

Legal Authority and Liability

The issue of government liability always surfaces in discussions of traffic calming. “What if we close a street and a fire rages on?” “What if we install speed humps and a motorcyclist goes flying?”¹ Lawsuits and damage claims are not nearly the problem commonly assumed. In legal research in the literature, only two lawsuits against traffic calming programs have been successful, and one of those is currently under appeal.² Close to 50 cities and counties were surveyed for this report, including every major program in the United States. Many have had no legal problems at all, and the remainder have experienced more threats than legal actions. The legal maneuvering has more often involved city attorneys concerned about potential liability than private attorneys claiming actual damages.

The legal histories of the 20 featured communities are summarized in table 6.1. Where cells are blank, these communities have no experience to report.

Chilling Effect—Gainesville, FL, Case Study

Gainesville, FL, has been spared lawsuits and damage claims, but the possibility of legal action has still had a chilling effect. Traffic circles, street closures, and semi-diverters have been installed without significant controversy. However,

single-lane chokers, which may create conflicts between opposing traffic flows, and speed humps, which have been likened to inverted potholes, have been viewed differently. Worries caused these measures to be initially rejected.

Then came the election of a new city commission, and a visit by a national expert on accommodating the needs of pedestrians. The expert convinced the new commission that speed humps would fill a program gap left by circles and semi-diverters. Circles, for example, had proven ineffective in one neighborhood with many T-intersections; vehicle deflection and corresponding speed reduction are difficult to achieve at the top of the T (see figure 6.1). Humps are not so limited, and thus were chosen by the neighborhood as a replacement for the circles. Two years after its first hump was installed, Gainesville now has many more humps than circles (see figure 6.2).

Minimizing Liability

Perception is often interpreted as reality, and the perceived threat of liability has a real impact on traffic calming practice. From the local government perspective, the legal issues surrounding traffic calming fall into three categories: *statutory authority*, *constitutionality*, and *tort liability*. First, the local government must have legal authority to implement



Figure 6.1. Ineffective Traffic Circle at a T-Intersection. (Gainesville, FL)



Figure 6.2. New Tool in Toolbox—12-foot Speed Hump. (Gainesville, FL)

Table 6.1. Legal Challenges to Featured Programs.

Community	Legal Threats/Concerns	Lawsuits	Damage Claims
Austin, TX			
Bellevue, WA	Two threats of litigation, one from a local resident over undercarriage damage sustained on a hump and the other from a commuter complaining of humps on a through street		
Berkeley, CA	Two voter initiatives to rescind citywide traffic management plan failed	Lawsuit challenging use of traffic diverters—successful but decision rendered moot when the California legislature excluded diverters from state regulation	
Boulder, CO	Concerns about bicyclists being “squeezed” at traffic circles	Lawsuit by motorist injured at temporary circle—dropped	
Charlotte, NC			Claim by motorist who bottomed out on a hump at high speed—denied
Dayton, OH	Potential liability with unwarranted 4-way stops		15 damage claims—denied
Eugene, OR		Lawsuit by pedestrian claiming that raised crosswalk and narrowing should have been coupled with pedestrian signal—pending	Only claim passed on to Oregon Department of Transportation
Ft. Lauderdale, FL	Threats of litigation over street closures	Lawsuit by property owner over street closure—city excused from suit; lawsuit by cyclist injured at angle point—pending	Several claims over damage at chokers on one high-volume collector street—paid
Gainesville, FL	Opposition from city attorney to one-lane narrowings and speed humps—humps installed anyway after city council reversed earlier position		
Gwinnett County, GA			
Howard County, MD			Claim by motorist who bottomed out on raised intersection—dropped

Table 6.1. Legal Challenges to Featured Programs (continued).

Community	Legal Threats/Concerns	Lawsuits	Damage Claims
Montgomery County, MD	Petition drive to ban speed humps	Lawsuit by disabled veteran alleging that speed humps violate Americans with Disabilities Act—suit dismissed because humps do not deny “meaningful access”	Two damage claims paid, one over improperly applied hump markings and the other over an injury sustained on a hump
Phoenix, AZ	Concern about the legality of humps on collectors—litigation threatened by residents experiencing cut-through traffic on local streets		
Portland, OR		Lawsuit by family of fatal crash victim alleging that city had not done enough to calm traffic—suit dismissed but under appeal	Many claims rejected—one paid when contractor prematurely removed an advisory sign from a traffic circle
San Diego, CA			Two claims associated with damage from humps—one paid
San Jose, CA		Lawsuit by bicyclist who struck debris from damaged choker—suit dismissed because city maintenance program had no time to respond	Claim by motorist hung up on choker after illegal maneuver—denied
Sarasota, FL		Lawsuit challenging humps as unapproved traffic control devices—city lost at trial court level and has appealed	Claim by motorcyclist injured on hump under construction—denied
Seattle, WA	Many threats of litigation over the years, often for not doing enough to calm traffic		About two claims filed per year—only three small claims paid over 15 years—two based on inadequate signage and one on a poorly designed measure
Tallahassee, FL	Resident demanded written acknowledgment of city's responsibility for humps in front of resident's home		
West Palm Beach, FL			

Source: Interviews with staffs of traffic calming programs.

a given set of traffic calming measures on a given class of roadways. Second, the local government must respect the constitutional rights of affected landowners and travelers on the roadways. Finally, the local government must take steps to minimize the risk to travelers from the installation of such measures. These issues are introduced and discussed below.

Rational Planning and Implementation—Bellevue, WA

Transportation professionals are accustomed to working with guidance documents. The American Association of State Highway and Transportation Officials' (AASHTO's) *A Policy on Geometric Design of Highways and Streets* (the Green Book) and the Federal Highway Administration's (FHWA's) *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) have been characterized as the profession's "bibles." These universally accepted manuals take much of the risk out of roadway design. By following these manuals, the transportation professional is unlikely to end up on the losing end of a lawsuit.

Traffic calming presents a more difficult challenge because of the lack of any comparable guidance document on this subject. Traffic calming measures are not included in the geometric features section of AASHTO's Green Book, nor are they included among the traffic control devices contained in the MUTCD. Thus, the standard guidance documents are of limited use.

The Europeans, British, and Australians have granted their localities statutory authority to install traffic calming measures and have provided detailed guidance on how to go about it.³ The Canadians have also developed design guidelines.⁴ But in the United States, there are no authorizing laws, professional standards, or generally accepted practices. In the communities surveyed there seems to be as much support among traffic managers for flexibility as for standardization.

In the absence of standards, what is to protect U.S. traffic calming programs against legal challenges? One community's answer is: a *rational planning and implementation process* (see figure 6.3). Government's exercise of police powers, including the power to manage traffic, must not be arbitrary, capricious, or unreasonable. If it is, government may be

challenged on statutory, constitutional, and common law grounds.

Several of Bellevue's program features include:

- Identification of traffic problems based on speed measurements, traffic counts, accident analyses, and other special studies
- Consideration of alternative traffic calming measures and selection (with public input) of one capable of solving documented problems
- Prioritization of projects for funding on some objective basis
- Installation of measures on a trial basis, subject to followup performance evaluation
- Follow-up evaluation to check that measures have performed as intended, and if not, that they are modified or removed
- Thorough documentation of the entire process⁵

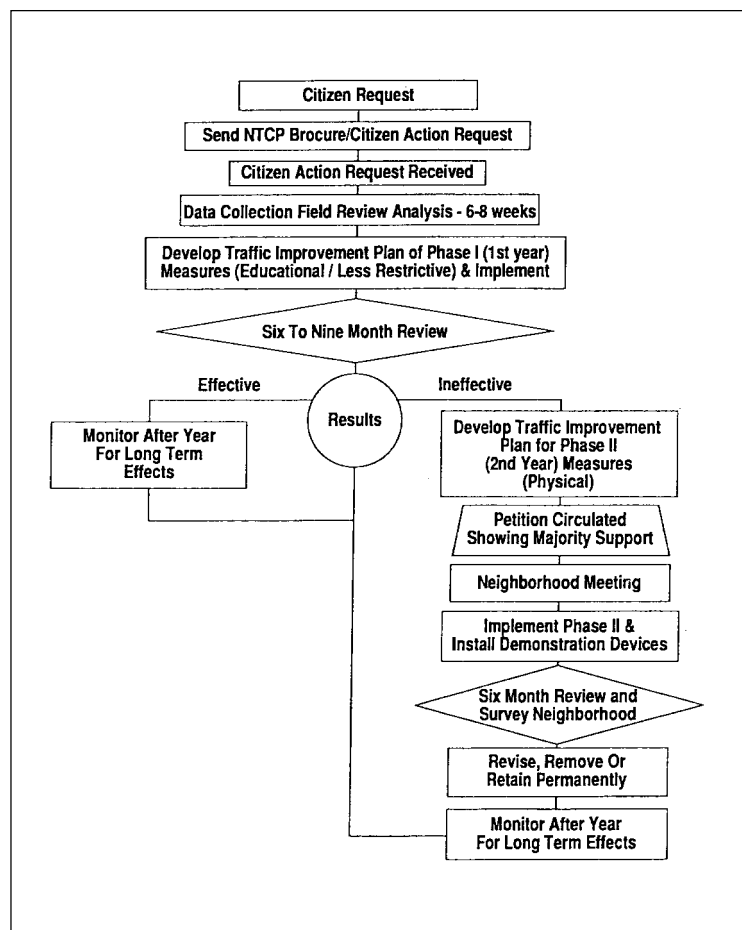


Figure 6.3. One Rational Traffic Calming Planning and Implementation Process. (Bellevue, WA)

Source: K.L. Gonzalez, "Neighborhood Traffic Control: Bellevue's Approach," *ITE Journal*, Vol. 63, 1993, pp. 43-45.

Traffic calming programs structured as popularity contests, relying exclusively on neighborhood petitions and financial antes to decide what gets built, are inviting litigation. Likewise, programs relying on casual observation of traffic conditions, ad hoc contacts with neighbors, and intuitive judgments are at legal risk. Examples of each can be found among the featured programs. See chapter 8 for more on programmatic options.

Case Law—Legal Authority

While members of the public have a right to use public highways without obstruction and interruption, this right is subject to the power of local governments to impose reasonable restrictions for the protection of the public. In some States, the right of a local government to interfere with the free flow of traffic requires express statutory authority. These States have preempted the regulation and control of traffic on all highways and streets, including those under the jurisdiction of local governments. In other States, local governments' general authority to construct and maintain streets has been interpreted by courts as providing ample authority for street closures and similar actions.

Challenge to Diverters and Half Closures—Berkeley, CA

In California, the State has preempted the entire field of traffic control. A locality has no right to interfere with the free flow of traffic unless expressly authorized by State statute. This fact led to the best known legal challenge to traffic calming, *Rumford v. City of Berkeley*, 31 Cal.3d 545, 645 P.2d 124. At the time of the lawsuit, Berkeley had placed large, movable concrete bollards on more than 40 streets to create full closures, diagonal diverters, and half closures (see figure 6.4). The barriers had proven effective

in reducing traffic volumes and collisions. Twice, the electorate had voted down ballot measures to remove the barriers.

The California Supreme Court ruled that the diverters and half closures were traffic control devices not authorized by State law. They were not complete closures, which had been authorized under certain circumstances, nor were they signs or symbols, which had also been authorized. They were not permanent changes in curb location or median installations, which had been authorized as well. Hence the diverters and half closures were declared illegal.

Dissenting judges noted the inconsistency of banning measures that had the same effect as mandatory turn signs but were less easily disobeyed. They also noted the absurdity of banning measures that had the same effect as permanent changes in the curb line but were movable as conditions changed.

Ultimately, the matter was settled by the State legislature, which gave local governments the authority to block entry to, or exit from, any street by means of islands, curbs, traffic barriers, or roadway design features. The legislature also excluded traffic calming measures from the definition of traffic control devices and hence from State regulation. This statutory exclusion, expanded recently, applies to islands, curbs, traffic barriers, speed humps, speed bumps, or roadway design features.

Challenge to Humps and Tables—Sarasota, FL

As traffic calming has become more common, arguments over the authority to install traffic calming measures have subsided. Thus, it came as a surprise when Sarasota was sued recently on essentially the same grounds as was Berkeley 15 years earlier (see figure 6.5). Like California, the State of Florida has preempted the field of traffic control. Cities and counties have the power to regulate traffic only



Figure 6.4. "Temporary" Diverter Challenged in Court. (Berkeley, CA)



Figure 6.5. Speed Table also Challenged. (Sarasota, FL)

by means of official traffic control devices, which must conform to the specifications of the Florida Department of Transportation (FDOT). FDOT has adopted the *MUTCD* as its official guide to traffic control devices.⁶

In *Windom v. City of Sarasota*, the plaintiffs claimed that speed humps and speed tables are traffic control devices not recognized by the *MUTCD* and hence illegal. In a letter to the plaintiffs, the State transportation engineer agreed. The city's response was that sovereign immunity protects the city from such claims; speed humps and speed tables are not traffic control devices but instead traffic calming measures, and the installation of such measures falls under the city's broad home rule and police powers.

In June 1998, the circuit court ruled against the city, finding that speed humps and speed tables are unauthorized traffic control devices. The city was enjoined from installing additional humps or tables, and was ordered to remove existing humps and tables. Removal, which could cost as much as a quarter million dollars, is stayed pending appeal. The State's Land Use and Transportation Study Committee has recommended legislative action to solve the problem.

Case Law—Tort Liability

Government has a legal duty to exercise ordinary care for the safety of motorists who are themselves exercising ordinary care. If this duty is breached, and someone is injured, a tort claim for government negligence can result. In order to establish tort liability, the following elements must be proven:

- The defendant must owe a legal duty to the injured plaintiff;
- There must be a breach of duty through the failure to perform or the negligent performance of that duty;
- The breach of duty must be a proximate cause of the accident;
- The plaintiff must have suffered damages as a result of the accident.

In both case and statutory law, the distinction is made between *discretionary* functions, which are generally immune from tort claims, and *ministerial* functions, which are not. Discretionary functions involve a choice among valid alternatives. Ministerial functions involve operational decisions that leave minimal leeway for personal judgment.

The decision to spend public funds on traffic calming, to install one set of measures versus an-

other, or to design measures for one speed versus another is discretionary. The duty to warn motorists of traffic calming measures that require slowing down, to maintain measures in a safe condition, or to construct measures per design specifications is ministerial.

Discretion in the Choice of Measures

Under sovereign immunity, courts will not second-guess discretionary decisions by public officials if there is reasonable basis for them. A recent case involving Portland is most germane. A young woman died in a collision on a street that was traffic calmed farther downstream, but not at the accident location. While complicated by alleged drinking and reckless driving, and by the question of whether the exact measures approved by the city council had been installed, the central issue was whether the city had done enough to prevent collisions of this type. The plaintiffs claimed that a diverter should have been installed on this particular street to prevent the teenage practice of "hill jumping" (roller-coaster-like speeding in hilly terrain). Instead, following its standard planning process, the city had installed a traffic island and a couple of traffic circles many years before. The neighborhood had specifically considered and rejected a diverter. A jury found in favor of the city. The verdict is currently under appeal.

There may be one exception to government discretion in the choice of traffic calming measures. One physical measure has been found by some courts to be patently unsafe when applied to public streets. It is the speed bump, as opposed to the longer speed hump.⁷ Speed bumps are abrupt features that rise and fall 3 to 4 inches over a span of 1 to 3 feet (see figure 6.6). Bumps have comfortable crossing speeds of 5 mph or less, which relegates them to

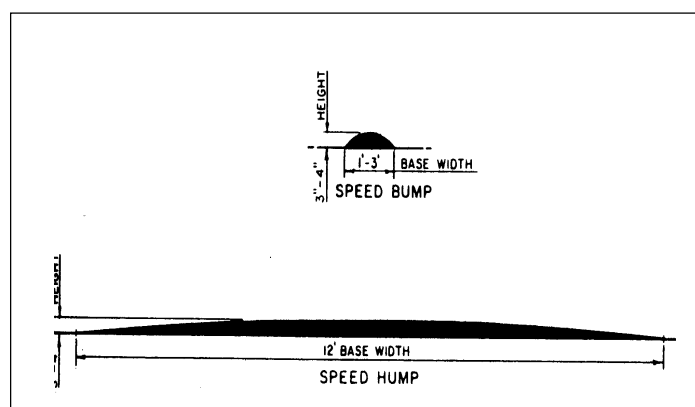


Figure 6.6. Bump Profile versus Hump Profile.

Source: H.S. Chadda and S.E. Cross, "Speed (Road) Bumps: Issues and Opinions," *Journal of Transportation Engineering*, Vol. 111, 1985, pp. 410-418. Reproduced with permission of the publisher.

parking lots and private driveways as opposed to public roadways with higher posted speed limits.⁸

In *Vicksburg v. Harrellton*, a landmark case, the Mississippi Supreme Court ruled that speed bumps constituted an inherent danger to motorists. The Connecticut courts reached the same conclusion, but had another reason for declaring them a public nuisance: Their low design speeds could so delay emergency vehicles as to cause serious injury or loss of life.⁹ An occasional bump can still be found on a public roadway.

Adequate Response to Safety Hazard— San Jose, CA

If government creates a hazardous condition, or knows of one on public property, it has a ministerial duty to either remove the hazard or warn of it. Designing a road with a sharp curve does not in itself create liability. “If, however, the governmental entity knows when it creates a curve that vehicles cannot safely negotiate the curve at speeds of more than twenty-five miles per hour, such entity must take steps to warn the public of the danger.”¹⁰

In the featured communities examined for this report, traffic calming generally improved traffic safety. Favorable impacts are documented in chapter 5. Yet, unless measures are well marked and well signed, they can catch motorists by surprise. Likewise, unless they are well maintained, measures can deteriorate under use to the point of creating a hazard.

Diverters and chokers in one San Jose neighborhood have tight geometrics that result in an occasional large vehicle striking them while making a turn (see figure 6.7). A bicyclist was injured when she ran over debris left from one such incident. She sued. While the city had a ministerial duty to clean up the debris, it was absolved of responsibility for the bicycle accident because it happened so soon after the truck incident. The city’s maintenance program was found to be adequate overall.



**Figure 6.7. Tight Geometrics at the Site of a Bicycle Accident.
(San Jose, CA)**

Case Law—Loss of Access

The takings clauses of the Federal Constitution and those of most States require that private property not be taken without just compensation. An access restriction does not effect a taking if it “substantially advance[s] legitimate State interests” and does not “deny an owner economically viable use of his land” (*Agins v. City of Tiburon*, 100 S.Ct. 2138, 1980). Typically, in takings litigation, the courts engage in a case-by-case inquiry in which the following factors are assessed:

- The economic impact of the regulation on the claimant
- The extent to which the regulation has interfered with investment-backed expectations
- The character of the governmental action

Businesses, in particular, rely on good access to remain viable. Thus, street closures and other access limitations can generate takings claims against a government.

Commercial Access—Seattle, WA

There have been many lawsuits occasioned by access management projects on major roads. Projects such as the installation of medians, creation of service roads, and construction of overpasses often impact businesses at the same time that they improve traffic flow. There have also been a fair number of lawsuits occasioned by the creation of transit and pedestrian malls in which automobile access is cut off or at least limited. These are not traffic calming cases per se, but the same legal principles apply. A taking of property occurs, and businesses are entitled to just compensation, if their right of access is “substantially diminished.” Generally, loss of the most convenient access or circuitry of route is not compensable where a reasonable alternative exists. Government action that diminishes traffic flow past a business is also not compensable. Only if direct access to an abutting highway is cut off entirely and no reasonable alternative route exists, is compensation required (that is assuming that under State law there is no prescriptive easement that would allow the property owner to have reasonable ingress and egress over the old roadbed).¹¹

The only related traffic calming case is *Mackie v. Seattle*, 19 Wash. App. 464, 576 P.2d. 414. Seattle was sued over the inconvenience and potential loss of sales caused by the closure of a through street (see figure 6.8). Although the street had provided the most direct route to the business, the court found no ground for compensation since access had not been completely denied.

Residential Access—Memphis, TN

There have been lawsuits involving the closure of neighborhood streets to outsiders through gating. If the streets



Figure 6.8. Street Closure that Prompted an Unsuccessful Lawsuit. (Seattle, WA)

are public to begin with, this kind of closure is discriminatory and illegal. That is not so with a closure or access limitation that leaves a street open to everyone, but makes it more difficult for everyone to get in and out. This kind of closure—in response to traffic, crime, or some other threat to public welfare—is a legitimate use of police power, constrained only by requirements of equal protection and due process.

In *Memphis v. Greene*, 451 U.S. 100, the U.S. Supreme Court upheld a street closure against a civil rights challenge. A barrier was erected at the dividing line between black and white neighborhoods. The court ruled that tranquility and safety from traffic are “legitimate” interests sufficient to justify “an adverse impact on motorists who are somewhat inconvenienced by the street closing.” The only injury suffered by black or white residents was that one street rather than another would have to be used for certain trips.

Access for People with Disabilities— Montgomery County, MD

In a different kind of access-related challenge, *Slager v. Duncan*, a disabled veteran with a spinal injury sued Montgomery County to prevent the installation of speed humps on his street (see figure 6.9). His suit was filed under the Americans with Disabilities Act of 1990. The veteran alleged that the proliferation of humps interfered with his use of county streets because of the pain they caused him; that he spent an extra 20 minutes commuting to work just to avoid them; and that he would have no way of avoiding them if they were placed on his own residential street. The court dismissed his lawsuit, concluding that while the humps presented the man with difficulty, they did not “totally bar his use of the roads” or leave him without “meaningful access.”



Figure 6.9. One of More than 1,100 Speed Humps in Montgomery County, MD.

Case Law—Failure to Act

This discussion ends with a new cause of legal action, alleged government negligence for failure to calm traffic on streets with excessive volumes or speeds. Seattle reports more threats of litigation for failure to act than for acting.

As already noted, the courts will not generally interfere with discretionary functions of other branches of government. Perhaps the most important discretionary function is deciding where tax dollars should be spent. Traffic calming is just one of many competing local government priorities, and within the traffic calming budget, a particular project is just one of many competing for funds. Even where a need for traffic calming can be clearly demonstrated, private parties have no direct remedy to abate public nuisances. Traffic is a public, not a private, nuisance.

Public Nuisance—Sacramento, CA

In *Friends of H Street v. City of Sacramento*, 24 Cal.2d 607, residents filed a nuisance complaint to force the city to do something about freeway-level volumes and excessive speeds on their street (see figure 6.10). The relief sought was the designation of their street as a local one, with operational changes to bring volumes down to the street’s “environmental capacity” (that is, down to the maximum volume consistent with a residential environment). The court ruled against the residents, holding that the routing of traffic is at the discretion of the city council, that the rerouting of traffic in this case would hurt other streets, and that the city council could not please everyone. As the court saw it: “[l]oss of peace and quiet is a fact of life which must be endured by all who live in the vicinity of freeways, highways, and city streets.” While the disputed section of H Street is still not traffic calmed, a section closer to downtown—part of a complete grid—has been



Figure 6.10. Section of H Street that Is Still Not Traffic Calmed. (Sacramento, CA)

converted from one-way to two-way operation and treated with a traffic circle, center islands, and half closures. This action appears to have resulted in somewhat reduced volumes.

Damage Claims

From table 6.1, it is apparent that damage claims filed with cities and counties are much more common than lawsuits filed with courts (as they must be, since State laws require that administrative remedies be exhausted before lawsuits are filed). But damage claims are still relatively rare, and the number of claims paid is minuscule. Given the hundreds of traffic calming measures in place for many years in featured communities, these numbers are surprisingly small.

With one of the longest running programs and the most measures in place, Seattle has the most experience with damage claims.¹² About two claims are filed on average per year. Over the past 15 years, only three claims have been paid. This is very low compared with the number of claims filed and paid in connection with, for example, potholes.

Two of the three claims paid to date involved signage. Government's ministerial duty to warn motorists of hazards was breached in both cases. In one case, an object marker on a traffic circle had been knocked down and was not replaced for lack of a spare in inventory. When an automobile ran over the center island, the undercarriage sustained \$600 in damage. In another case, barricades were removed prematurely from a circle under construction. An automobile had to be realigned, at a cost of \$30, after it ran over the curb and into the center island, which was as yet unfilled with dirt.

The third claim paid by Seattle involved a poorly constructed speed hump. It was paid in the early 1980's, before hump designs had been standardized in the community. A hump only slightly longer than a speed bump and about 6 inches high took the bottom out of an automobile. Damages were paid, and the offending hump was removed.

These experiences, and lawsuits and damage claims arising from street design and maintenance, have made Seattle officials sensitive to the potential for liability in its traffic calming program. While photographing traffic calming measures with the manager of the Seattle program, the author came across a choker "landscaped" with some medium-sized rocks (see figure 6.11). The rocks, placed there by neighbors responsible for landscape maintenance, were apparently intended to protect the landscaping from errant vehicles. Aware of a large damage award over rocks in a highway median, the manager declared that the "foreign objects" would be removed from the island post-haste, and they were.

Two other featured communities have had to pay multiple claims. Claims in Ft. Lauderdale, FL, have involved wheel damage sustained by cars striking chokers on a high-volume collector street. One choker posed a particular threat because it has a vertical monument on one side of the street and nothing on the other side as a result of a fronting property owner's objection (see figure 6.12). The number of claims and apparent design flaw caused the city's risk manager to take a public stand against this installation. The city traffic engineer responded by having a tree planted in the small choker island, mitigating the risk (see figure 6.13).

Montgomery County has paid two claims involving speed humps. In one case, the driver of a community college van went over a hump at a speed alleged to be too high, and a student was injured. The county agreed to pay \$2,500 in medical expenses to avoid the expense of litigation.



Figure 6.11. Rocks in a Choker Island. (Seattle, WA)



Figure 6.12. Problem Choker Prior to Improvement. (Ft. Lauderdale, FL)



Figure 6.13. Problem Choker After Improvement. (Ft. Lauderdale, FL)

tion. In the other case, hump markings came off on the undercarriage of a car that had bottomed out traveling too fast. Because the hump markings had been improperly applied, the county assumed liability for \$300 in damages associated with removal of tape and glue.

Endnotes

1. A survey of 98 traffic agencies uncovered only 6 lawsuits related to traffic calming, this among agencies that collectively reported over 1,500 traffic-related lawsuits each year. These same agencies reported paying only two damage claims. R.S. McCourt, "Survey of Neighborhood Traffic Management Performance and Results," in *Harmonizing Transportation & Community Goals* (ITE International Conference, Monterey, CA, 1998), Institute of Transportation Engineers, Washington, DC, 1998. A survey of 407 urban traffic agencies found legal liability to be their greatest concern about use of speed humps. Yet, among the dozens of agencies using speed humps at that time, only one had ever paid a damage claim, and this for only \$2,500. ITE Technical Council Committee 5B-15, "Road Bumps—Appropriate for Use on Public Streets," *ITE Journal*, Vol. 56, November 1986, pp. 18–21.
2. A review of case law conducted for the State of Washington came up with nothing except the Berkeley case described in this chapter. J.P. Savage, R.D. MacDonald, and J. Ewell, *A Guidebook for Residential Traffic Management*, Washington Department of Transportation, Olympia, WA, 1994.
3. Director General of Transport for South Australia, *Residential Street Management Manual*, Adelaide, 1987; AUSTROADS, *Guide to Traffic Engineering Practice—Part 10—Local Area Traffic Management*, Sydney, NSW, Australia, 1988; Main Roads Department—Western Australia, *Guidelines of Local Area Traffic Management*, East Perth, WA, Australia, 1990; Committee MS/12, *Manual of Uniform Traffic Control Devices—Part 13: Local Area Traffic Management*, Standards Association of Australia, Sydney, NSW, Australia, 1991; Danish Road Directorate, *Urban Traffic Areas*, Copenhagen, Denmark, 1991 (10-volume series of road standards for urban areas); Devon County Council, *Traffic Calming Guidelines*, Exeter, England, 1991; and Kent County Council, *Traffic Calming—A Code of Practice*, Maidstone, England, 1992.
4. Transportation Association of Canada, *Canadian Guide to Neighbourhood Traffic Calming*, Ottawa, ON, Canada, 1998.
5. In an early legal analysis of traffic calming, "reasonableness" in the exercise of police powers was linked to these elements:
 - Evidence of need for action—harm to residents
 - Alternative traffic control measures, attempted or considered
 - Relationship to an overall transportation plan
 - Reasonable access for emergency vehicles
 - Conduct of public hearings
- D.T. Smith and D. Appleyard, *Improving the Residential Street Environment—Final Report*, Federal Highway Administration, Washington, DC, 1981, pp. 132–133.
- A report on minimizing tort liability included these pre-accident actions:
 - Weighing of multiple objectives
 - Identification of problem areas
 - Prioritization of needs
 - Evaluation of alternatives
 - Documentation and record keeping
- R.M. Lewis, *Practical Guidelines for Minimizing Tort Liability*, National Cooperative Highway Research Program Synthesis of Highway Practice 106, Transportation Research Board, Washington, DC, 1983, pp. 11–17.
6. Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways*, Washington, DC, 1988.
7. The distinction between humps and bumps is elaborated in H.S. Chadda and S.E. Cross, "Speed (Road) Bumps: Issues and Opinions," *Journal of Transportation Engineering*, Vol. 111, 1985, pp. 410–418.
8. Despite their low comfortable crossing speeds, bumps have less overall impact at high speeds than do humps because the vehicle suspension quickly absorbs the impact of bumps before the vehicle body has time to react. Bicycles, motorcycles, and other vehicles with rigid suspensions are more susceptible to damage and loss of control on bumps or humps.
9. A. Davis, "Speed Bumps Enjoined in Connecticut," *ITE Journal*, Vol. 50, May 1980, p. 16.
10. *Polk County v. Donna M. Safka*, 675 So. 2d 615.
11. Representative access control cases include: *City of Orlando v. Cullom*, 400 So.2d 513; *Steel v. Bach*, 124 Wis.2d 250, 369 N.W.2d 174; *Paradyne Corp. v. Florida Department of Transportation*, 528 So.2d 921; *Palm Beach County v. Tessler*, 538 So.2d 846, 850; *Rubano v. Department of Transportation*, 656 So.2d 1264; *State Department of Transportation v. Kreider*, 658 So.2d 548; *Brumer v. Los Angeles County Metropolitan Transportation Authority*, 36 Cal.App.4th 1738, 43 Cal.Rptr.2d 314; and *Pringle v. City of Wichita*, 22 Kan.App.2d 297, 917 P.2d 1351.
12. For descriptions of damage claims filed against other programs, see R. Ewing and C. Kooshian, "U.S. Experience with Traffic Calming," *ITE Journal*, Vol. 67, August 1997, pp. 28–33.