proposed building must be contained.

**Note:** As buildings must comply to height “at any point” on the site, the numerical limits shown on the envelope must take into account any sloping conditions on the site in question. Interpolation along the specified property lines may be required to ensure compliance. See Figure 7 for an example of an envelope requirement for the RM-5 district below.

Figure 7. Example of building envelope



Some district schedules allow for discretionary height increases if certain conditions are met. Where discretionary increases in height are noted in specific district schedules, additional information on how this discretion is exercised is often found in district-specific design guidelines (see guidelines on the [Zoning and Land Use Document Library at Vancouver.ca](#)).

## 8 Protrusions Beyond the Height Limitations (General Regulations-Section 10.1 Building Height)

Section 10.1 of the By-law lists specific building features that may be permitted at a greater height than otherwise permitted within the zoning district that applies to the site.

### 8.1 Features that may Exceed Permitted Building Height (Section 10.1)

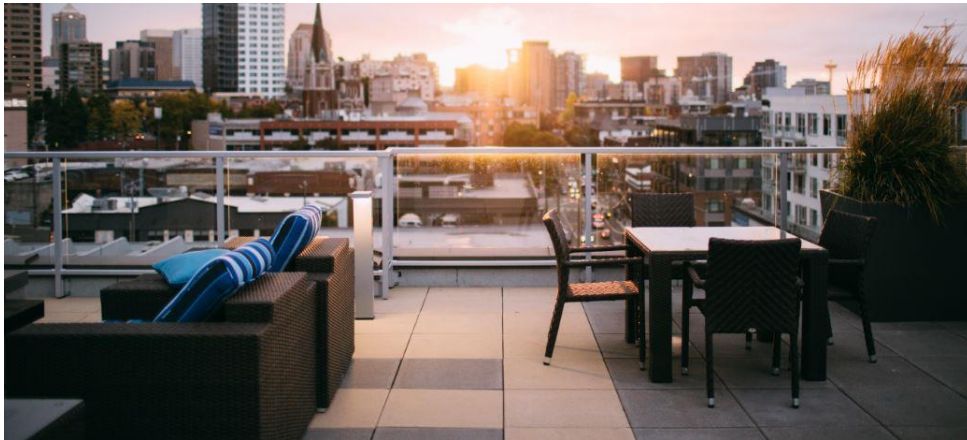
The Director of Planning may, after first considering the effects on siting, massing, overlook, shadowing, and noise allow the items noted in section 10.1.1 of the By-law and listed below to exceed the maximum permitted building height noted in applicable district schedules:

- architectural appurtenances;
- common roof-top amenity structures;(see Figure 8)

- roof-top access structures; (see Figure 9)
- mechanical rooms or appurtenances, including elevator machine rooms;
- screening materials, required guards, chimneys (see Figure 10);
- access and infrastructure required to maintain green-roofs or urban agriculture (see Figure 11); and
- roof-mounted energy technologies, venting skylights, opening clerestory windows designed to reduce energy consumption or improve natural light and ventilation (see [Roof Mounted Energy Technologies and Green Roofs](#) bulletin).

Specific height and area limitations and/or design requirements can apply to some of these items (see section 10.1 of the By-law for more specifics and some examples shown below).

**Figure 8. Example of common roof-top amenity space**



Source: Unsplash

**Figure 9. Example of roof-top stair access structure**

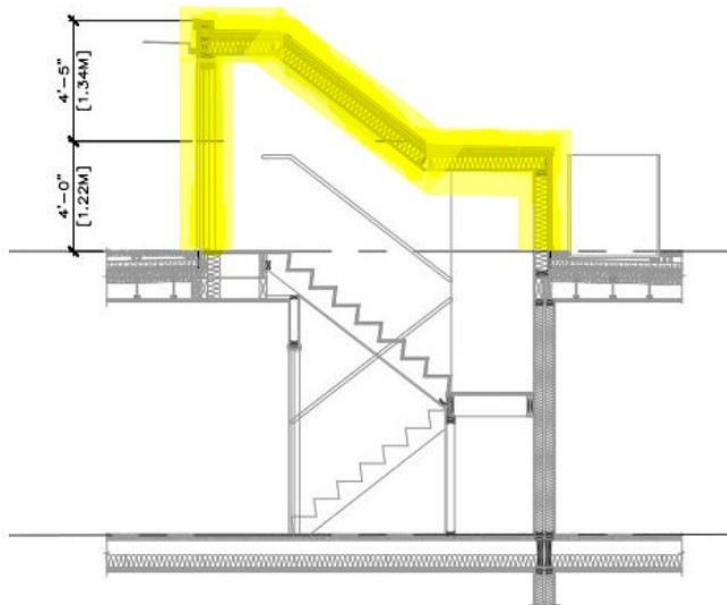


Figure 10. Example of roof top mechanical screening



Source: Flickr

Figure 11. Example of a green roof



Source: pnwra, Victoria BC Marriot Green Roof, CC By 4.0

## 8.2 Decorative Roofs

Section 10.1.2 of the By-law allows the Development Permit Board to permit a decorative roof (defined in Section 2 of the By-law), on buildings higher than 30.5 m (100 ft.), provided it enhances the appearance of the building, screens and integrates mechanical equipment and does not add to the floor area of the building (see Figure 12).

Figure 12. Example of a decorative roof



Source: City of Vancouver

## 9 Height of Accessory Buildings

Accessory buildings are also defined in Section 2 of the By-law.

Individual district schedules prescribe the building height limitations that apply to these structures. Height measurements are calculated using the same grading and interpolation methods used for the principal building on a site (see Appendix C: Accessory building height).

**Note:** Laneway houses and infill buildings are not considered accessory buildings and have specific height limitations prescribed in the By-law or associated design guidelines. For example, laneway house requirements are noted in Section 11 of the By-law and infill height limitations are found in either the appropriate district schedule or applicable guidelines.

## 10 View Cones

City Council has adopted view cones to protect selected public views. Some sites in the city are affected by these view cones. Refer to the [View Protection Guidelines](#) for locations and map references. These maps show only the location of view cones, they do not prescribe the maximum building heights within them. Consultation with staff is necessary to determine if maximum building height is affected. Factors such as topography and distance of the site from the view point will influence potential view blockages and the resulting maximum building height.

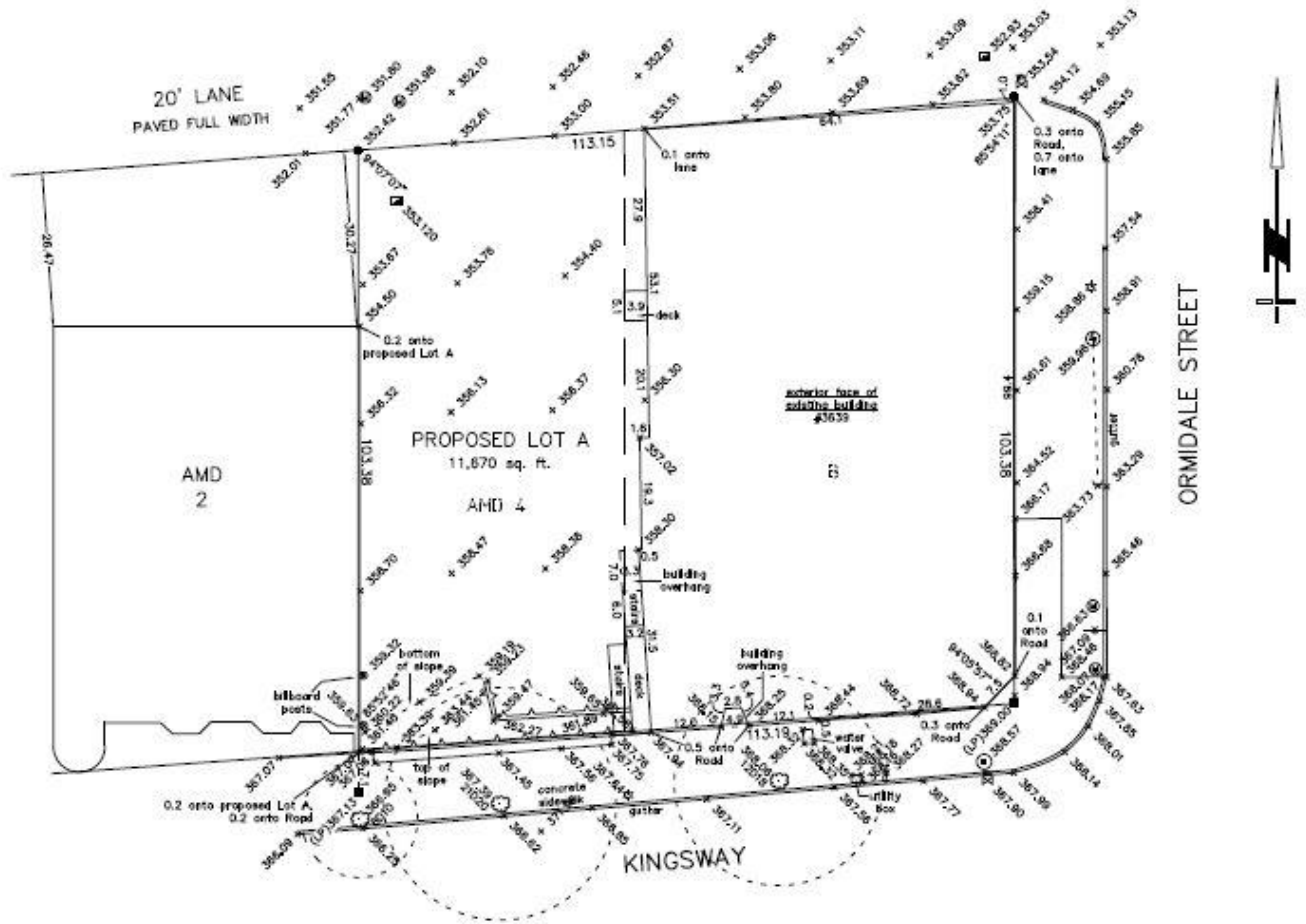
In some cases, the maximum height that can be achieved within the view cone is greater than the height limit specified in the applicable zoning district schedule. In this circumstance, the zoning limit will take precedence.

## 11 Questions

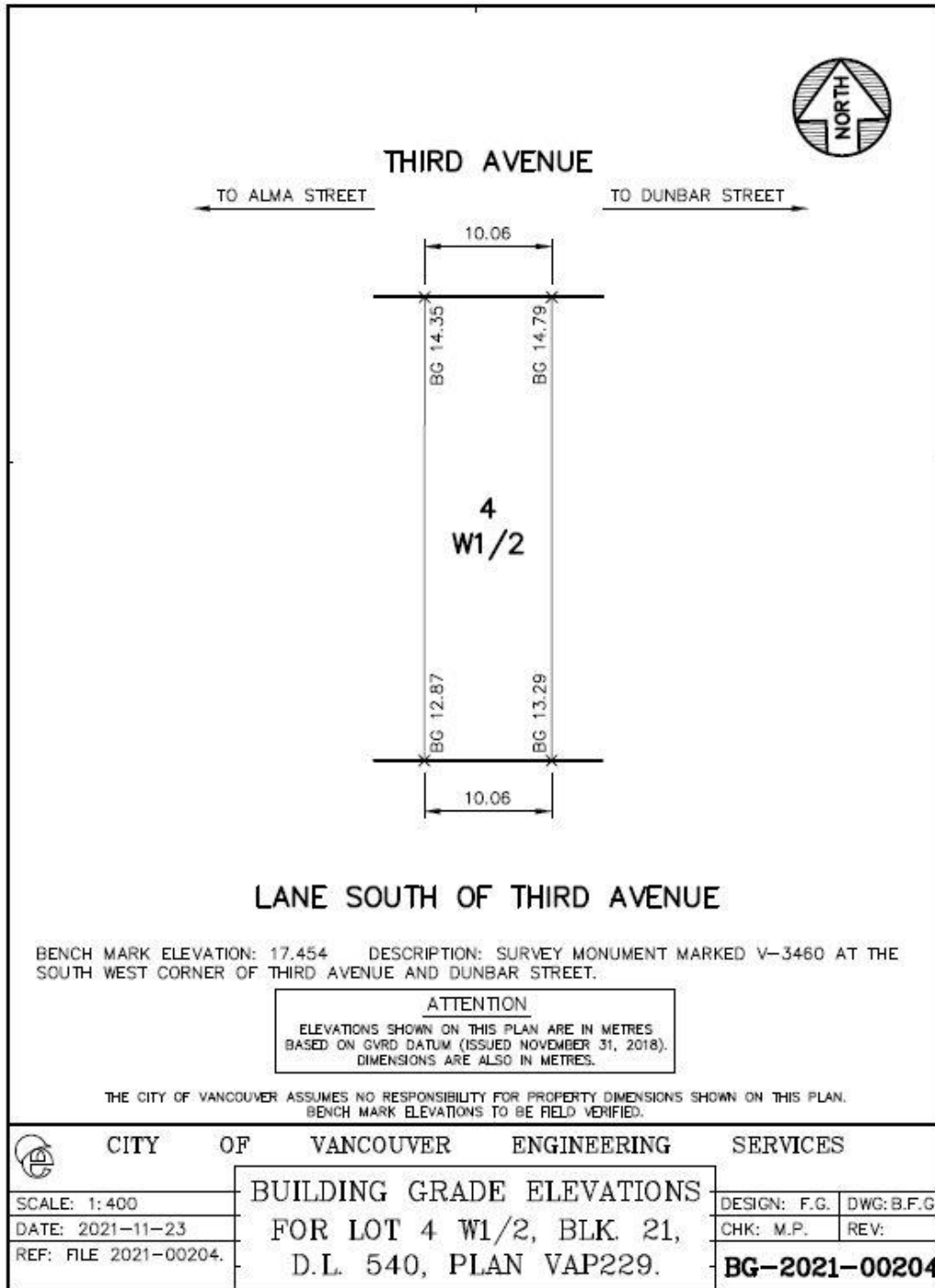
For permitting information and site-specific inquiries, please contact the Development and Building Services Centre through the online form at [vancouver.ca/building-development-support](https://vancouver.ca/building-development-support). All enquiries received through the form will receive a reference number, which can be used to obtain real-time status updates by calling 3-1-1.

# Appendix A. Grading Plan Examples

## A1. Registered Survey Plan

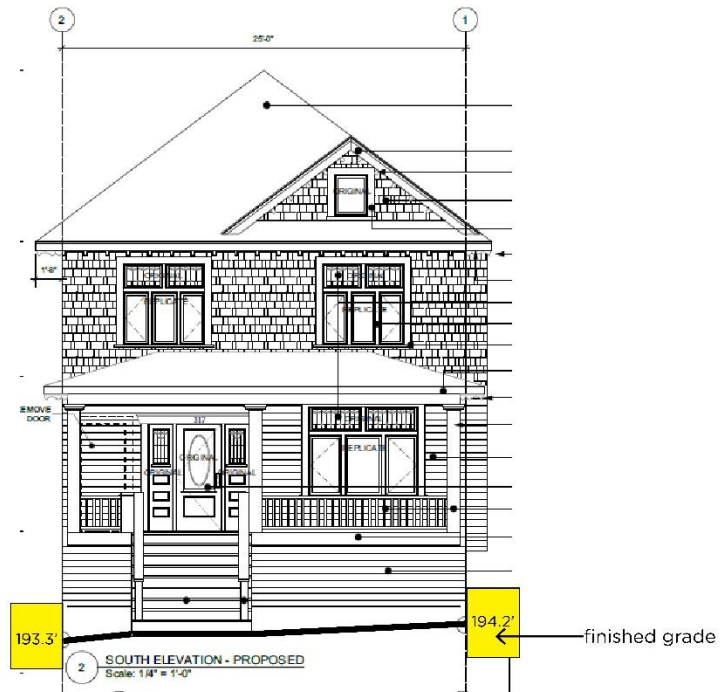


A.2 Building Grades Plan



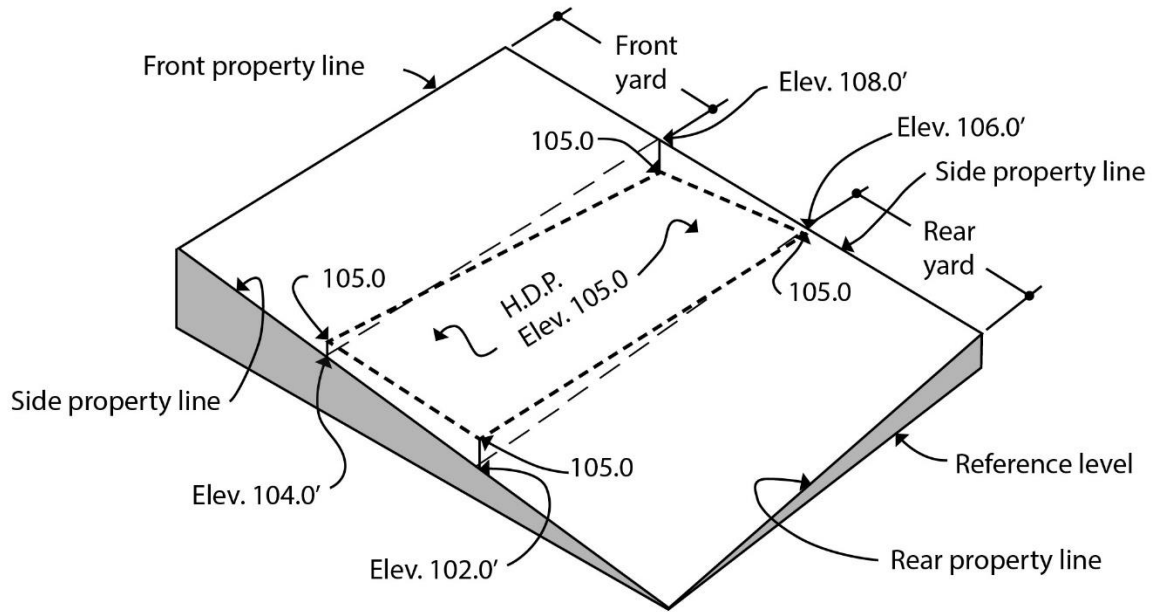


### A3. Finished Grades noted on Development Plans



#### A4. Horizontal Datum Plane

The use of a “Horizontal Datum Plane” as the base from which principal building’s maximum height, maximum roof spring-point height, and other height-related sections are taken is an attempt to simplify these regulations while maintaining reasonable control of building height.



$$\text{H.D.P} = \frac{102 + 104 + 106 + 108}{4} = 105.0' \text{ elevation}$$

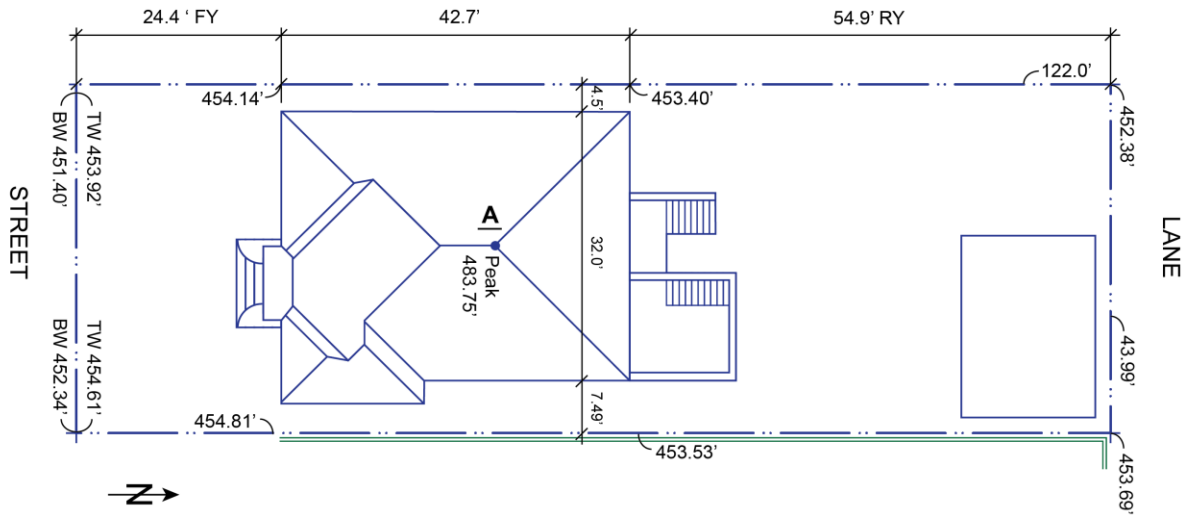
Therefore, maximum height is 35' +

H.D.P. elevation may not exceed 1.5 m (5') above lowest averaged elevation:

$$105.0' - 102.0' = 3.0' \leq 5.0' \quad \text{OK}$$

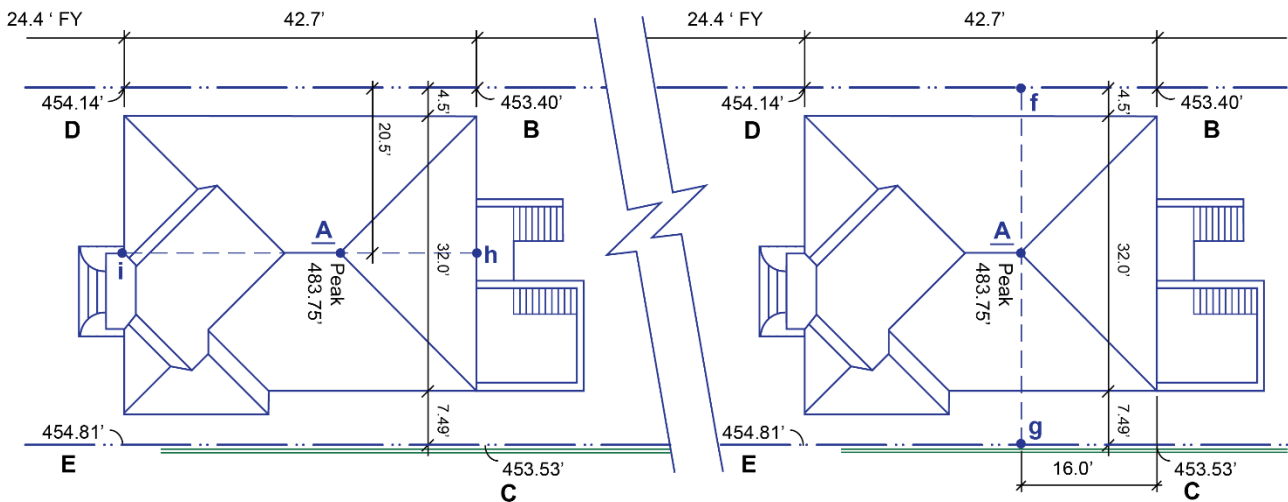
# Appendix B. Interpolation Calculation Example

## Step 1



- Point A along the roof ridge is the highest point of the house, as grades slope downwards from south to north; therefore, the elevation of the 'modified base surface' below this point (A) must be determined
- Design elevations used to determine the hypothetical surface for measuring height are (clockwise from top left) 454.14', 453.40', 453.53', and 454.81'

## Step 2



Using the four grade elevations at the intersection of the front and rear yards and side property lines, how do we determine the grade elevation at Point 'A'?

### Step 3

- It takes three steps to calculate the elevation below Point 'A':
  1. locate Point A on a site (dimension from side property lines or from front or rear of the buildings/ yards)
  2. interpolate E-W along the front and rear yards, using grade elevations at points B & C to point 'h' and points E & D to point 'i', OR N-S along the side property lines, using grade elevations at points B & D to point 'f' and points C & E to point 'g'
  3. interpolate between grade elevations at points 'h' and 'i' to Point A, OR points 'f' and 'g' to Point A to determine the grade directly below A

- The difference between the roof ridge elevation and the grade elevation below Point A will be the overall height of the building

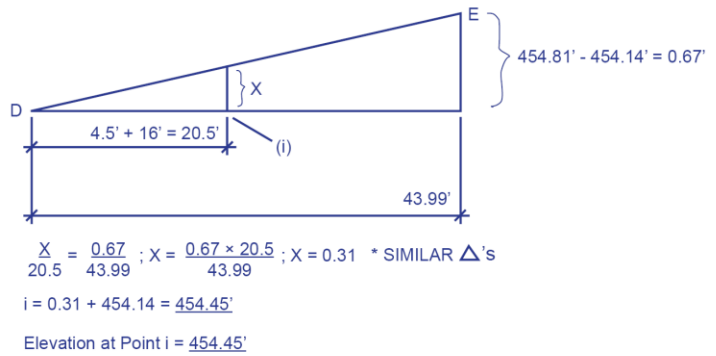
- The actual interpolation follows this formula  

$$[(E - D) \div L \times \underline{D_i}] = \text{grade at } i \text{ where}$$

D, E = lowest and highest grades at points at ends of line segment DE

L = length of line segment DE

$\underline{D_i}$  = distance between lowest grade of segment DE and point under consideration (i)



### Step 4

#### Calculations continued from file #3

Then do a similar calculation for grade at Point h

$$453.53 - 453.40 = .13$$

$$\therefore \frac{x}{20.5} = \frac{.13}{43.99} \therefore x = \frac{.13 \times 20.5}{43.99} \quad x = .061$$

$$\text{So } h = .061 + 453.40 = 453.46$$

Therefore, elevation at grade under Point h = 453.46

Then interpolate to a point directly under Point A

$$\text{Point } i (454.45) - \text{Point } h (453.46) = .99$$

$$\therefore \frac{x}{16.0} = \frac{.99}{42.7} \therefore x = \frac{.99 \times 16.0}{42.7} \quad x = .371$$

$$\text{Then } 453.46 + .371 = 453.83$$

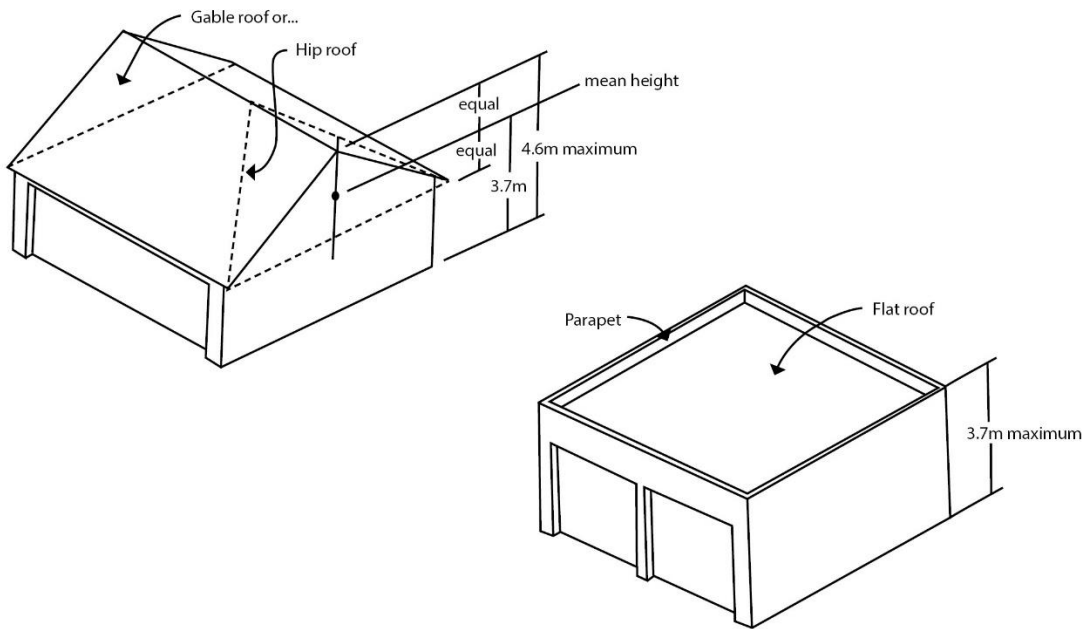
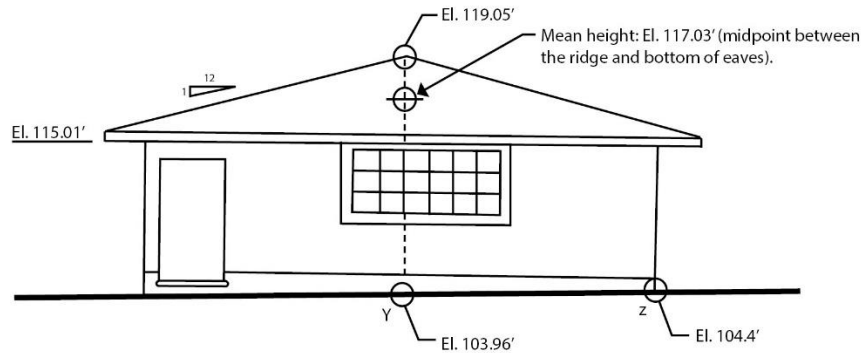
Elevation of grade directly under Point A = 453.83

# Appendix C. Accessory Building Height

## Height measurement for various roof types

Mean height: The mean height of a sloping roof is taken at a midpoint between the highest point of the roof (ridge/ pitch) and the eaves.

Mean height of a gable or sloping roof of accessory building



Flat roofs are limited to a maximum height of 3.7 metres and it includes parapet.