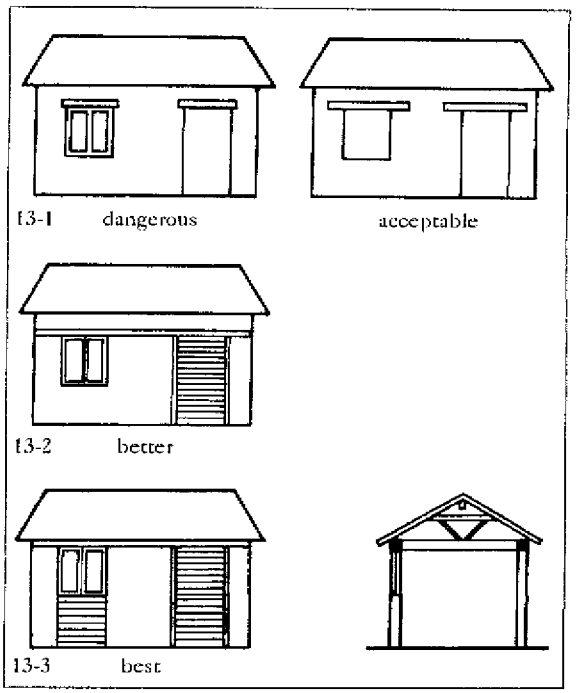
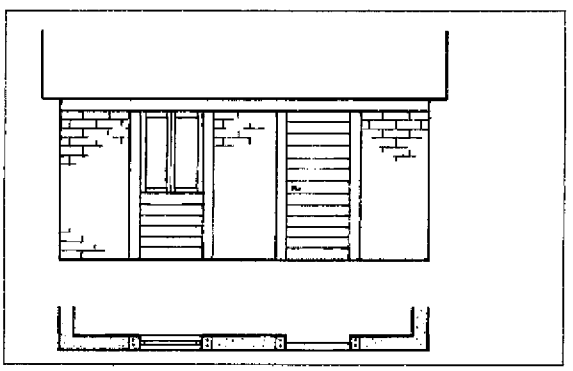
13. Openings for doors and windows

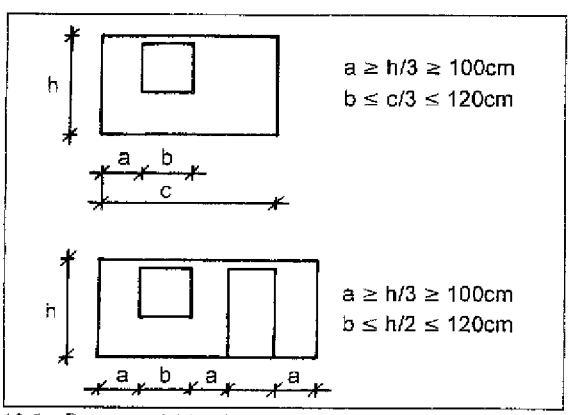
Openings within the walls destabilize the wall system. In an earthquake diagonal cracks often occur, starting at the window edges, see Figs. 4-1 and 4-2. Lintels have to penetrate into the wall for at least 40 cm in order to achieve a good bond, see Fig. 13-1. However, in this case the part above the lintel may be weak and come off in an earthquake, and therefore the best solution is to also use the lintel as a ring beam on which the roof structure rests. It is also recommended that the part below the window be built as a light flexible structure, for instance from wooden panels or wattle and daub. The following rules have to be taken into account, see Figs. 13-5 and 13-6:

a) The length of the windows should not be more than 1.20 m and not more than 1/3 of the length of the wall.
b) The length of walls between openings must be at least 1/3 of their height and not less than 1 m.
c) Doors must be opened towards the outside. Opposite the entrance door there should be a large window or another door, which acts as emergency exit, see Fig. 13-6.

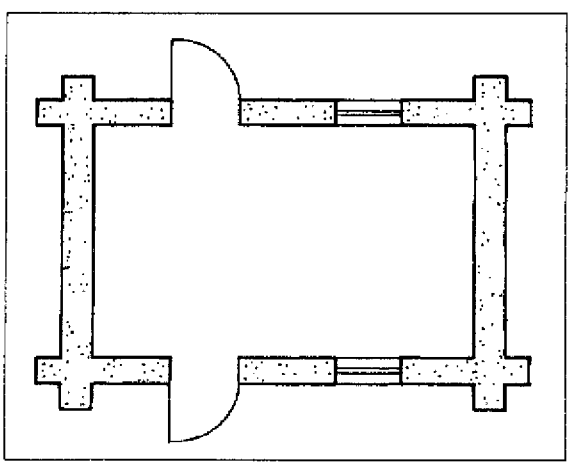


13-1 to 13-3


13-4 Stabilized openings



13-5 Recomendable dimensions of openings


13-6 Recommendable positions of openings