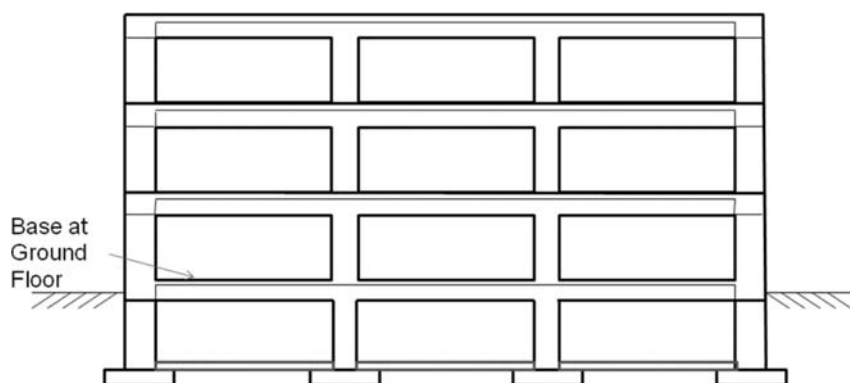
**FIGURE C11-2 Base for a Level Site.****FIGURE C11-3 Base at Ground Floor Level.**

the base may need to be located below these soils rather than close to grade. Stiff soils are required over the depth of the basement because seismic forces will be transmitted to and from the building at this level and over the height of the basement walls. The engineer of record is responsible for establishing whether the soils are stiff enough to transmit seismic forces near grade. For tall or heavy buildings or where soft soils are present within the depth of the basement, the soils may compress laterally too much during an earthquake to transmit seismic forces near grade. For these cases, the base should be located at a level below grade.

In some cases, the base may be at the floor level adjacent to but above grade. In order for the base to be located at a floor level above grade, stiff foundation walls on all sides of the building should extend to the underside of the elevated level considered the base. The validity of having the base above grade is based on the same principles used to justify the two-stage equivalent lateral force procedure for a flexible upper portion of a building with one-tenth the stiffness of the lower portion of the building as

permitted in Section 12.2.3.1 of ASCE 7-05. For a floor level above grade to be considered the base, it should generally not be above grade more than one-half the height of the basement story, as shown in Fig. C11-4.

If the base is located at the level closest to grade, the lateral stiffness of the basement walls should be substantially stiffer than the stiffness of the vertical elements of the seismic force-resisting system. A condition where the basement walls that extend above grade on a level site may not provide adequate stiffness is where the basement walls have many openings for items such as light wells, areaways, windows, and doors, as shown in Fig. C11-5. Where the basement wall stiffness is inadequate, the base should be taken as the level close to but below grade. If all of the vertical elements of the seismic force-resisting system are located on top of basement walls and there are many openings in the basement walls, it may be appropriate to establish the base at the bottom of the openings. Another condition where the basement walls may not be stiff enough is where the vertical elements of the seismic force-resisting system