Walking speeds vary greatly among people, but a normal average walking speed of 4.0 ft/s is usually assumed. A number of factors influence this speed. For example, older people walk slower than younger people, and most people tend to walk faster in the middle of a block and slow down at intersections. The activity that walkers are engaged in affects their speed as well—for example, shoppers walk slower than commuters. Men tend to walk faster than women. Groups of people will walk slower than individuals. Curbs, islands, circuitous pathways, changes in grade, and even ramps can present barriers of one sort or another to various users. Changes of grade of more than a few percent should be signaled visually and texturally. To determine the appropriate level of service, designers should weigh the anticipated use of the site, the characteristics of the users, and the character of the final design (Table 4.1).

Grades also affect walking speed, level of service, and safety. Sidewalks should be designed with a minimum cross slope of 1 percent to allow for drainage, but the cross slope should not exceed 3 percent. A longitudinal slope of up to 3 percent is desirable, but slopes greater than 5 percent should be avoided in areas where freezing may be an issue. As a rule of thumb in areas where climate is a consideration, any sidewalk with a slope in excess of 5 percent should be considered and treated as a ramp with associated handrails.

When incorporating stairs into an outdoor design, there are often local standards to consider; however, when such regulations are not in place, a rule of thumb to determine tread width is the following:

$$2R + T = 26 \text{ to } 27 \text{ in}$$

where R = riser height, in
T = tread width, in

Table 4.2 lists some general guidelines for designing outdoor stairways. Figure 4.5 gives dimensions for the amount of stair tread that is actually usable and for the nosing (that is, the rounded edge) of the stair tread. Figure 4.6 shows stair treads with painted nosing on each tread.

All site features should comply with the specifications provided in the *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (see Table 4.3). Ramps should be designed to meet the ADA requirements (Figs. 4.7 through 4.18). Ramps with a slope of between 1:12 and 1:16 should be designed to not exceed a rise of 30 in (760 mm) or a run of 30 ft (9 m). Flatter ramps of 1:16 to 1:20 slope may be designed to a run of 40 ft, but the maximum rise should not exceed 30 in. The minimum clear width of a ramp should be 36 in (915 mm). Ramps shall have level landings at the bottom and top of each ramp and each ramp run. The cross slope of ramp surfaces should be no greater than 1:50. Outdoor ramps and their approaches should be designed so that water will not accumulate on walking surfaces. Landings should be at least as wide as the ramp run leading to it and be a minimum of 60 in (1525 mm) clear. If the ramp changes direction at landings, the minimum landing size should be 60