

# Introduction

In his pioneering publication *Livable Streets*, Don Appleyard called streets the “most important part of our urban environment.”<sup>1</sup> Appleyard goes on to say:

[W]e should raise our sights for the moment. What could a residential street—a street on which our children are brought up, adults live, and old people spend their last days—what could such a street be like?

Such questions are being asked with increasing frequency. For some transportation professionals, public officials, and citizens, the answer involves traffic calming. For others, it does not. The purpose of this report is not to advocate for or against traffic calming but rather to provide balanced information so readers can make their own informed decisions.

Nationally, traffic calming is part of a marked change in the way transportation systems are viewed. With passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), transportation planning and engineering have become more multimodal and sensitive to

the social costs of automobile use.<sup>2</sup> The once single-minded pursuit of speed, capacity, and traffic safety is being tempered by other concerns.<sup>3</sup> The legislative successor to ISTEA, the Transportation Equity Act for the 21st Century (TEA-21), continues and expands ISTEA programs, and creates a \$120-million “Transportation and Community and System Preservation Pilot Program.” The legislation refers to traffic calming by name as an eligible activity under this new program. Prior to TEA-21, traffic calming projects were eligible for federal funding only under the Hazard Elimination Program (part of the Surface Transportation Program’s safety set-aside).

At the local level, traffic calming responds to public concerns about speeding and cut-through traffic, particularly on neighborhood streets (see figure 1.1). Citizens look to their elected officials for leadership in this area, and elected officials look to transportation professionals for technical solutions. The Federal Highway Administration (FHWA) has responded by launching a national traffic calming technical assistance project in partnership with the Institute of Transportation Engineers (ITE). This report is one work product.

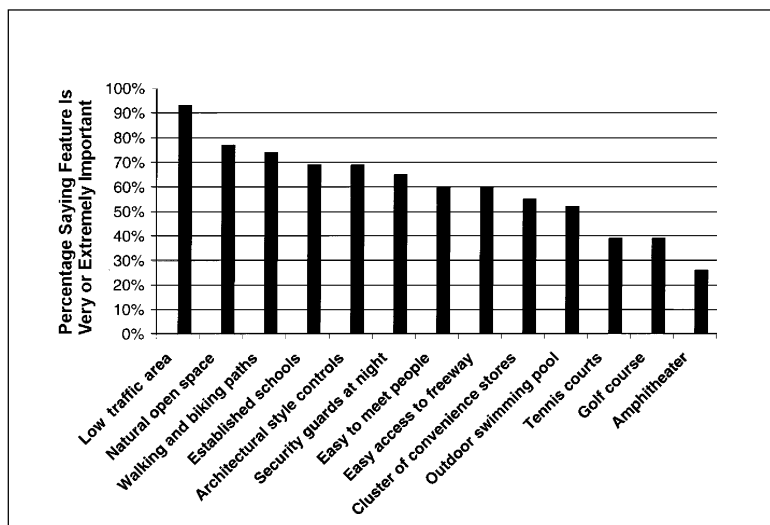


Figure 1.1. Concern About Traffic in One Public Survey.

Source: Adapted from B. Warrick and T. Alexander, “Looking for Hometown America,” *Urban Land*, February 1997, p. 28.

## Related Studies

The last federally funded study of traffic calming dates back to 1979–1981, before any meaningful history had been established in the United States.<sup>4</sup> That pioneering study explored residential preferences related to traffic, collected performance data on speed humps, and reviewed legal issues.<sup>5</sup> It documented the adverse impact of high traffic volumes and speeds on quality of life in residential areas (an example is illustrated in figure 1.2). Appleyard's *Livable Streets* grew out of that project.

Almost 20 years later, with a track record in place, there is much to learn from the U.S. experience. Compared to the 1980 study, this report goes beyond residential streets to major thoroughfares, beyond speed humps to a toolbox of calming measures, and beyond legal issues to policy, procedural, and political challenges.

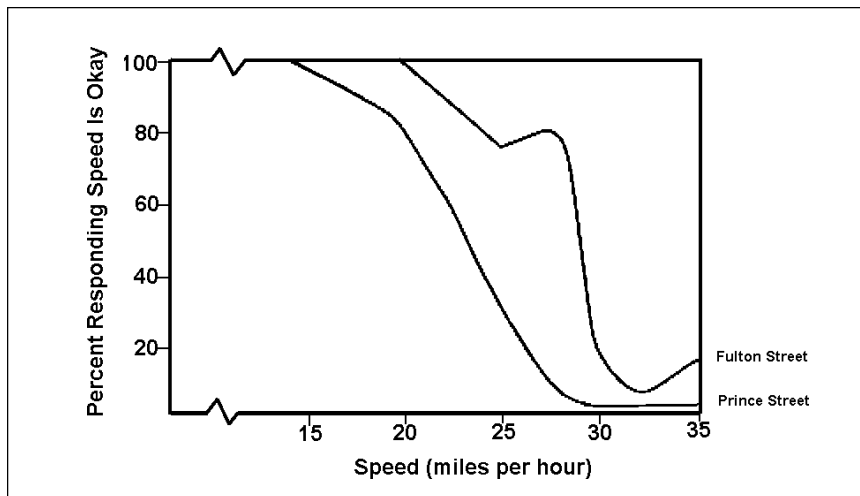


Figure 1.2. Resident Acceptance versus Traffic Speed. (From the Early FHWA Study)

Source: D.T. Smith and D. Appleyard, *Improving the Residential Street Environment—Final Report*, Federal Highway Administration, Washington, DC, 1981, p. 117.

In a parallel effort to this one, the Transportation Association of Canada and the Canadian Institute of Transportation Engineers have produced a *Canadian Guide to Neighbourhood Traffic Calming*.<sup>6</sup> That guide outlines a recommended process of public involvement, provides guidelines for the selection of traffic calming measures, and provides guidelines for geometrics, signing, and marking of different measures. The desired outcome is “a consistent approach to traffic calming across Canada, eliminating the need for local municipalities to develop their own guidelines.”<sup>7</sup>

Examples of suggested designs from the Canadian manual are reproduced in chapter 4 of this report, “Engineering and Aesthetic Issues.” These designs, plus Canadian process guidelines, will prove useful to transportation engineers who want off-the-shelf guidance. The approach taken in this report is less prescriptive, outlining principles and presenting case studies for those who choose to design their own programs and projects.

## What Traffic Calming Is and Is Not

What this report calls traffic calming has many names across the country. In San Jose, CA, its official name is “neighborhood traffic management.” An ordinance in Boulder, CO, refers to “traffic mitigation.” Until recently, it was called “traffic abatement” in Sarasota, FL. “Neighborhood traffic control” is another common name for traffic calming.

The term “traffic calming” has such descriptive power that even places with other official names for their programs revert to this English translation of the German term “verkehrsberuhigung.” Sarasota is not the first, nor will it be the last, to change the official name of its program to the more descriptive term (as illustrated in figures 1.3 and 1.4).

## An Elusive Definition

Reaching consensus on a definition of traffic calming has proved difficult. After much debate, a subcommittee of ITE came up with the following:

Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users.<sup>8</sup>

The subcommittee distinguished traffic calming from route modification, traffic control devices, and streetscaping. Traffic control devices, notably STOP signs and speed limit signs, are regulatory measures that require enforcement. By contrast, traffic calming measures are intended to be *self-enforcing*.



Figure 1.3. Original Name. (Sarasota, FL)



Figure 1.4. More Descriptive Term. (Sarasota, FL)

Second, as defined by the ITE subcommittee, traffic calming measures rely on the laws of physics rather than human psychology to slow down traffic. Street trees, street lighting, street furniture, and other streetscape elements, while complementary to traffic calming, do not directly compel drivers to slow down.

The ITE subcommittee made a third distinction. Route modification measures, such as diverters, street closures, and turn restrictions, were placed outside the umbrella of traffic calming. They were said not to change driver behavior (i.e., speed) but simply to modify driver routing options.

This third distinction is harder to justify than the first two. In terms of their ultimate effects on traffic speeds and volumes, as will be demonstrated in “Traffic Calming Impacts” (chapter 5), a single-lane choker is not very different from a half street closure, nor is a sharp bend designed into a new street network very different from a diagonal diverter inserted into an old street grid. All affect volumes and speeds of traffic. All are largely self-enforcing. All are engineered.

### Scope of This Report

For the purposes of this report, traffic calming involves changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and cut-through volumes in the interest of street safety, livability, and other public purposes. The Canadian definition of traffic calming is similar.<sup>9</sup>

The concept of traffic calming as presented in this report is narrow compared to those of some surveyed communities, whose traffic calming programs are structured around the “3Es”—education, enforcement, and engineering. The definition used by Montgomery County, MD, for example, includes “operational measures such as enhanced police enforcement, speed displays, and a community speed watch program, as well as such physical measures as edgelines, chokers, chicanes, traffic circles, and (for the past 4 years) speed humps and raised crosswalks.”<sup>10</sup>

This report takes the middle ground, focusing mainly on physical measures, including street closures and other volume controls under the traffic calming umbrella. Education and enforcement activities, such as neighborhood speed watch and neighborhood traffic safety campaigns (as illustrated in figure 1.5), fall outside the umbrella but will also be mentioned where relevant.

### Multiple Purposes of Traffic Calming

The immediate purpose of traffic calming is to reduce the speed and volume of traffic to acceptable levels (“acceptable” for the functional class of a street and the nature of bordering activity). Reductions in traffic speed and volume, however, are just means to other ends such as traffic safety and active street life. Different localities have un-

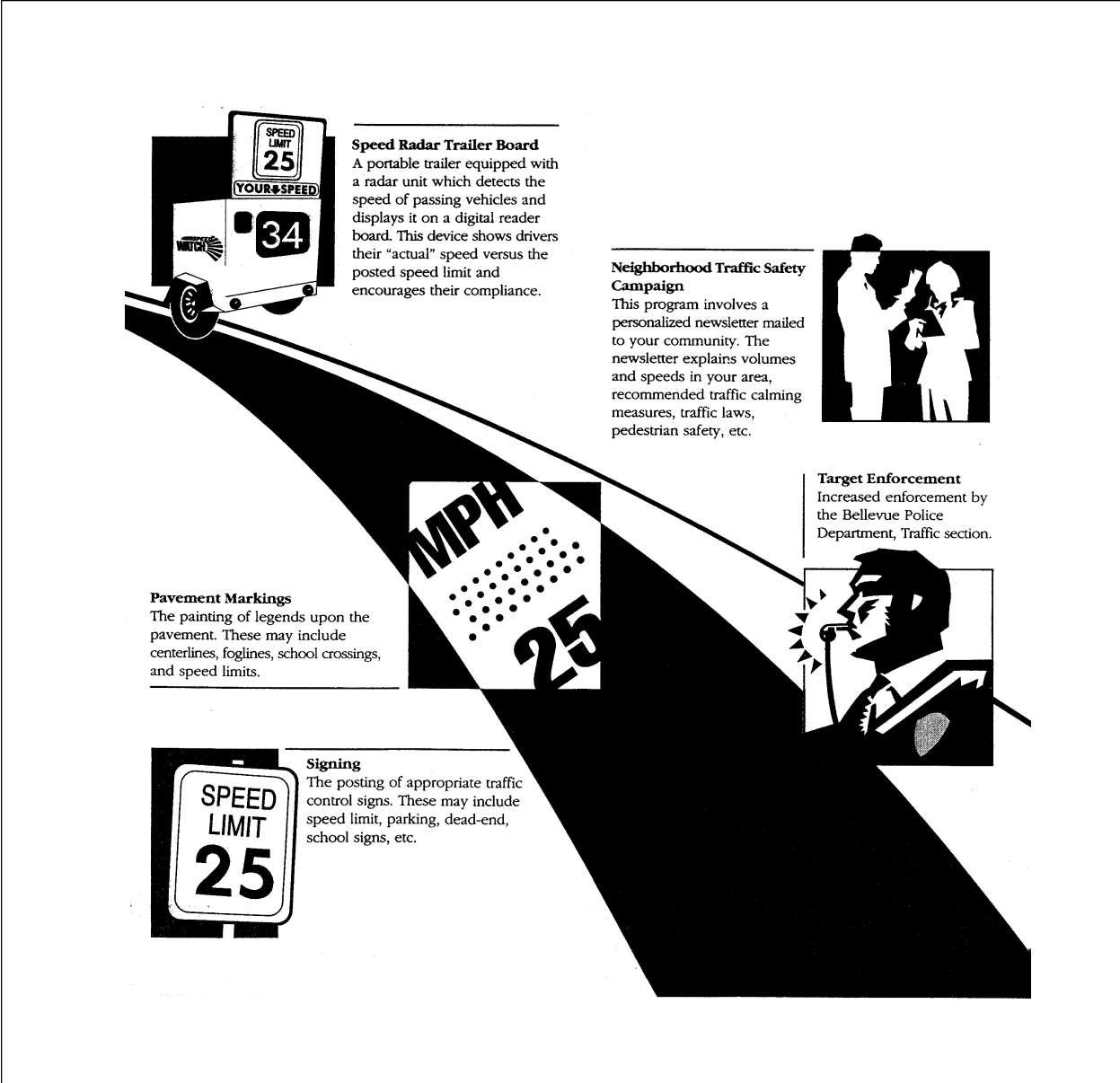


Figure 1.5. Examples of Education and Enforcement Activities. (Bellevue, WA)

Source: City of Bellevue, Transportation Department, "Neighborhood Traffic Control Program," Bellevue, WA, 1996.

dertaken traffic calming for different reasons, three of which are now given as examples.

### Neighborhood Livability—San Jose, CA

A neighborhood traffic calming project in San Jose, CA, defined the following objectives:

- Reduce through traffic
- Reduce truck traffic
- Reduce occurrence of excessive speeding
- Reduce noise, vibration, and air pollution
- Reduce accidents
- Provide safer environment for pedestrians and children

Objective measurements such as a reduction in collisions—from 47 in the 9 months before treatment to 27 in the 9 months after—demonstrated the effect of traffic calming

on neighborhood livability. So did attitudinal changes captured in a resident survey, which are summarized in table 1.1.

### Crime Prevention—Dayton, OH

Traffic calming measures that limit motor vehicle access are a common strategy in the field of crime prevention through environmental design (CPTED). One crime-ridden neighborhood in Dayton, OH, underwent street and alley closures to transform an open grid into a series of mini-neighborhoods, each with a single entry portal off an arterial (illustrated in figure 1.6).<sup>11</sup> Through streets were treated with speed humps. With street closures in place, violent crime within the neighborhood dropped from 111 reported incidents in 1992 to 56 reported incidents in the same 11-month period of 1993, a 50 percent

Table 1.1. Resident Opinion Survey Results. (San Jose, CA)

Problem Reported	% Residents Reporting Problem Before Traffic Calming	% Residents Reporting Problem After Traffic Calming
Air pollution from traffic	54	44
Noise from traffic	52	34
Safety of children	39	30
Pedestrian safety	43	28

Source: Department of Transportation Operations, “Naglee Park Traffic Plan—Final Project Report,” City of San Jose, CA, August 1984.

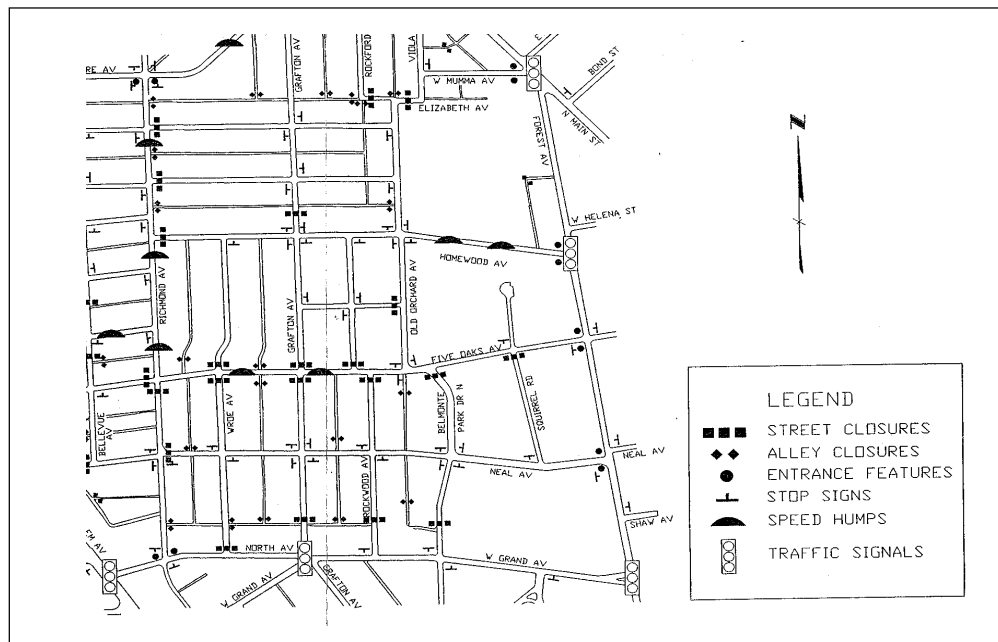


Figure 1.6. Traffic Calming in the Five Oaks Neighborhood. (Dayton, OH)

Source: Department of Urban Development, City of Dayton, OH, 1995.



Figure 1.7. Before, During, and After Neighborhood Redevelopment. (West Palm Beach, FL)



Figure 1.8. Before, During, and After Commercial Area Revitalization. (West Palm Beach, FL)

reduction; nonviolent crime within the neighborhood dropped from 969 to 741 reported incidents in the same time period, a 24 percent reduction. Traffic volumes, collisions, and speeds within the neighborhood were down as well—by 36, 40, and 18 percent, respectively.

### Urban Redevelopment— West Palm Beach, FL

Probably nowhere in the United States is traffic calming more central to overall redevelopment efforts than in West Palm Beach, FL. “Traffic calming has gone beyond the usual speeding, cut-through, and safety benefits by increasing inner city neighborhood pride, attracting private investment, supporting other programs involving home ownership and historic preservation, and helping downtown businesses.”<sup>12</sup> From the level of reinvestment activity on traffic-calmed streets, the strategy seems to be working (figures 1.7 and 1.8). (See chapter 5 for more on the West Palm Beach experience.)

### Overview of Current Practice

Until only a few years ago, traffic calming was but a glimmer on the U.S. transportation profession’s screen. The 1991 ITE Annual Meeting included a presentation on a novel 22-foot, flat-topped speed hump designed and tested by Seminole County, FL (see figure 1.9). Because its 85th percentile speed (the speed below which 85 percent of the vehicles travel) was higher than that for the common



Figure 1.9. Seminole County Speed Hump—Innovation Circa 1991. (Maitland, FL)

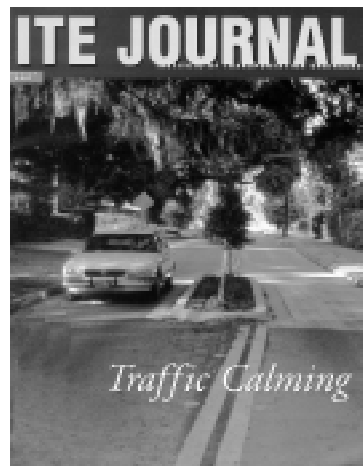


Figure 1.10. Special Issue of the *ITE Journal*.

12-foot rounded hump, this new hump was successfully applied to a collector road with a daily volume of 12,000 vehicles. There was also a presentation on roundabouts, which are both intersection control devices and traffic calming measures. There were two presentations on neotraditional neighborhood design, whose goals include traffic calming, and mention of the fledgling neighborhood traffic management program in Austin, TX. But that was all, among 124 professional presentations.

Just 6 years later, traffic calming was declared a priority by ITE's International Board of Direction. Two special issues of the *ITE Journal* (figure 1.10), one of three tracks at the 1997 ITE International Conference, and a newly formed Traffic Calming Committee all signaled burgeoning professional interest in the subject.

### ITE District 6 Survey

U.S. traffic calming practice has evolved in ways that would have been hard to imagine only a few years ago. While the precise number is unknown, jurisdictions with active traffic calming programs certainly number in the hundreds. Of 153 cities and counties located in the 13 western U.S. States that responded to a 1996 ITE District 6 survey, 110 reported the use of one or more engineering measures.<sup>13</sup> Others had educational and enforcement ac-

Table 1.2. Prevalence of Selected Measures in 153 Cities and Counties. (ITE District 6 Survey)

Measure	Number of Jurisdictions
Speed humps	79
Diverters/closures	67
Traffic circles	46
Chokers	35
Engineering measures (any kind)	110

tivities that would fall under a broader definition of traffic calming. The numbers of jurisdictions in each category are shown in table 1.2.

### University of California at Berkeley Survey

A literature search by researchers at the University of California at Berkeley uncovered about 350 U.S. cities and counties that had engaged in some form of traffic calming over the past 30 years. The study's definition of traffic calming included nonengineering measures.<sup>14</sup> In a random sample of 43 communities, 40 reported taking steps beyond the standard enforcement of traffic laws. The initial survey was supplemented by interviews with an additional

20 cities whose traffic calming programs appeared to be particularly ambitious. The survey covered a host of hard and soft subjects, from funding levels to political conflict.

### For Every Action...

For every action there is often an opposite reaction. As traffic calming measures have proliferated, political support and political opposition have grown. The more traffic calming occurs in a locality, the more controversy seems to erupt (see figure 1.11). The more it expands beyond local streets to major thoroughfares, the more heated the controversy becomes. The following is a brief status report as of mid-1998.

Montgomery County, MD, first witnessed a lawsuit challenging the legality of its speed hump program and then an antihump petition drive. The lawsuit was dismissed, and the petition was disqualified from the ballot by the courts. Later, the county council imposed a moratorium on new speed hump applications, and after lifting the moratorium adopted such stringent eligibility requirements that a virtual moratorium still exists. The county council also decreed that 12-foot speed humps be replaced



Figure 1.11. Controversy Surrounding Traffic Calming.

by 22-foot speed tables on all emergency response routes, potentially a very costly requirement.

The experience of Portland, OR, has paralleled that of Montgomery County. First, a moratorium was applied to the installation of humps and circles on emergency response routes. Then, when the moratorium was lifted, funding was withheld from the Neighborhood Collector Program aimed at just such routes. Portland has been sued as well. The lawsuit, won by the city at the trial court level, is under appeal.

San Diego, CA, imposed a moratorium on all speed hump projects while new warrants were being developed. The old warrants had been violated under political pressure from city council members, and the resulting installation of humps on collector roads outraged both fire officials and residents of local streets to which traffic was diverted.

Boulder, CO, imposed a large budget cut (from \$900,000 annually to \$250,000 and finally to \$100,000) as part of a general retrenchment of traffic calming. Only demonstration projects, plus education and enforcement activities, are permitted until emergency response issues have been resolved.

When Gwinnett County, GA, expanded its notification area, residents of neighboring streets began appearing at county commission meetings in opposition to speed table applications. The board interpreted their sudden appearance as a revolt against the program, and has placed otherwise qualified applications on hold until public support for the program can be reassessed.

Sarasota, FL, has been sued, and lost; the decision is being appealed. Berkeley, CA, has a total moratorium in effect. Eugene, OR, has a moratorium on speed humps, while Howard County, MD, has a moratorium on speed humps and most other vertical measures. San Jose, CA, has stopped funding comprehensive neighborhood traffic calming plans. Austin, TX, has a limited moratorium in effect while new measures are being pilot tested.

The various types of traffic calming measures referenced above are described in "Toolbox of Traffic Calming Measures" (chapter 3). Moratoria, lawsuits, and political controversies are discussed in "Legal Authority and Liability" (chapter 6), "Emergency Response and Other Agency Concerns" (chapter 7), and "Warrants, Project Selection Procedures, and Public Involvement" (chapter

8). Let it suffice to say that this is a critical time in the evolution of U.S. traffic calming, one filled with perils and possibilities.

## Featured Programs

Twenty traffic calming programs are featured in this report (see list on page vii). Traffic managers were interviewed by telephone several times, and sites were visited and photographed at least once; in some cases, two or three times. Another 30 programs were surveyed less extensively, and many others provided before-and-after studies, photographs, and occasional anecdotes.<sup>15</sup>

Selection criteria were informal. A program experimenting with a variety of measures, defending itself in a lawsuit, beginning to treat major thoroughfares, using traffic calming to help revitalize low-income neighborhoods, or facing a funding crisis was an obvious choice for in-depth study. A big residential speed hump program with no institutional issues was less likely to be selected. The former had much to teach us; the latter did not.

Admittedly, a Florida bias crept into the selection process, for it is close to home for the author. But even the featured Florida programs had to be exemplary. The 20 featured programs are among the most innovative in the United States. Because they are pushing the envelope, the

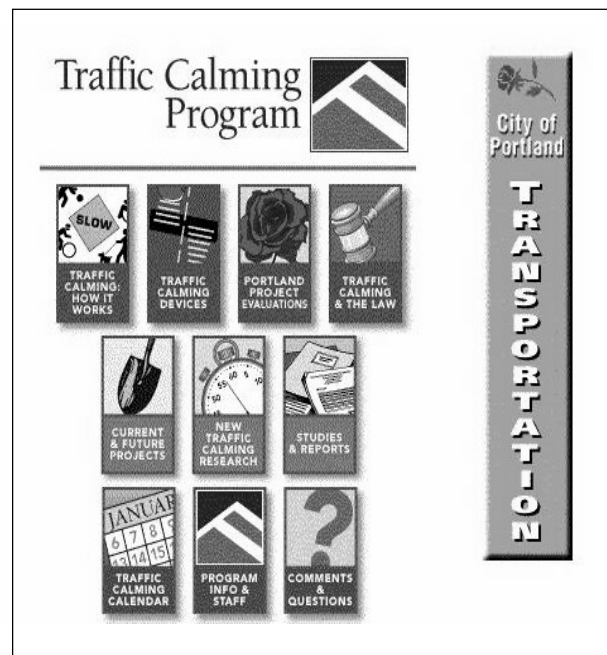


Figure 1.12. One of the More Complete Web Sites ([www.trans.ci.portland.or.us/Traffic\\_Management/trafficalming](http://www.trans.ci.portland.or.us/Traffic_Management/trafficalming)). (Portland, OR)



featured communities often face complex institutional issues, which adds to their interest. For those wishing to learn more about the featured programs, several web sites are well worth visiting (see p. vii for list, and figure 1.12).

## Endnotes

1. D. Appleyard, *Livable Streets*, University of California Press, Berkeley, 1981, p. 243.
2. R. Ewing, *Transportation and Land Use Innovations—When You Can't Pave Your Way Out of Congestion*, American Planning Association (in cooperation with the Surface Transportation Policy Project), Chicago, IL, 1998, pp. 5–8.
3. R. Ewing, "Beyond Speed—The Next Generation of Transportation Performance Measures," in D. Porter (ed.), *Performance Standards for Growth Management*, American Planning Association, Chicago, IL, 1996, pp. 31–40.
4. D.T. Smith and D. Appleyard, *State-of-the-Art: Residential Traffic Management*, Federal Highway Administration, Washington, DC, 1980; and D.T. Smith and D. Appleyard, *Improving the Residential Street Environment—Final Report*, Federal Highway Administration, Washington, DC, 1981.
5. There have been modest efforts since the early 1980's, consisting of literature surveys and European site visits, in connection with the National Bicycling and Walking Study of the Federal Highway Administration. See, in particular, A. Clarke and M.J. Dornfeld, *National Bicycling and Walking Study: Case Study No. 19, Traffic Calming, Auto-Restricted Zones and Other Traffic Management Techniques: Their Effects on Bicycling and Pedestrians*, Federal Highway Administration, Washington, DC, 1994.
6. Transportation Association of Canada, *Canadian Guide to Neighbourhood Traffic Calming*, Ottawa, ON, Canada, December 1998.
7. G. Chartier and Diane G. Erickson, "Canada's Guide to Neighbourhood Traffic Calming—CITE/TAC Project 208," in *Compendium of Technical Papers for the 67th ITE Annual Meeting* (Boston, MA, 1997), Institute of Transportation Engineers, Washington, DC, 1997, CD-ROM.
8. I.M. Lockwood, "ITE Traffic Calming Definition," *ITE Journal*, Vol. 67, July 1997, pp. 22–24.
9. The *Canadian Guide to Neighbourhood Traffic Calming* wrestled with the distinction between speed and volume control, and came to favor an inclusive definition of traffic calming:  

Traffic calming involves altering of motorist behaviour on a single street or on a street network. It also includes traffic management, which involves changing traffic routes or flows within a neighbourhood.

Transportation Association of Canada, op. cit., p. 1–1.
10. D.A. Loughery and M. Katzman, *Montgomery County, Maryland—Speed Hump Program Evaluation Report*, Montgomery County Council, January 1998, p. 1.
11. Oscar Newman, a recognized expert in the field of CPTED, developed the Five Oaks Neighborhood Stabilization Plan for a crime-ridden neighborhood in Dayton, OH.
12. I.M. Lockwood, "Meeting Community Objectives Through Street Design (The West Palm Beach Approach)," paper presented at the ITE International Conference in Monterey, CA, Institute of Transportation Engineers, Washington, DC, 1998.
13. R.S. McCourt, *Neighborhood Traffic Management Survey, ITE District 6*, available through DKS Associates, Portland, OR, 1996.
14. The University of California at Berkeley defined traffic calming as "physical retrofitting or changes in operations or management strategies on existing streets, designed to reduce adverse impacts such as speeding and excessive volumes and to improve safety and amenity." A. Weinstein and E. Deakin, "A Survey of Traffic Calming Programs in the United States," paper presented at the ITE International Conference in Monterey, CA, Institute of Transportation Engineers, Washington, DC, 1998.
15. A shorter survey included Ada County, ID; Albuquerque, NM; Arlington County, VA; Beaverton, OR; Boca Raton, FL; Brookline, MA; Cambridge, MA; Dallas, TX; Greensboro, NC; Houston, TX; Lee County, FL; Madison, WI; Minneapolis, MN; Naples, FL; North Little Rock, AR; Omaha, NE; Orlando, FL; Plano, TX; Reno, NV; Sacramento, CA; San Antonio, TX; Santa Monica, CA; Tampa, FL; Tucson, AZ; and Yakima, WA.