

Average Grade

Guide to Calculating Building Height

This document is intended as a general guideline for determining Grade for Ontario Building Code (OBC) purposes.

The OBC, Division A; 1.4.1.2.(1) defines *grade* as;

Grade means the average level of proposed or finished ground adjoining a building at all exterior walls.

There are other important terms defined by the OBC to understand for determining the height of a building;

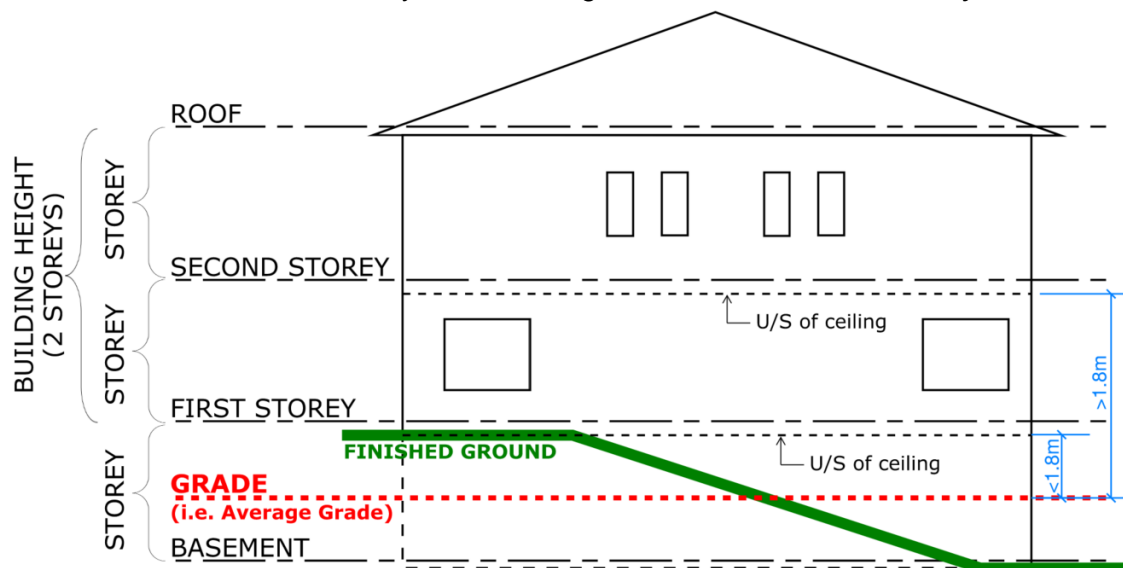
Building height means the number of *storeys* contained between the roof and the floor of the *first storey*.

Storey means the portion of a building,

- (a) that is situated between the top of any floor and the top of the floor next above it, or
- (b) that is situated between the top of the floor and the ceiling above the floor, if there is no floor above it.

First storey means the storey that has its floor closest to *grade* and its ceiling more than 1.8 m above *grade*.

Basement means one or more storeys of a building located below the *first storey*.



Average grade calculations may be necessary to determine *grade*, and the *building height*. To determine average grade, calculate the average of the finished ground elevation around the entire perimeter of the building at the exterior walls. Averaging spot grades (i.e. corners of building only, or averaging the grade points only) is not permitted as this would not represent the true average of the finished ground at exterior walls. The calculation below is a more accurate method and may be used to determine *grade* (average grade). Also see attached example.

$$\text{Average Grade} = \frac{\text{Segment 1 } (L \times SA) + \text{Segment 2 } (L \times SA) + \text{Segment 3 } (L \times SA) + \text{Segment 4 } (L \times SA) + \text{Segment 5 } (L \times SA) + \text{Segment... } (L \times SA) \dots}{L^{S1} + L^{S2} + L^{S3} + L^{S4} + L^{S5} + L^{S\dots}}$$

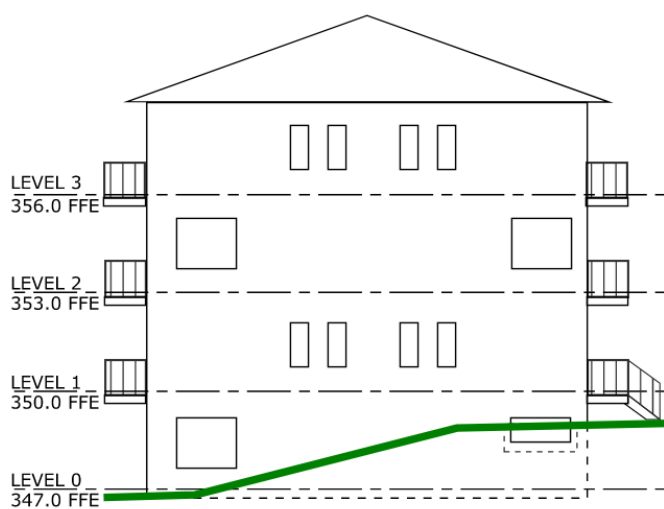
Example Building Elevations:



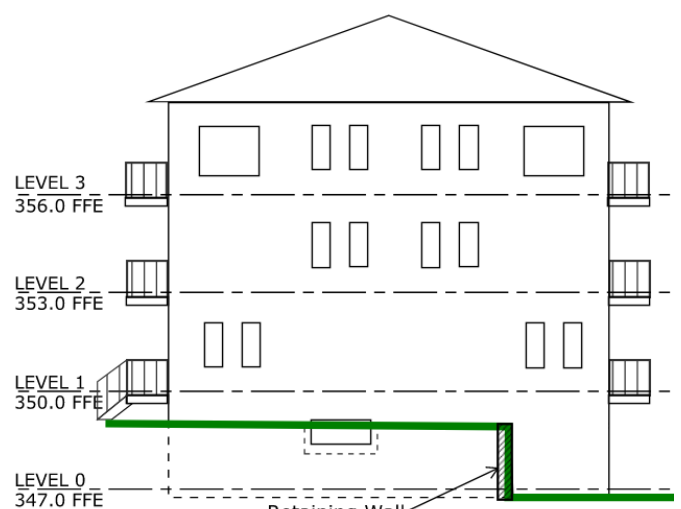
Front Elevation



Rear Elevation

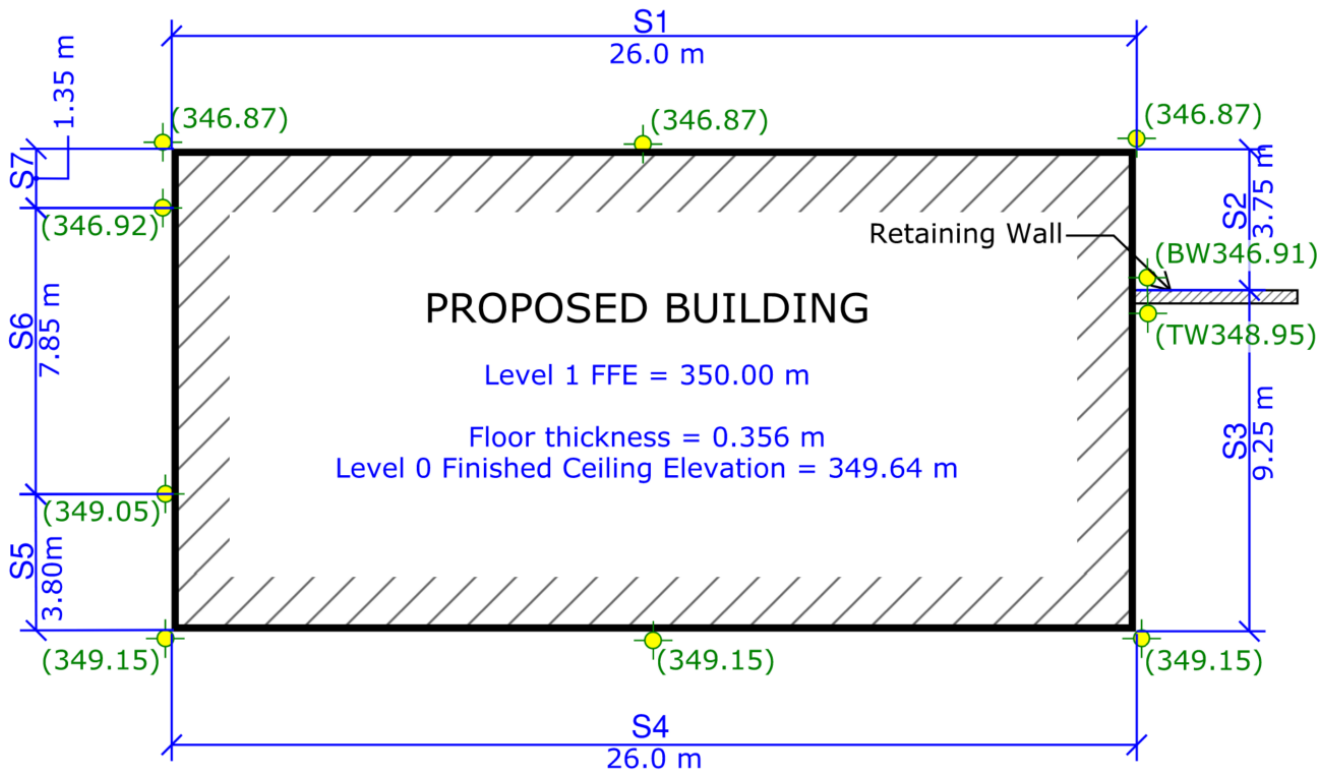


Left Side Elevation



Right Side Elevation

Example Grading Plan:



Segment Number	Length (L)	Start Elevation (EL1)	End Elevation (EL2)	Segment Average Grade (SA) $\frac{(EL1 + EL2)}{2}$
S1	26.00 m	346.87	346.87	346.87
S2	3.75 m	346.87	346.91	346.89
S3	9.25 m	348.95	349.15	349.05
S4	26.00 m	349.15	349.15	349.15
S5	3.80 m	349.15	349.05	349.10
S6	7.85 m	349.05	346.92	347.99
S7	1.35 m	346.92	346.87	346.90

$$\begin{aligned}
 \text{Average Grade} &= \frac{\text{Segment 1 } (L \times SA) + \text{Segment 2 } (L \times SA) + \text{Segment 3 } (L \times SA) + \text{Segment 4 } (L \times SA) + \text{Segment 5 } (L \times SA) + \text{Segment 6 } (L \times SA) + \text{Segment 7 } (L \times SA)}{L^{S1} + L^{S2} + L^{S3} + L^{S4} + L^{S5} + L^{S6} + L^{S7}} \\
 &= \frac{(26.00 \times 346.87) + (3.75 \times 346.89) + (9.25 \times 349.05) + (26.00 \times 349.15) + (3.80 \times 349.10) + (7.85 \times 347.99) + (1.35 \times 346.90)}{26.00 + 3.75 + 9.25 + 26.00 + 3.80 + 7.85 + 1.35} \\
 &= \mathbf{348.11 \text{ m}}
 \end{aligned}$$

Level 0 Finished Ceiling Elevation = 349.64 m (noted on example grading plan)

Distance between *grade* and u/s of ceiling of Level 0
 = 349.64 m - 348.11 m
 = **1.5 m** (since this is not more than 1.8 m, the *storey* above Level 0 is considered the *first storey*)

Therefore Level 1 is the *first storey*. The *building height* is a 3 storey building plus *basement*.