Research (Isyumov 1982 and Isyumov and Case 2000) indicated that the low-rise method alone underestimates the amount of torsion caused by wind loads. In ASCE 7-02, Note 5 was added to Fig. 28.4-1 to account for this torsional effect and has been carried forward through subsequent editions. The reduction in loading on only 50 percent of the building results in a torsional load case without an increase in the predicted base shear for the building. The provision will have little or no effect on the design of MWFRS that have well-distributed resistance. However, it will impact the design of systems with centralized resistance, such as a single core in the center of the building. An illustration of the intent of the note on two of the eight load patterns is shown in Fig. 28.4-1. All eight patterns should be modified in this way as a separate set of load conditions in addition to the eight basic patterns.

Internal pressure coefficients (GC_{pi}) to be used for loads on MWFRS are given in Table 26.11-1. The internal pressure load can be critical in one-story moment-resisting frames and in the top story of a building where the MWFRS consists of moment-resisting frames. Loading cases with positive and negative internal pressures should be considered. The internal pressure load cancels out in the determination of total lateral load and base shear. The designer can use judgment in the use of internal pressure loading for the MWFRS of high-rise buildings.

C28.4.4 Minimum Design Wind Loading

This section specifies a minimum wind load to be applied horizontally on the entire vertical projection of the building as shown in Fig. C27.4-1. This load case is to be applied as a separate load case in addition to the normal load cases specified in other portions of this chapter.

PART 2: ENCLOSED SIMPLE DIAPHRAGM LOW-RISE BUILDINGS

This simplified approach of the Envelope Procedure is for the relatively common low-rise ($h \leq 60$ ft) regular-shaped, simple diaphragm building case (see definitions for "simple diaphragm building" and "regular-shaped building") where pressures for the roof and walls can be selected directly from a table. Figure 28.6-1 provides the design pressures for MWFRS for the specified conditions. Values are provided for enclosed buildings only ((GC_{pi}) = ±0.18).

Horizontal wall pressures are the net sum of the windward and leeward pressures on vertical projection of the wall. Horizontal roof pressures are the net sum of the windward and leeward pressures on vertical projection of the roof. Vertical roof pressures are the net sum of the external and internal pressures on the horizontal projection of the roof.

Note that for the MWFRS in a diaphragm building, the internal pressure cancels for loads on the walls and for the horizontal component of loads on the roof. This is true because when wind forces are transferred by horizontal diaphragms (e.g., floors and roofs) to the vertical elements of the MWFRS (e.g., shear walls, X-bracing, or moment frames), the collection of wind forces from windward and leeward sides of the building occurs in the horizontal diaphragms. Once transferred into the horizontal diaphragms by the vertically spanning wall systems, the wind forces become a net horizontal wind force that is delivered to the lateral force resisting elements of the MWFRS. There should be no structural separations in the diaphragms. Additionally, there should be no girts or other horizontal members that transmit significant wind loads directly to vertical frame members of the MWFRS in the direction under consideration. The equal and opposite internal pressures on the walls cancel each other in the horizontal diaphragm. This simplified approach of the Envelope Procedure combines the windward and leeward pressures into a net horizontal wind pressure, with the internal pressures canceled. The user is cautioned to consider the precise application of windward and leeward wall loads to members of the roof diaphragm where openings may exist and where particular members, such as drag struts, are designed. The design of the roof members of the MWFRS for vertical loads is influenced by internal pressures. The maximum uplift, which is controlled by Load Case B, is produced by a positive internal pressure. At a roof slope of approximately 28° and above the windward roof pressure becomes positive and a negative internal pressure used in Load Case 2 in the table may produce a controlling case. From 25° to 45°, both positive and negative internal pressure cases (Load Cases 1 and 2, respectively) must be checked for the roof.

For the designer to use this method for the design of the MWFRS, the building must conform to all of the requirements listed in Section 26.8.2; otherwise the Directional Procedure, Part 1 of the Envelope Procedure, or the Wind Tunnel Procedure must be used. This method is based on Part 1 of the Envelope Procedure, as shown in Fig. 28.4-1, for a specific group of buildings (simple diaphragm buildings). However, the torsional loading from Fig. 28.4-1 is deemed to be too complicated for a simplified