

# GUIDELINES FOR MEASURING BUILDING HEIGHT

## THE CITY'S POLICIES ON BUILDING HEIGHT

In 1994, the City adopted a new General Plan that sets direction for development within Brisbane. Among its policies affecting development, the General Plan intends to "encourage options that minimize grading and transformation of the landform and fit comfortably with the topography" (Program 18a; also see Policies 43, 245 & 312 and Program H8a). The General Plan also addresses regulating height to protect the character of established neighborhoods and to preserve public views of the Mountain and the Bay (see Policies 11, 252 & 310.1 and Programs 22b, 22d, 22f, 252a, 275a, 330a & 330.b). The General Plan deals directly with the method of determining building height in Program 22a, "Consider amendments to the Zoning Ordinance which contain clear and defined standards to protect creativity and diversity in design while addressing issues of height, scale, mass and articulation."

As part of the City's implementation of the General Plan, a new definition of "height of structures" was adopted in 1998, incorporating elements from the Uniform Building Code, so that in most cases buildings would be measured from finished grade, rather than from natural grade, as had been done previously. Finished grade provides a more stable reference point, since natural grade is often eliminated during the course of construction. This change would also eliminate the occasional incongruity between the visible height of a building and its defined height, if a significant portion of the site had been graded away so that one or more stories were now below what had been "natural grade."

Note that technical terms shown in *italics* are defined on the last page.

## WHAT YOU NEED TO MEASURE BUILDING HEIGHT

1. A topographical map or survey of the existing and proposed (*finished*) grades of the site. Existing grade is typically shown by solid lines, while proposed grade is indicated by dashed lines. The topographical map should show the changes in the grade or slope of a site in 2 ft. minimum increments. The increments (*relative elevations*) are identified relative to sea level or other accepted point of reference, such as one of the City's survey monuments.
2. A site plan, showing the boundaries of the property and the location of the existing/proposed building, atop the topographical map.
3. Views (also called "architectural elevations") of each of the sides of the building, drawn to scale (such as ¼ inch equals 1 foot). Typically, views sliced through the building ("sectional views") to show interior floors are also provided; these show the *relative elevation* of each finished floor and other portions of the building, such as exterior walls hidden by overhanging eaves, which can be useful in calculating the *height of the structure*.

## HOW TO MEASURE BUILDING HEIGHT

1. Break up the building into *segments*, based upon changes in the *roofline* of the building (see Figure 1).
2. Include bays and similar building *projections*, as well as dormers, towers and similar rooftop elements, when identifying the *segments*.
3. For each *segment*, identify the *reference datum*, which is the lowest *finished grade* on that portion of the site not exceeding 5 ft. between the *segment* and the adjoining property line. The 5 ft. distance should be measured from the *segment* perpendicular to the property line. Where *finished grade* differs from one side to the other of a *segment*, the lower of the two will be the *reference datum*. For the front or rear *segment*, *finished grade* toward the front or rear property line must be considered, in addition to *finished grade* at the sides (see Figure 2).
4. When *finished grade* has been artificially raised above natural grade through backfilling, the *reference datum* shall be the lowest point of elevation of the natural grade prior to the placement of the fill rather than the finished grade. However, where the Planning Commission has approved the contour grading of a site through roughly balanced combinations of cut and fill, the finished grade may be used as the reference datum instead of the natural grade..
5. For each *segment*, determine what type of *roofline* it has and then identify its *relative elevation*, based upon the following:

For a flat or minimally pitched (less than 1:12) roof, use the *relative elevation* of the top of the roof, including any parapets or coping;

For a mansard roof, use the *relative elevation* of the deck line;

For a shed, gable, hip, gambrel or vaulted roof, use the *relative elevation* at the midpoint of the pitch of the roof, measured from the peak of the roof to that point vertically above the highest exterior wall, including dormer walls (see Figure 3); where the midpoint differs from one side of such a roof to another, the midpoint with the greatest *relative elevation* should be used.

6. Subtract the *reference datum* from the *relative elevation* of the *roofline* to calculate the height of each *segment*. The greatest difference is the *height of the structure*.

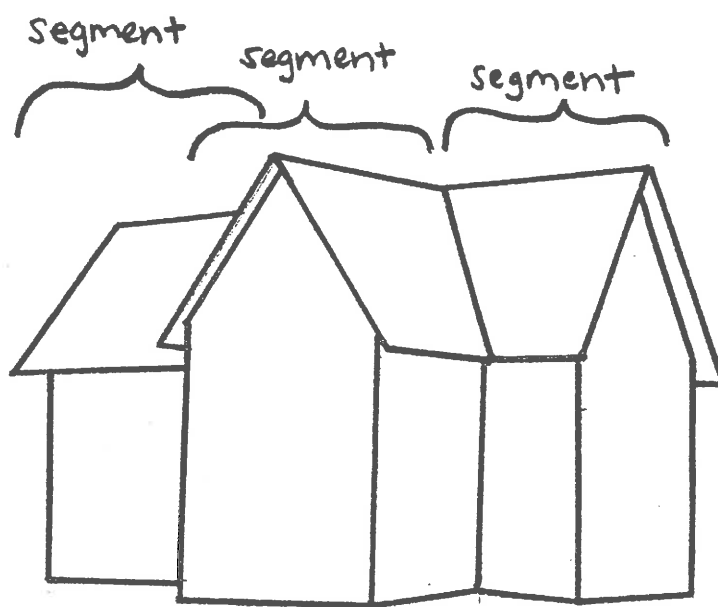


Figure 1.

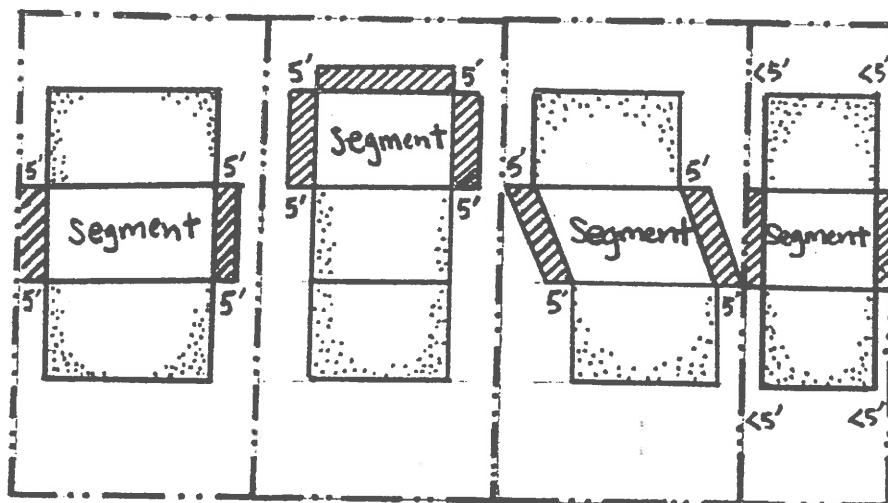
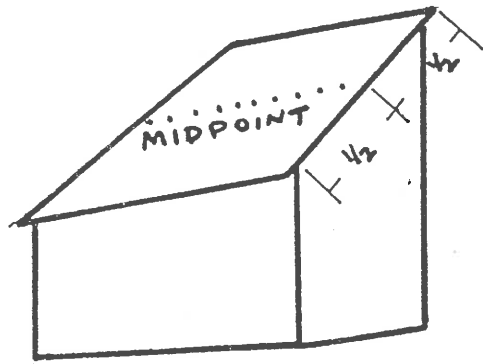
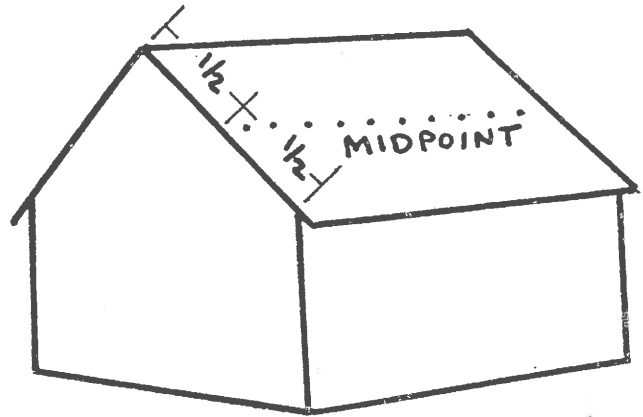


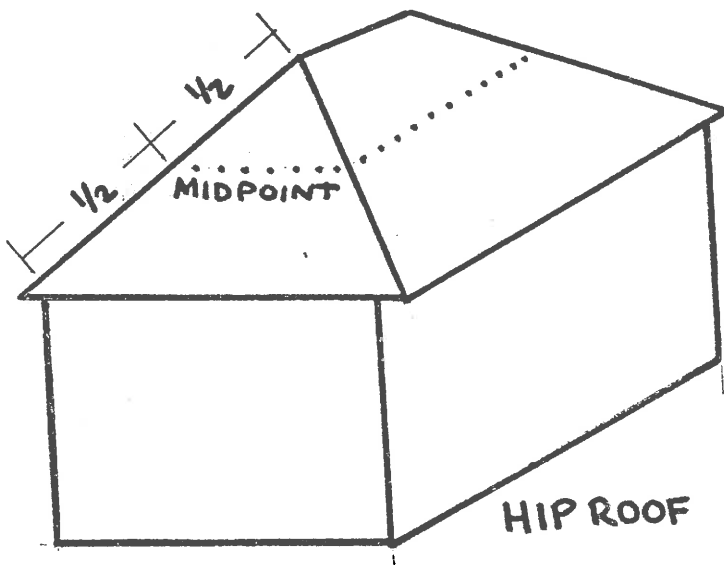
Figure 2.



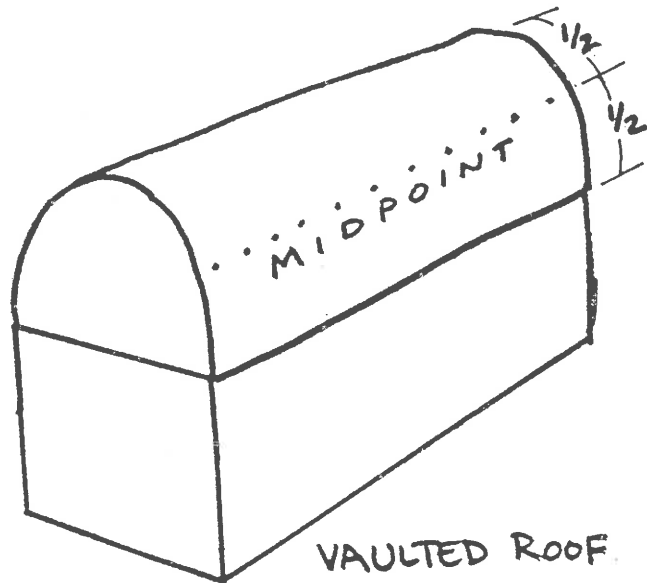
SHED ROOF



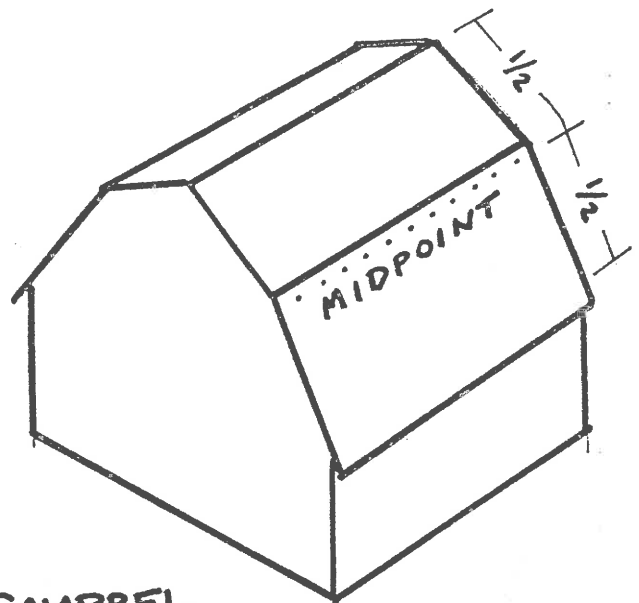
GABLE ROOF



HIP ROOF



VAULTED ROOF



GAMBREL ROOF

Figure 3.

## IMPLICATIONS OF THE CITY'S METHOD OF MEASURING BUILDING HEIGHT

Caution should be taken in designing buildings to make sure that they comply with the City's height limits.

### Sometimes, the simpler the building, the greater its height.

Height is not necessarily measured from the top of the building to the bottom. While from a distance, for example, a building containing four floors that step up or down a hillside in three two-story *segments* may look taller than the three-story, single-*segment* building next door, the opposite may be the case. Because height is measured per *segment*, a building made up of multiple *segments* can have a lower height than one made of a single *segment* (see Figure 4).

### The height of a building might be greater than its vertical dimension at any one point.

Even though a pitched roof might parallel the slope below at a uniform vertical distance above grade, its height as measured by the City might be greater. This is because the *height of a structure* is not measured vertically from the midpoint of the pitch of the roof to finished grade below; instead, height is measured as the difference in *relative elevation* between the midpoint of the pitch of the roof and the *reference datum* which will typically be finished grade lower down the slope from the midpoint (see Figure 5).

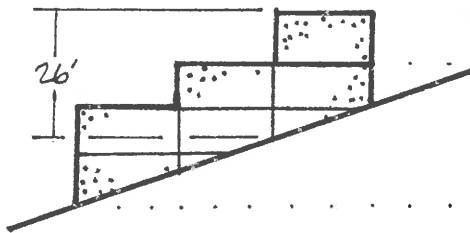
### A 30 ft. height limit doesn't always accommodate a 30 ft. tall building.

While the 30 ft. height limit that applies to sites with slopes of 20% or more would appear to allow 3-story buildings, this isn't necessarily the case on steep hillsides or where greater than minimum standard ceiling heights are proposed. Note, too, that 3-story buildings may be subject to additional requirements and restrictions under the Uniform Building Code, regarding side setbacks, secondary exits, and other safety and design standards.

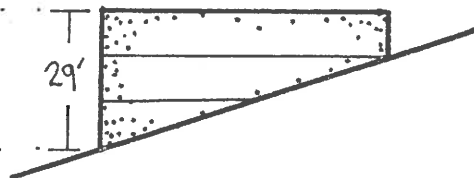
### The steeper the site, the greater the effect on the height of the building.

On sloped sites, the *relative elevation* of the *reference datum* on the downslope side of the building drops proportionately to the percentage of slope. For example, on a site with a 40% downslope, the relative elevation drops 2 feet for each 5 feet in horizontal distance, in turn adding 2 ft. to the height of a building if measured from the *reference datum* 5 feet from the rear of such a building (see Figure 6). The effect is intensified when the slope of a site does not drop consistently, but instead becomes steeper.

HEIGHT LIMIT	SITE SLOPE	HEIGHT DIFFERENTIAL
28 ft.	0%	minus 0 ft.
	10%	minus 0.5 ft.
30 ft.	20%	minus 1 ft.
	30%	minus 1.5 ft.
	40%	minus 2 ft.
	50%	minus 2.5 ft.

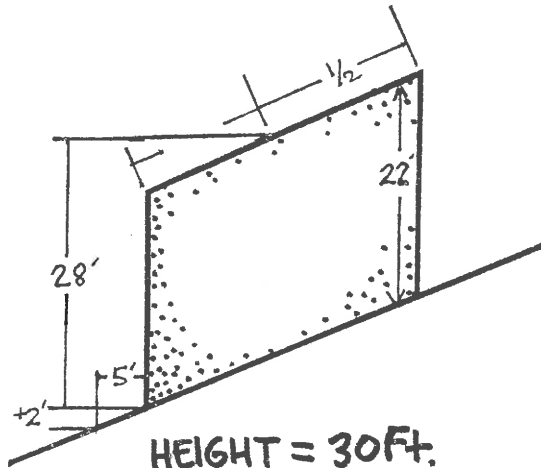


HEIGHT = 26 Ft.



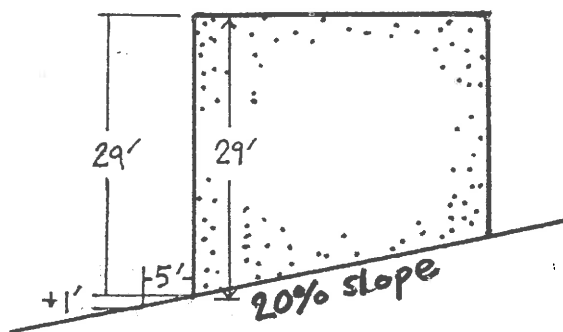
HEIGHT = 29 Ft.

Figure 4.

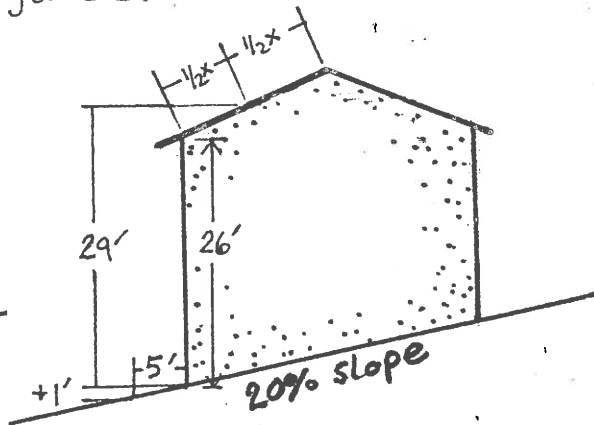


HEIGHT = 30 Ft.

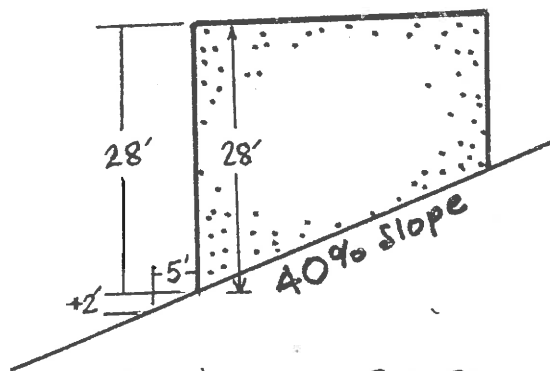
Figure 5.



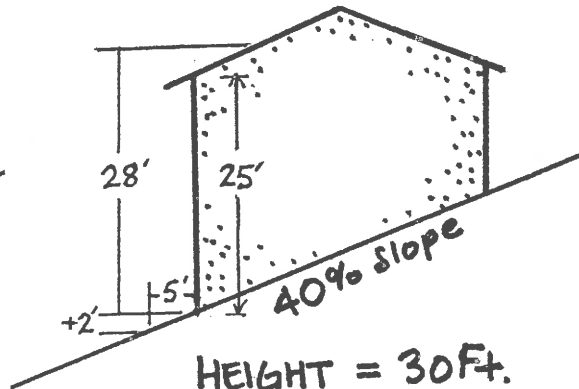
HEIGHT = 30 Ft.



HEIGHT = 30 Ft.



HEIGHT = 30 Ft.



HEIGHT = 30 Ft.

Figure 6.

Peaked roofs are encouraged, but take careful measurements.

The idea behind measuring the height of a peaked roof from the midpoint of its pitch was that even though the peaked roof would extend higher than a flat roof of the same height as measured by the City's method, the mass of the two buildings in section would be approximately equal. Because the height at the midpoint of the roof is measured relative to a point at finished grade that may be a significant distance horizontally and vertically away, it is not always guaranteed that the height of a peaked roof under the City's definition will be less than a flat roof. This is particularly true if the peak is not centered on the building and if the slope of the site is skewed. A simple shed ("pitched") roof designed to parallel a hillside 30 ft. below cannot be assumed to comply with the 30 ft. height limit; it must be specifically measured using the City's method.

Articulation is encouraged, but take careful measurements.

The City's zoning regulations are intended to discourage boxy buildings and to encourage designs that break up a building's bulk with pop-outs and insets. Sometimes, though, this added articulation can have height implications. Certain forms of articulation, such as dormers that project above rooflines, will increase the height of a building under the City's method of measurement.

Providing parking is required, but take careful measurements.

Parking is required to be provided. Sometimes, though, it may be difficult to juggle the City's parking standards and height limits, particularly on upslope sites. For example, driveways cannot have a slope steeper than a 20%, which sometimes means that the driveway and garage have to be cut into the hillside. Even though the rest of the building might remain above natural grade, the height of the front of the garage (and the rest of the building atop it) will be measured from the *finished grade* of the driveway.

## TERMINOLOGY

**FINISHED GRADE**—"the final elevation of the ground surface after completion of all site preparation and development," per Brisbane Municipal Code Section 17.02.360.A.

**HEIGHT OF STRUCTURE**—"the vertical distance above a *reference datum* measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped or vaulted roof. The *reference datum* shall be the lowest point of elevation of the *finished grade* between the building and the property line when the property line is five (5) feet or less from the building. When the property line is more than five (5) feet from the building, the *reference datum* shall be the lowest point of elevation of the *finished grade* between the building and a line five (5) feet from the building. When the *finished grade* results from fill, the *reference datum* shall be the lowest point of elevation of the natural grade prior to the placement of the fill. In the case of a stepped or terraced building, each *segment* of the building shall be separately measured and the height of the building shall be the maximum height of the highest *segment*," per Brisbane Municipal Code Section 17.02.400.A (also see Brisbane Municipal Code Section 17.32.060.F).

**PROJECTION**—any roofed portion of a building which projects outward from a wall (such as a cantilevered bay) or any deck which projects outward from a wall when the deck also serves as a roof for an area below with at least 7 ft. of clearance (see Brisbane Municipal Code Sections 17.02.085 and 17.02.495).

**REFERENCE DATUM**—a term used to describe the point from which the height of a building is measured; see *Height of Structure* for its specific use.

**RELATIVE ELEVATION**—the height of a point of ground or a portion of a building relative to sea level or some other accepted point of reference, such as one of the City's survey monuments.

**ROOFLINE**—the form a building's roof creates by its type (such as flat, mansard, gable, or hip) and/or its orientation (such as when the ridge of a roof changes direction in an "L" shape); it is such variations that may give a building a stepped or terraced appearance.

**SEGMENT**--each portion of the building with a different *roofline*; in some cases, bays, decks and dormers may be considered separate *segments*. For example, a deck which covers another deck or porch, thus resulting in floor area as defined by BMC Section 17.02.315.A, would be considered a separate *segment*.



#### ADDITIONAL INTERPRETATIONS:

A bay or other projection from the face of a building is not counted as a separate segment.

Finish grade is taken 5 ft. from the foundation/supports of the building, not from any overhang or bay.

The height of a flat roof with a roof deck railing is measured from the deck line, as is done for mansard roofs.

On a site with a cross slope, for the height of a building segment to be measured from the upslope finish grade, the building segment must be inset from the downslope side of the building footprint by at least half the width of the building.