structure is detrimental, resulting in a hard soil crust when it dries. The crust limits infiltration and increases runoff and further erosion. In soils without structure, it is difficult to establish vegetation, exacerbating the erosion cycle.

Sheet erosion occurs where there is a uniform slope and surface and runoff flows in a sheet. Erosion in these instances usually is limited to the loose soil particles. Sheet erosion rarely occurs in any other than a limited form in the field. Sheet flow tends to concentrate into more defined flows as it is channeled by the irregularities of a site.

The channelized flow result in the types of erosion most think of when the subject comes up: rill and gully erosion. *Rill erosion* is characterized by small, even tiny channels that often abrade and intertwine, while *gully erosion* is identified by the large channels, which are obviously damaging. Where a rill is at worst only a few inches deep, a gully can be as deep as 10 ft or more.

The impacts of erosion and sediment extend from the esthetic impacts to the easily quantified cost of dredging reservoirs to recover lost capacity. The U.S. Army Corps of Engineers spend an estimated $350 million annually to dredge rivers and harbors in the United States. Sediment-filled rivers, reservoirs, and harbors cannot be used for shipping or recreation. The loss of soil as an agricultural resource can have a direct impact on the productivity and feasibility of that operation. To replace topsoil in the United States with commercially available topsoil would cost at least $20/yd^3 ($26/m^3) or about $4.6 billion each year. Taking these replacement costs and the dredging costs together make a compelling economic argument for erosion and sediment control. The federal government through the National Pollution Discharge Elimination System regulates discharges from most construction sites. Most states have their own version of these regulations and require builders to meet a minimum set of performance standards (Table 3.7).

The essence of the principles lies in the fundamental difference between the prevention of erosion and the control of sediment. Erosion prevention and sediment control are proactive. While it is not possible to have site development without some earth disturbance, often the amount of disturbance is well

TABLE 3.7 Principles of Erosion and Sediment Control

1. Design development to fit the site and the terrain.
2. Protect and retain existing vegetation to the extent possible.
3. Protect and/or revegetate, and mulch exposed areas.
4. Minimize steepness of slopes to manage both velocity and flow of runoff.
5. Schedule earthwork and construction to minimize soil exposure and enhance stabilization.
6. Protect new swales and drainage paths. Improve stabilization of existing channels for increased flows and velocities.
7. Trap the sediment on the site.
8. Maintain site controls.
9. Develop contingency plans before they are needed.