for small children will serve about 100 families. Approximately 50 to 60 percent of the area should be turf. Equipment should be spaced to provide safe and comfortable traffic flow around it; generally a minimum spacing is 12 ft between pieces of equipment. Placement and spacing of equipment should avoid overlapping fall zones as well.

Play areas for small children must include benches on which parents may sit and observe their children, and the design should allow for strollers, carriages, and the like. This may require wider sidewalks or paved areas so that standing groups of parents do not encroach onto the traffic pattern. Access to a play area should be limited for security purposes, although care should be given to avoid an institutional feeling that would discourage use. As a rule of thumb, playground equipment that requires participation should be located toward the entrances of a playground because the presence of groups contributes to the security of the facility.

As the target age group of a playground moves from small children to children between the ages of 5 and 12, there are some additional considerations. It is sometimes true that the play area for these older children includes a "tot lot" facility for younger children. The requirements for older children are developed around or in addition to the tot lot. Older children require larger spaces for participatory games and activities, so large surfaced or turf areas need to be provided. The shape and size of these areas deserve particular attention since at this age the games take place over larger areas for which adequate space must be provided. These types of facilities will serve a larger population than the tot lot and are often associated with other facilities such as schools or churches. An area of 5 to 8 acres will serve up to 250 families or about 110 elementary school children. For each 50 families, the size of the area needs to be increased by 0.2 to 0.4 acre. A maximum service population for such a facility would be about 1500 families. Above this service level, additional facilities should be considered to avoid overcrowding and to reduce the distance to the facility for families.

The choice of playground surface material can be a critical factor in determining the injury from the impact of a fall. Materials are selected for their shock-absorbing ability. Head injuries have the greatest life-threatening potential and so are used as the design criteria for surfacing materials. The height of a fall is the next most critical element of playground injury risk. The *critical height* is a term used to describe the approximate maximum height of a fall from which a life-threatening head injury would not be expected (Table 4.14). Critical heights are determined by several different methods including the *ASTM Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment, F1292.* Surface materials should be selected using the critical height of the specified playground apparatus. The critical height is determined from the highest accessible part of the piece of equipment.

There are many different types of surfacing materials available commercially. Hard surfaces such as asphalt, packed earth, or even turf are not acceptable materials. In general, the available acceptable surfaces are of two types: unitary materials and loose-fill materials. *Unitary materials* are generally