User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B)

Erratum

Issued by the Canadian Commission on Building and Fire Codes

The erratum described below has been issued to facilitate the use of the Structural Commentaries. An updated replacement page is provided for your convenience.

Provision	Erratum	Date of Issue
Commentary I		
Paragraph 14	A subscript "h" was added to three occurrences of "L" to form "L_h" in the equation at the end of the first paragraph and in equation (3).	08-06-20

Speed-up over Hills and Escarpments

13. Hills and escarpments can significantly amplify wind speeds near the ground and this should be reflected in the exposure factor for buildings located on a hill or escarpment. A method that can be used with both the Static and Dynamic Procedures to reflect this amplification is presented below.

14. Buildings on a hill or escarpment with a maximum slope greater than 1 in 10, particularly near a crest, may be subject to significantly higher wind speeds than buildings on level ground. The exposure factor at height z above the surrounding ground elevation is then equal to that over open level terrain multiplied by a factor $(1 + \Delta S(z))^2$, where $\Delta S(z)$ is the "speed-up factor" for the mean wind speed (this effect is illustrated in Figure I-6). Near the crest, and within a distance $|x| < kL_h$, the exposure factor is modified as follows:

$$C_e^* = C_e \left\{ 1 + \Delta S_{max} \left(1 - \frac{|x|}{kL_h} \right) e^{(-\alpha z / L_h)} \right\}^2 \qquad (3)$$

where

C_e^* = corresponding modified value for use on the hill or escarpment,
C_e = exposure factor over open level terrain given in Paragraphs 11 and 12 for the Static Procedure, and in Paragraph 41 for the Dynamic Procedure,
ΔS_{max} = relative speed-up factor at the crest near the surface, and
α = decay coefficient for the decrease in speed-up with height.

The values of α and ΔS_{max} depend on the shape and steepness of the hill or escarpment. Representative values for these parameters are given in Table I-1.

Table I-1
Parameters for Maximum Speed-up Over Hills and Escarpments

Shape of Hill or Escarpment	ΔS_{max}(1)	α	k	
			x < 0	x > 0
2-dimensional ridges (or valleys with negative H)	2.2 H_h/L_h	3	1.5	1.5
2-dimensional escarpments	1.3 H_h/L_h	2.5	1.5	4
3-dimensional axi-symmetrical hills	1.6 H_h/L_h	4	1.5	1.5

(1) For $H_h/L_h > 0.5$, assume that $H_h/L_h = 0.5$ and substitute $2H_h$ for L_h in Equation (3).

15. The definitions of H_h, height, and L_h, length, shown in Figure I-6 are as follows: H_h is the height of the hill or or escarpment, or the difference in elevation between the crest and that of the terrain surrounding the hill or escarpment upwind; L_h is the distance upwind of the crest to where the ground elevation is half of H_h. The maximum slope for rounded hill shapes is roughly $H_h/(2L_h)$. In the expressions above, it is assumed that the wind approaches the hill along the direction of maximum slope, i.e. the direction giving the greatest speed-up near the crest.