highways and commercial air. In general, there has been an improvement in safety for all modes of transportation, at least if accident rates are used as the main indicator of safety. Figure 2.2 shows trends in motor vehicle fatality rates from 1945 to 1990. As can be seen, fatalities have been steadily decreasing, although the rate leveled off during the 1990s. This has been the result of improved highway design and maintenance, improved vehicle design, driver education and law enforcement activities.

Although aviation safety also receives a great deal of public attention, fatality rates for commercial aviation are very low compared to those for motor vehicles, and are quite variable from year to year, since a single accident can make a significant difference. In addition, there has been sporadic public concern about rail traffic safety, especially where transportation of hazardous materials is involved.

2.2.2 Organizational Responsibilities

At the federal level, agencies involved with transportation safety issues include the various modal agencies in the USDOT, such as the Federal Highway Administration (FHWA), FAA, and the Federal Railway Administration (FRA), the National Highway Traffic Safety Administration (NHTSA), and the National Transportation Safety Board (NTSB). NHTSA, which was established in 1970, carries out a variety of safety programs related to highways. These focus on improvement of safety of vehicles, traffic safety, safety research and development, and collection of accident data. The NTSB investigates selected accidents involving all transportation modes, identifies safety problems, and serves as an advocate for transportation safety concerns with Congress, other government agencies, and private industry.

2.2.3 Legal Concerns

Despite the general improvement in traffic safety, public transportation agencies have found themselves subject to increased legal liability for safety problems. The major area of concern is tort liability arising from traffic accidents—that is, liability for damages in cases where unsafe conditions lead to personal injury or property damage. Public agencies providing transportation services or facilities have a legal duty to provide the public with reasonably safe travel. Also, they have a duty to warn the public of dangerous conditions. In order to be liable for an unsafe condition, the government must have received notice of its existence; however, it may be held to have received constructive notice if it should have known about it.

The courts recognize a distinction between the ministerial functions of public agencies, which involve clearly defined tasks allowing little leeway for personal judgment or weighing of alternatives, and their discretionary functions, which involve exercise of independent judgment. Ordinarily, ministerial functions are open to tort liability but discretionary functions are not. Design is usually regarded as a discretionary function; however, designs may involve liability if they are clearly defective. Maintenance activities, on the other hand, are usually regarded as ministerial functions.

Tort liability for public agencies became a major issue because of changes in legal doctrines that led to a dramatic rise in the number of such cases and in the magnitude of the damages awarded, particularly during the 1970s and 1980s. Two changes were of primary importance. The first was the erosion of the doctrine of sovereign immunity, which held that the government could not be sued without its consent. The second was the tendency to weaken the doctrine of contributory negligence or to replace it with that of comparative negligence. Under the doctrine of contributory negligence, plaintiff cannot recover for damages if they share responsibility for the accident, even if it can be shown that the other party was primarily at fault. Under the doctrine of comparative negligence, on the other hand, negligence is allocated by the court on a percentage basis, and the plaintiff’s damages are diminished to the extent he or she is judged to have been negligent.
Another change that had important consequences was the rise of the doctrine of joint and several liability, also known as the “deep pockets” doctrine. In cases in which there are several defendants, this doctrine makes all defendants liable for all damages due the plaintiff, regardless the degree of responsibility each bears. In many cases, traffic accidents are partly the fault of individual drivers and partly the fault of a public agency. Since the government has superior resources, the public agency bears most of the cost of the settlement even though its degree of responsibility is minor.

Transportation agencies have responded to their increased tort liability in several ways. One common response has been institution of risk management programs to limit exposure to liability. Possible elements of such programs include instituting and carefully documenting accident reduction programs, training personnel in accident response and in dealing with legal procedures involved in tort cases, institution of policy and procedures related to the release of information and documents, and addition of indemnity clauses in contracts to shift some risks to other parties. On the negative side, the funds used to pay judgments have been diverted from other uses—quite possibly from safety improvements in some cases—and agencies have sometimes become overly cautious or unwilling to discuss safety problems openly.

### 2.2.4 The Challenges

Traffic safety is a continuing challenge for the transportation engineering profession because of public expectations that safety will continue to improve. To some extent this expectation is responsible for the increased legal liability of public agencies for safety problems. Despite the public concern for safety, however, some of the safety legislation passed during the 1970s and 1980s, such as the national 55 MPH speed limit and the national motorcycle helmet law, have recently been repealed. One aspect of the challenge will be to meet increasing public expectations for improved safety in the face of increasing public impatience with measures that may (or may not) improve safety but are seen as infringing on personal freedom. Another will be to counteract the tendency for accidents to increase with increasing congestion.

### 2.3 EQUALITY OF ACCESS

Another continuing challenge has been to provide adequate access to the transportation system for all sorts of people. Three groups in particular have been seen as generally underserved. These are the poor, the elderly, and the physically handicapped. Poor people are seen as underserved because they are less likely than other people to own automobiles. As the automobile has increased its dominance of the short-distance passenger transportation market, other alternatives, such as urban mass transit, have tended to decline in terms of availability and quality of service. In addition, when mass transit systems have tried to compete with the automobile to regain some of their market, they have often provided incentives to the more affluent choice riders, who do have access to automobiles, rather than to captive riders, who tend to be taken for granted. In the early 1970s, when public mass transit subsidies were increasing rapidly, there was a tendency to keep fares low. This led to uncontrolled increases in transit deficits, and to a more conservative policy in granting subsidies. The result has been a steady increase in transit fares that has also fallen most heavily on the poorest riders. In spite of all this (or perhaps because of it) automobile ownership has continued to increase, so that the number of people with no access to automobiles continues to decline. In many cases the issue now is not so much that the poor do not have access to automobiles at all as that the cars they may own are old, unreliable, and the worst offenders in terms of air pollution.

The elderly and physically handicapped are seen as underserved both because many are unable to operate automobiles and because historically there have been barriers to the use of public transportation by those whose physical mobility is limited. Over the past two decades, federal legislation has addressed the issue of physical access for the handicapped, and in so doing has created numerous design and financial challenges for the transportation engineering profession. The Americans with Disabilities Act of 1990 (ADAAG), for example, mandates design standards for access by disabled individuals. These standards are known as the Americans with Disabilities Act Accessibility Guidelines (ADAAG). Under the law and these guidelines, all public transportation systems must be fully accessible to both wheelchair users and pedestrians. This requires, among other things, the installation of wheelchair lifts on public transit vehicles, provision of curb cuts and wheelchair ramps at intersections of streets with sidewalks, and provision of wheelchair access by means of ramps or elevators at facilities such as airports and rail transit stations.

**FIGURE 2.4**

Urban transit bus equipped with a wheelchair lift.

Challenges posed by these more stringent accessibility standards include the design and financing of accessibility features such as wheelchair ramps. Mass transit systems, in particular, have faced significant financial challenges because of the need for wheelchair lifts on vehicles and modifications to stations. Meanwhile, the design of