Cases A through E of Appendix D are described to allow the designer to establish the lines of resistance of the MWFRS so that the torsional load cases of Fig. 27.4-8 need not be considered.

For the type of buildings covered in this method, the internal building pressure cancels out and need not be considered for the design of the MWFRS. Design net wind pressures for roofs and walls are tabulated directly in Tables 27.6-1 and 27.6-2 using the Directional Procedure as described in Part 1. Guidelines for determining the exterior pressures on windward, leeward, and side walls are provided in footnotes to Table 27.6-1.

The requirements in Class 2 buildings for natural building frequency (75/*h*) and structural damping (β = 1.5% critical) are necessary to ensure that the Gust Effect Factor, G_f, which has been calculated and built into the design procedure, is consistent with the tabulated pressures. The frequency of 75/*h* represents a reasonable lower bound to values found in practice. If calculated frequencies are found to be lower, then consideration should be given to stiffening the building. A structural damping value of 1.5%, applicable at the ultimate wind speeds as defined in the new wind speed maps, is conservative for most common building types and is consistent with a damping value of 1% for the ultimate wind speeds divided by $\sqrt{1.6}$, as contained in the ASCE 7-05 wind speed map. Because Class 1 buildings are limited to $h \leq 60$ ft, the building can be assumed to be rigid as defined in the glossary, and the Gust Effect Factor can be assumed to be 0.85. For this class of buildings frequency and damping need not be considered.

C27.6.1 Wall and Roof Surfaces

Wall and roof net pressures are shown in Tables 27.6-1 and 27.6-2 and are calculated using the external pressure coefficients in Fig. 27.4-1. Along-wind net wall pressures are applied to the projected area of the building walls in the direction of the wind, and exterior sidewall pressures are applied to the projected area of the building walls normal to the direction of the wind acting outward, simultaneously with the roof pressures from Table 27.6-2. Distribution of the net wall pressures between windward and leeward wall surfaces is defined in Note 4 of Table 27.6-1. The magnitude of exterior sidewall pressure is determined from Note 2 of Table 27.6-1. It is to be noted that all tabulated pressures are defined without consideration of internal pressures because internal pressures cancel out when considering the net effect on the MWFRS of simple diaphragm buildings. Where the net wind pressure on any individual wall surface is required, internal pressure must be included as defined in Part 1 of Chapter 27.

The distribution of wall pressures between windward and leeward wall surfaces is useful for the design of floor and roof diaphragm elements like drag strut collector beams, as well as for MWFRS wall elements. The values defined in Note 4 of Table 27.6-1 are obtained as follows: The external pressure coefficient for all windward walls is $C_p = 0.8$ for all *L*/*B* values. The leeward wall C_p value is (–0.5) for *L*/*B* values from 0.5 to 1.0 and is (–0.3) for *L*/*B* = 2.0. Noting that the leeward wall pressure is constant for the full height of the building, the leeward wall pressure can be calculated as a percentage of the p_h value in the table. The percentage is 0.5/(0.8 + 0.5) × 100 = 38% for *L*/*B* = 0.5 to 1.0. The percentage is 0.3/(0.8+0.3) x 100 = 27% for L/B = 2.0. Interpolation between these two percentages can be used for L/B ratios between 1.0 and 2.0. The windward wall pressure is then calculated as the difference between the total net pressure from the table using the p_h and p_0 values and the constant leeward wall pressure.

Sidewall pressures can be calculated in a similar manner to the windward and leeward wall pressures by taking a percentage of the net wall pressures. The C_p value for sidewalls is (–0.7). Thus, for *L*/*B* = 0.5 to 1.0, the percentage is 0.7/(0.8 + 0.5) × 100 = 54%. For *L*/*B* = 2.0, the percentage is 0.7/(0.8 + 0.3) × 100 = 64%. Note that the sidewall pressures are constant up the full height of the building.

The pressures tabulated for this method are based on simplifying conservative assumptions made to the different pressure coefficient (GC_p) cases tabulated in Fig. 27.4-1, which is the basis for the traditional all heights building procedure (defined as the Directional Procedure in ASCE 7-10) that has been a part of the standard since 1972. The external pressure coefficients C_p for roofs have been multiplied by 0.85, a reasonable gust effect factor for most common roof framing, and then combined with an internal pressure coefficient for enclosed buildings (plus or minus 0.18) to obtain a net pressure coefficient to serve as the basis for pressure calculation. The linear wall pressure diagram has been conceived so that the applied pressures from the table produce the same overturning moment as the more exact pressures from Part 1 of Chapter 27. For determination of the wall pressures tabulated, the actual gust effect factor has been calculated from Eq. 26.9-10 based on building height, wind speed, exposure, frequency, and the assumed damping value.