the roof are handled by exposure factor C_e. This two-step procedure generates ground-to-roof load reductions as a function of exposure that range from 0.49 to 0.84.

Table 7-2 has been changed from what appeared in a prior (1988) version of this standard to separate regional wind issues associated with terrain from local wind issues associated with roof exposure. This was done to better define categories without significantly changing the values of C_e.

Although there is a single "regional" terrain category for a specific site, different roofs of a structure may have different exposure factors due to obstruction provided by higher portions of the structure or by objects on the roof. For example in terrain category C, an upper level roof could be fully exposed ($C_e = 0.9$) while a lower level roof would be partially exposed ($C_e = 1.0$) due to the presence of the upper level roof, as shown in Example 3.

The adjective "windswept" is used in the "mountainous areas" terrain category to preclude use of this category in those high mountain valleys that receive little wind.

The normal, combined exposure reduction in this standard is 0.70 as compared to a normal value of 0.80 for the ground-to-roof conversion factor in the 1990 National Building Code of Canada. The decrease from 0.80 to 0.70 does not represent decreased safety, but arises due to increased choices of exposure and thermal classification of roofs (i.e., five terrain categories, three roof exposure categories, and four thermal categories in this standard vs. three exposure categories and no thermal distinctions in the Canadian code).

It is virtually impossible to establish exposure definitions that clearly encompass all possible exposures that exist across the country. Because individuals may interpret exposure categories somewhat differently, the range in exposure has been divided into several categories rather than just two or three. A difference of opinion of one category results in about a 10 percent "error" using these several categories and an "error" of 25 percent or more if only three categories are used.

C7.3.2 Thermal Factor, C_t

Usually, more snow will be present on cold roofs than on warm roofs. An exception to this is discussed in the following text. The thermal condition selected from Table 7-3 should represent that which is likely to exist during the life of the structure. Although it is possible that a brief power interruption will cause temporary cooling of a heated structure, the joint probability of this event and a simultaneous peak snow load event is very small. Brief power interruptions and loss of heat are acknowledged in the C_t = 1.0 category. Although it is possible that a heated structure will subsequently be used as an unheated structure, the probability of this is rather low. Consequently, heated structures need not be designed for this unlikely event.

Some dwellings are not used during the winter. Although their thermal factor may increase to 1.2 at that time, they are unoccupied, so their importance factor reduces to 0.8. The net effect is to require the same design load as for a heated, occupied dwelling.

Discontinuous heating of structures may cause thawing of snow on the roof and subsequent refreezing in lower areas. Drainage systems of such roofs have become clogged with ice, and extra loads associated with layers of ice several inches thick have built up in these undrained lower areas. The possibility of similar occurrences should be investigated for any intermittently heated structure.

Similar icings may build up on cold roofs subjected to meltwater from warmer roofs above. Exhaust fans and other mechanical equipment on roofs may also generate meltwater and icings.

Icicles and ice dams are a common occurrence on cold eaves of sloped roofs. They introduce problems related to leakage and to loads. Large ice dams that can prevent snow from sliding off roofs are generally produced by heat losses from within buildings. Icings associated with solar melting of snow during the day and refreezing along eaves at night are often small and transient. Although icings can occur on cold or warm roofs, roofs that are well insulated and ventilated are not commonly subjected to serious icings at their eaves. Methods of minimizing eave icings are discussed in Grange and Hendricks (1976), Klinge (1978), de Marne (1988), Mackinlay (1988), Tobiasson (1988), and Tobiasson and Buska (1993). Ventilation guidelines to prevent problematic icings at eaves have been developed for attics (Tobiasson et al. 1998) and for cathedral ceilings (Tobiasson et al. 1999).

Because ice dams can prevent load reductions by sliding on some warm ($C_t \le 1.0$) roofs, the "unobstructed slippery surface" curve in Fig. 7-2a now only applies to unventilated roofs with a thermal resistance equal to or greater than 30 ft^2 h °F/Btu (5.3 °C m^2/W) and to ventilated roofs with a thermal resistance equal to or greater than 20 ft^2 h °F/Btu (3.5 °C m^2/W). For roofs that are well insulated and ventilated, see C_t = 1.1 in Table 7-3.