is partially enclosed or not, and the value of the final coefficient used would only be based on tributary area of the element. It is not clear whether the ceiling system is to be designed for a specific pressure or any pressure at all. For outward acting pressures on the soffit, if the building is unenclosed, the GC_p value for wind parallel to the ridge would apply. These pressures would not be combined with the roof pressures discussed above.

13.6 Balconies

Question 5. For the structures shown in Figure 13-4, what would be the pressure acting on the balconies in the two situations? Would these pressures act to overturn the structure?

Answer and Comment. In both buildings, for the wind direction from left to right, there is likely to be pressure acting upward on the bottom surface of the balconies. Pressure acting downward on its upper surface counteracts this. Therefore, the net effect would be near zero and one would not include it in the overturning calculations.

For a wind flowing parallel to the balconies, it would be prudent to design the balcony for an upward pressure using the GC_p values for enclosed structures, regardless of the classification of the structure itself.

The eaves will have a net uplift force due to a combination of the upward pressure on the bottom surface (now defined in 2002 ASCE 7 Section 6.5.11.4.1 for MWFRS Method 2 as corresponding to a $C_p = 0.8$) and upward suction on the roof surface (corresponding to the pressures defined by Figure 6-6 for buildings of All-Heights or Figure 6-10 for Low-Rise buildings). The pressure on the rafter is calculated by using the appropriate exterior GC_p values in 2002 ASCE 7 Figure 6-6 and should include additional internal pressure from ASCE 7 Figure 6-5 if there is an attic at the overhang.

13.7 Partially Enclosed Parking Garages

Question 6. Would the rear wall of the first story garage indicated in the three sketches shown in Figure 13-5 be subject to higher pressures than normal? (Figure 13-5 shows one-, two-, and three-story structures, all of which have a partially enclosed story at the ground floor for parking.)

Answer and Comment. Yes, the walls in all three cases would be subjected to increased internal pressures due to the "ballooning" or "deflating" effects of a partially enclosed story. The net pressures on this wall in the multistory buildings shown in Figures 13-5 (b) and (c) will be larger because of the higher mean roof heights and effects of q_z. Assuming that the walls of the rooms in the upper two stories are enclosed, their net pressures will be relatively lower because the internal pressures are smaller.

The maximum net pressure coefficient, GC_p, of the wall is approximately +-1.35 and is determined from three different scenarios: wind coming from the left, right, and into the plane of the building sections shown in Figure 13-5.

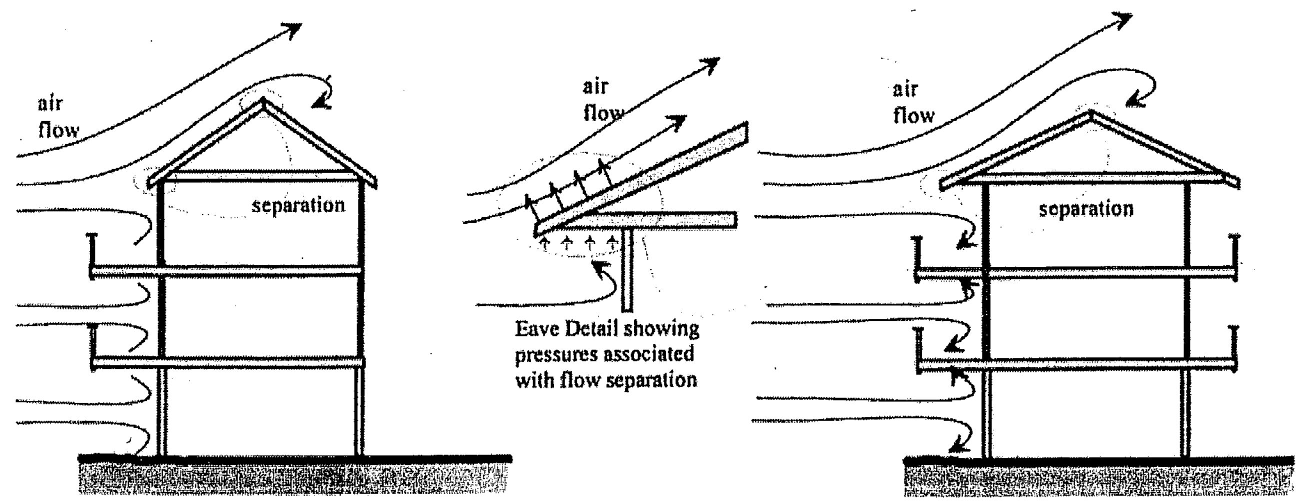

Figure 13-4 Schematic showing airflow on buildings with balconies and overhangs

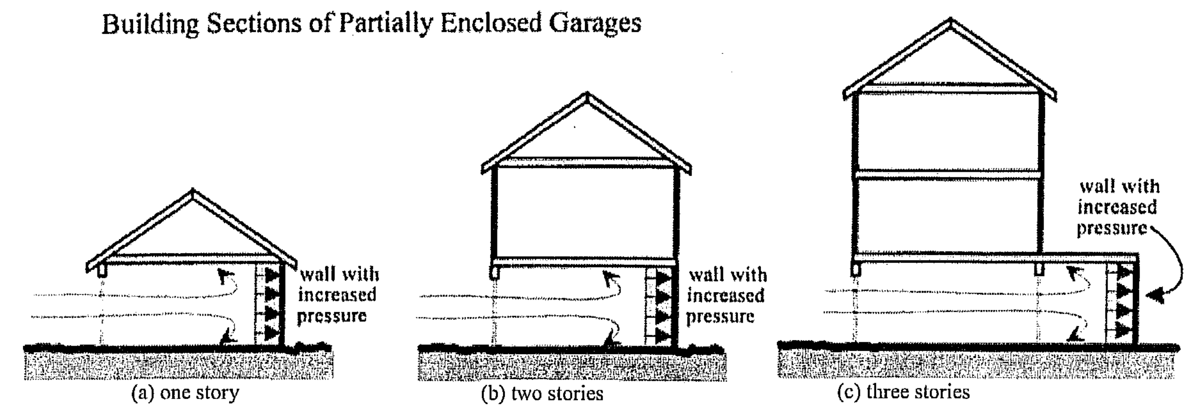

Figure 13-5 Schematic showing airflow and pressures on walls of partially enclosed garages in one-, two-and three-story buildings.

The internal GC_{pi} factor is $\pm$ 0.55 for the design of these partially enclosed garage walls (as well as the low roof in Figure 13-5 (c), which extends beyond the outline of the building above it). The external wall pressures depend on the building shape, but initially assume maximum cases where on the windward wall it is +0.8, on the sidewalls it is -0.7 and on the leeward wall it is -0.5. Potential pressures on the back wall can be found by considering wind coming from the left, or the right, or in the perpendicular direction (into the plane of the building sections shown). (Framing members could also be designed based on higher pressures from components and cladding coefficients.)

For each loading scenario, wind pressures are computed as follows:

- From the left, where wind enters the garage door opening. If the back wall is considered an "exterior" wall, then a GC_p of 0.8 can be used, in which case this coefficient is considered to include effects of internal pressure. To this is added the leeward pressure, arriving at a net absolute pressure of 0.80 + 0.50 = 1.30 outward in the direction of the wind.
- From the right, the exterior surface will have a GC_p coefficient of 0.80 and the internal pressure is 0.55, which give a net absolute pressure of 0.80 + 0.55 = 1.35 inward. (Use this result because it is the maximum value).
- For the direction perpendicular to the plane of the buildings section shown (Figure 13-5), this wall is considered a "sidewall" and the net absolute pressure is 0.70 + 0.55 = 1.25 outward perpendicular to the direction of the wind.

It is noteworthy that ASCE 7 introduced a new provision in its 1998 edition that requires internal pressure to be evaluated relative to the "... highest opening in the building that could affect the *positive* internal pressure." See Section 6.5.12.2 (and 6.5.12.4 for cladding or components for buildings with mean roof heights greater than 60'). Both sections, however, allow the designer to be conservative and use the actual height of the building. In the 3-story building, such precision will make no significant difference. For much taller buildings, it is likely that all openings will be fixed, or if there are balconies, it is unlikely that doors thereto will deliberately be left open during high-wind events. The SEAW Wind Engineering Committee recommends that velocity pressure, q, at the mean roof height be used to calculate both positive and negative pressures, not only because it is much easier to calculate net pressure coefficients, but also because they are conservative.

13.8 Structures near Stepped Terrain

13.8.1 1998 ASCE 7 Procedure

The stair tower shown in Figure 13-6 is proposed to provide access from the top of a cliff down to a beach facing, and within 200' of a large body of inland water (two miles in width perpendicular to the shore). It clings to the face of the 60'-tall cliff and is 65% open on all 4 sides. Basic wind speed (3-second gust) is 85 mph.

Question 7. What pressures should be used for the roof members and solid, 42"-high, guardrail? (Use the ASCE 7 procedure for analysis of components and cladding on both roof and wall.)