

## Brief History of Traffic Calming

This chapter gives an abbreviated history of European and Australian traffic calming. It then describes the early U.S. experience, focusing on Seattle, WA, a leader in the field.

### International Origins of Traffic Calming

#### Dutch Woonerven and Other Experiments

European traffic calming began as a grassroots movement in the late 1960's.<sup>1</sup> Angry residents of the Dutch city of Delft fought cut-through traffic by turning their streets into “woonerven,” or “living yards.”<sup>2</sup> What were once channels for the movement of cars became shared areas, outfitted with tables, benches, sand boxes, and parking bays jutting into the street. The effect was to turn the street into an obstacle course for motor vehicles, and an extension of home for residents (see figure 2.1).

Woonerven were officially endorsed by the Dutch government in 1976. Over the next decade, the idea spread to many other countries. Laws and regulations were changed to permit woonerf designs in Germany, Sweden, Denmark, England, France, Japan, Israel, Austria, and Switzerland. By 1990, there were more than 3,500 shared streets in the Netherlands and Germany, 300 in Japan, and 600 in Israel.<sup>3</sup>

Woonerven were no cure-all. The woonerf design was meant for streets with low traffic volumes. Extensive use of street furniture made converted woonerven about 50 percent costlier than normal reconstructed streets. The twists and turns, plus brick pavement and periodic raised areas, brought motorists down to “walking speeds,” meaning about 15 kph or 9 mph. Such low speeds were sustainable only for short distances on local access streets.

The Dutch wanted to see if the design principles of woonerven could be adapted to a wider range of streets at a lower cost to the government. They experimentally compared the effectiveness of woonerven to treatments of two types:



Figure 2.1. Dutch Woonerf. (Delft, The Netherlands)

Source: L. Herrstedt et al., *An Improved Traffic Environment—A Catalogue of Ideas*, Danish Road Directorate, Copenhagen, Denmark, 1993, p. 11.

- Diversion schemes involving street closures and one-way streets
- Now-standard traffic calming treatments involving humps and other physical measures

Of the three approaches, the traffic calming alternative was judged the most cost-effective for neighborhood streets. It was officially endorsed by the Dutch government in 1983. Other nations followed suit, calling their traffic-calmed streets and areas “stille veje” (translated as “silent roads”) in Denmark, “Tempo 30” zones in Germany, and 20-mph zones in Britain.

#### European “Environmentally Adapted Through Roads”

In the early 1980's Norway needed a policy to deal with intercity traffic speeding through its many small towns. Due to budget constraints, the nation could not afford to build bypasses around all of them. The government decided its one viable option was traffic calming.

Inspired by Norway, Denmark undertook a test of traffic calming measures applied to highways through three small towns.<sup>4</sup> Pre-warnings or gateways were placed at the town entries, and chicanes, roundabouts, chokers, and other mea-



**Figure 2.2. Danish Environmentally Adapted Through Road. (Vinderup, Denmark)**

Source: L. Herrstedt et al., *An Improved Traffic Environment—A Catalogue of Ideas*, Danish Road Directorate, Copenhagen, Denmark, 1993, p. 117.

asures were installed in the town centers. The results included a drop in speeds, decline in accidents, and improvement in air quality, all at one-fourth to one-third the cost of constructing a bypass. This led to a series of similar projects on main roads throughout Denmark (see figure 2.2).

Germany conducted a related test in the state of Nordrhein-Westfalen. Twenty-eight villages located on intercity highways were traffic calmed with narrowings, roundabouts, textured surfaces, and redesigned street spaces. Significant speed reductions were recorded for most highways as they ran through town centers and for nearly all highways as they entered towns.

### **German Areawide Traffic Calming**

Germany experimented in the late 1970's with neighborhood traffic calming.<sup>5</sup> This was the era when the term “verkehrsberuhigung” (translated as traffic calming) was coined. The Germans quickly learned that calming individual streets resulted in traffic diversion. Already quiet streets became quieter as traffic moved to already congested streets. The Germans decided to test the feasibility of areawide traffic calming, where calming principles were extended to main roads.

In the 1980's, a long-term demonstration was conducted in six German towns (see figure 2.3). A 30-kph speed limit was imposed over large areas; local streets and collectors were treated with speed tables, chicanes, and pinch points; and one-way streets were converted to two-way operation. Ring roads and arterials were narrowed in some cases. Alternative travel modes were given higher priority. The demonstration had these results:

- Volumes were unchanged.
- Speeds were reduced.

- Frequency of accidents was unchanged, but severity was reduced.
- Air pollution was reduced.
- Noise was reduced.
- Fuel use increased or decreased depending on the location.

These positive results helped encourage many cities across the globe to adopt areawide traffic calming programs. Notable examples include Odense in Denmark; Goteburg and Malmö in Sweden; Groningen, Delft, Tilburg, The Hague, and Amsterdam in the Netherlands; Bologna and Parma in Italy; Zurich and Basel in Switzerland; and Osaka, Tokyo, and Nagoya in Japan.<sup>6</sup>

Germany's Green Party has argued that, even with areawide traffic calming, heavy traffic ends up somewhere in cities. Their view is gaining currency and, now in the late 1990's, citywide policies are being adopted to restrain automobile use. Traffic restraint is called the “third generation” of traffic calming, coming as it does after the neighborhood and areawide approaches. Although similar to travel demand management in the United States, traffic restraint in Germany is being pursued much more vigorously.<sup>7</sup>

### **British “Environmental Traffic Management”**

A 1963 British government document, *Traffic in Towns*,<sup>8</sup> is often credited with launching the modern traffic calming movement. The report's author, Colin Buchanan, is considered the father of traffic calming by many Europeans. Thus it is surprising that Britain has only recently begun to implement the range of measures used, the extension of traffic calming to main roads, and the redesign of street environments to create people places.<sup>9</sup>

The Buchanan report was the first official document to recognize that growth of traffic threatened the quality of urban life. However, compared with current thinking on the subject, the solutions offered in the report were shortsighted. Urban areas were to be reconstructed to accommodate the automobile. Neighborhoods were to be protected largely by closing streets and using short one-way segments to prevent through trips. *Volume control measures* were emphasized to the virtual exclusion of *speed control measures* (see chapter 3).

Buchanan-inspired traffic calming plans were implemented throughout Britain under the 1969 Housing Act and a 1977 street design manual (*Design Bulletin 32*, updated in 1992).<sup>10</sup> The Urban Safety Project, a traffic calming initiative launched in 1982 to reduce accidents, also featured Buchanan-like volume controls. It had a relatively modest impact on collision rates compared with German, Dutch, and Danish demonstrations. Comparing



and 1993 Traffic Calming Regulations expanded the range of authorized measures to include almost any vertical or horizontal feature imaginable. The 1992 edition of *Design Bulletin 32* shifted from advocating a tree-like hierarchy of roads to a hierarchical network of traffic-calmed streets.

### Australian “Local Area Traffic Management”

Following the Buchanan model, Australia began its traffic calming efforts with street closures and conversions to one-way streets, but soon progressed beyond these measures. By the 1980’s, Adelaide, Melbourne, and Sydney had full-blown “local area traffic management” programs in place, concentrating on residential streets.<sup>12</sup> A 1988 survey identified hundreds of speed control measures in the Sydney Metropolitan Area alone.<sup>13</sup>

The emphasis in Australian traffic calming shifted again in 1989, with a campaign by the Committee Against Route Twenty. This community group developed a plan offering traffic calming as an alternative to a major highway project.

The plan, and the resulting publicity, drew attention to problems of higher order roadways.<sup>14</sup>

Today, one can find many types of traffic calming measures on Australian streets that have not yet appeared in the United States (see figure 2.5). One can also find an extraordinary number of roundabouts, almost 2,000 at last count. Australia has been a leader in the use of modern roundabouts for traffic calming and intersection control. It has also been a leader in roundabout capacity research and analysis.

### Lessons from Abroad

Having a considerable head start, Europe and Australia have much to share with the United States about traffic calming. Several trends are evident, such as the shift from volume controls to speed controls, from simple to diverse programs, and from spot to areawide treatments. These trends are just beginning to show up in the United States (see chapter 3). The advantage of supportive legislation is evident from the European experience. U.S. traffic calm-



Driveway Link



Diamond Choker



Angle Point



Impeller

Figure 2.5. Australian Calming Measures.

Photo Credit: Joseph P. Perone, Melbourne, Victoria, Australia

ing is proceeding without any official sanction, to its legal detriment (see chapter 6). The Europeans have conducted several large-scale controlled demonstrations to better assess the benefits and costs of traffic calming. U.S. programs have generated before-and-after speed, volume, and collision data, but nothing equivalent in scope or rigor to the European studies (see chapter 5). Some European communities have long since concluded that traffic calming must encompass higher order roads if traffic safety, livability, and walkability are to be achieved outside isolated pockets. Given the controversies described in chapters 1, 7, and 9, a similar conclusion may never be reached in the United States.

## U.S. Beginnings

Use of street closures and traffic diverters in the United States dates back to the late 1940's or early 1950's, when Montclair, NJ, and Grand Rapids, MI, treated problem streets with these measures.<sup>15</sup> Berkeley, CA, was probably first to establish a full-blown program of traffic calming, when it adopted a citywide traffic management plan in 1975. Seattle, WA, may have been first to do areawide planning, when it conducted neighborhood-wide demonstrations in the early 1970's. Seattle has more experience implementing more traffic calming measures than any other community in the United States.

Seattle's early success was due, in part, to its ability to get funding in place. A \$12-million bond issue for neigh-

borhood street improvements passed in 1968. Bond proceeds were used for a series of traffic calming demonstrations.

## Stevens Neighborhood Demonstration

The first demonstration, in the Stevens neighborhood, rivals in sophistication some of today's best projects. It began in 1971 and involved a 12-square-block area of gridded streets that were used as cut-through routes. Although bordering arterials had excess capacity, outsiders apparently found internal streets more convenient for certain trips. To discourage through traffic, the initial demonstration involved a series of temporary diagonal diverters constructed with 50-gallon drums. Diverters were placed at both ends of streets, creating very indirect trips for the neighborhood's own residents (see figure 2.6a). This inconvenience was corrected following a favorable neighborhood vote to modify the demonstration. Traffic circles replaced diverters at one end of each street (see figure 2.6b). A half street closure was installed, and a diagonal diverter was redesigned to permit an additional turning movement. This was Seattle's first test of what became the workhorse of its traffic calming program—the traffic circle. It was also the first test of its preferred alternative to a full street closure (i.e., a half closure that blocked traffic in one direction).

Finally, in early 1973, permanent landscaped circles and diverters were installed to replace the temporary ones. Before-and-after traffic counts showed a reduction in in-

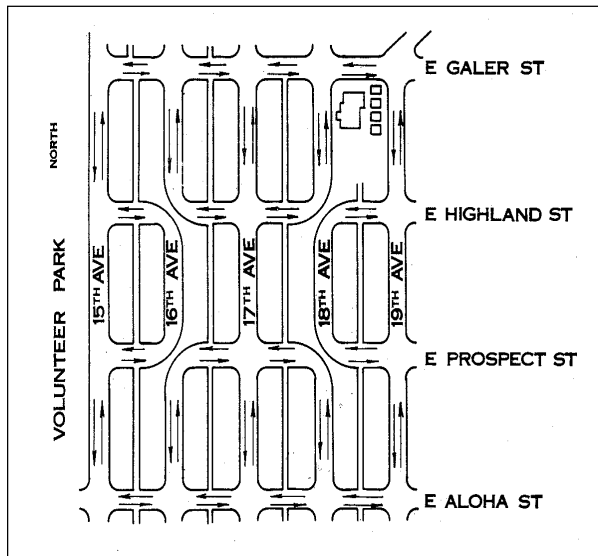


Figure 2.6a. Original Demonstration. (Seattle's Stevens Neighborhood)

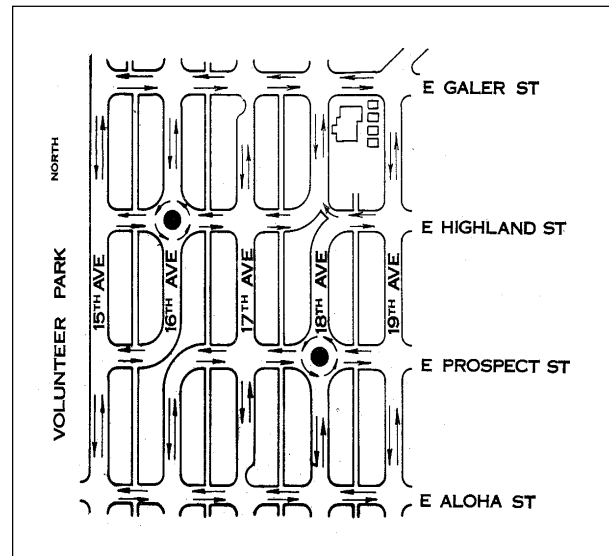


Figure 2.6b. Permanent Installation. (Seattle's Stevens Neighborhood)

Source: Traffic and Transportation Division, "A Study in Traffic Diversion in the Stevens Neighborhood," City of Seattle, WA, 1974.

ternal traffic volume of 56 percent. Traffic accidents, which had averaged 12 per year, fell to zero during the 2 years of the demonstration. A follow-up survey of residents found general satisfaction with the treatment.

Serious concern was raised by the Seattle Fire Department. Emergency response would be affected, particularly by the one full diagonal diverter. The solution was to place fire hydrants on each side of that diverter and design it to be traversable by emergency vehicles (see figure 2.7).

### Lessons from Seattle

This early demonstration illustrates the wisdom of several practices:

- Testing complex areawide treatments before implementing them permanently
- Assessing public support for the treatment
- Conducting before-and-after studies of traffic impacts
- Including traffic accidents among the impacts studied

- Working with emergency services to address their concerns
- Opting for the most conservative designs that will do the job

Seattle's selective replacement of volume controls (diagonal diverters) with speed controls (traffic circles) was particularly enlightened for its time.

### Other Early Programs

Seattle and Berkeley were followed by other communities. Most experimented with traffic calming measures in an isolated case or two before establishing formal programs. Indeed, it was the citywide demand created by these isolated examples that prompted the creation of full-blown programs. The communities in table 2.1 were among the first to establish programs. Communities that experimented with street closures, diverters, or other measures but stopped at that—and there were many such places—are not listed.<sup>16</sup>



Traffic Circle



Half Closure



Truncated Diverter



Traversable Diverter

Figure 2.7. Early Innovations in the Stevens Neighborhood. (Seattle, WA)

**Table 2.1. Approximate Start Dates of Other Early U.S. Traffic Calming Initiatives.**

Community	Year
Austin, TX	1986
Bellevue, WA	1985
Charlotte, NC	1978
Eugene, OR	1974
Gainesville, FL	1984
Montgomery County, MD	1978
Portland, OR	1984
San Jose, CA	1978

## Endnotes

- For a general history of European traffic calming, see K. Kjemtrup and L. Herrstedt, "Speed Management and Traffic Calming in Europe: A Historical View," *Accident Analysis & Prevention*, Vol. 24, 1992, pp. 57–65; A. Clarke and M.J. Dornfeld, *National Cycling 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, pp. 3–24; and K. Schlabbach, "Traffic Calming in Europe," *ITE Journal*, Vol. 67, July 1997, pp. 38–40.
- For the history of Dutch traffic calming, see J.H. Kraay, "Woonerven and Other Experiments in the Netherlands," *Built Environment*, Vol. 12, 1986, pp. 20–29; R. Tolley, *Calming Traffic in Residential Areas*, Brefi Press, Brefi, England, 1990, pp. 19–27; S.T. Janssen, "Road Safety in Urban Districts: Final Results of Accident Studies in the Dutch Demonstration Projects of the 1970s," *Traffic Engineering + Control*, Vol. 32, 1991, pp. 292–296; and C. Hass-Klau et al., *Civilised Streets—A Guide to Traffic Calming, Environment & Transport Planning*, Brighton, England, 1992, pp. 103–114.
- E. Ben-Joseph, "Changing the Residential Street Scene: Adapting the Shared Street (Woonerf) Concept to the Suburban Environment," *Journal of the American Planning Association*, Vol. 61, 1995, pp. 504–515.
- For the history of Danish traffic calming, see Hass-Klau et al., op. cit., pp. 115–119; L. Herrstedt, "Traffic Calming Design: A Speed Management Method—Danish Experience on Environmentally Adapted Through Roads," *Accident Analysis & Prevention*, Vol. 24, 1992, pp. 3–16; and L. Herrstedt et al., *An Improved Traffic Environment—A Catalogue of Ideas*, Danish Road Directorate, Copenhagen, Denmark, 1993, pp. 11–12.
- For the history of German traffic calming, see Hass-Klau et al., op. cit., pp. 85–102; Tolley, op. cit., pp. 29–57; P.H. Bowers, "Environmental Traffic Restraint: German Approaches to Traffic Management by Design," *Built Environment*, Vol. 12, 1986, pp. 60–73; H.H. Keller, "Environmental Traffic Restraints on Major Roads in the Federal Republic of Germany," *Built Environment*, Vol. 12, 1986, pp. 44–57; H.H. Keller, "Three Generations of Traffic Calming in the Federal Republic of Germany," Environmental Issues, PTRC Education and Research Services, Sussex, England, 1989, pp. 15–31; and R. Schnull and J. Lange, "Speed Reduction on Through Roads in Nordrhein-Westfalen," *Accident Analysis & Prevention*, Vol. 24, 1992, pp. 67–74.
- H. Monheim, "Area-Wide Traffic Restraint: A Concept for Better Urban Transport," *Built Environment*, Vol. 12, 1986, pp. 74–82.
- See, for example, J. Pucher and S. Clorer, "Taming the Automobile in Germany," *Transportation Quarterly*, Vol. 46, 1992, pp. 383–395.
- C. Buchanan, *Traffic in Towns: A Study of the Long Term Problems of Traffic in Urban Areas*, Her Majesty's Stationery Office, London, England, 1963.
- For the history of British traffic calming, see Hass-Klau et al., op. cit., pp. 61–83; Tolley, op. cit., pp. 13–18, 59–71; C. Hass-Klau, "Environmental Traffic Management in Britain—Does It Exist?" *Built Environment*, Vol. 12, 1986, pp. 7–19; and County Surveyors Society, *Traffic Calming in Practice*, Landor Publishing, London, England, 1994, p. 9.
- J. Noble and A. Smith, *Residential Roads and Footpaths—Layout Considerations—Design Bulletin 32*, Her Majesty's Stationery Office, London, England, 1992.
- Tolley, op. cit., p. 61.
- For the history of Australian traffic calming, see W.B. Hagan and S.E. Amamoo, "Residential Street Management in South Australia," *ITE Journal*, Vol. 58, March 1988, pp. 35–41; R. Brindle, "Local Street Speed Management in Australia—Is It 'Traffic Calming'?" *Accident Analysis & Prevention*, Vol. 24, No. 1, 1992, pp. 29–38; and R. Brindle, "Traffic Calming in Australia—More Than Neighborhood Traffic Management," *ITE Journal*, Vol. 67, July 1997, pp. 26–31.
- Brindle, op. cit., 1992.
- Citizens Against Route Twenty (CART), *The Solution to Route 20 and a New Vision for Brisbane*, available from Sensible Transportation Options for People, Tigard, OR, 1989.
- W.S. Homburger et al., *Residential Street Design and Traffic Control*, Prentice Hall, Englewood Cliffs, NJ, 1989, p. 10.
- The original traffic calming project of the Federal Highway Administration, undertaken circa 1980, found 120 jurisdictions in North America that had taken some action to control speeding. D.T. Smith and D. Appleyard, *Improving the Residential Street Environment—Final Report*, Federal Highway Administration, Washington, DC, 1981, table 1.