Traffic Calming in Europe

EXAMINING THE ROOTS OF TRAFFIC CALMING HELPS EXPLAIN HOW EUROPE'S CHANGING CULTURE AND LEGISLATION HAVE CALLED FOR REVISED TRAFFIC CALMING SCHEMES.

BY KLAUS SCHLABBACH

TRAFFIC CALMING STARTED IN the Dutch town of Delft in 1970 as an incident. A road hump was built at the end of an alley by municipal technicians. The difference in elevation of 8 cm triggered off immediate reactions: One of the council committee members complained because the beer bottles in the back of his car almost broke when he rode over this "obstacle." Some years later people in Gouda, Rotterdam and other Dutch cities convinced politicians and officials of spending more money on speed reduction measures. The fact that the symbol of progress, the car, was being limited in its mobility caused a virtual revolution in the traffic world. In September 1976, a number of new traffic regulations came into effect and minimum design standards for residential precincts *(woonerf)* were published for the first time in Europe by the Netherlands Ministry of Transport and Public Works.[1]

The design standards were formulated in order to permit maximum freedom in their application. A *woonerf* can also contain schools, offices, recreation grounds and community centers, so long as these are not major traffic generators. The road network shall be structured so that motorized through traffic will be excluded within a *woonerf.* Traffic volumes must not affect the character of a *woonerf;* while this standard is not precisely formulated, experience suggests that the limit is up to 300 vehicles per hour during the peak period, but this is a function of both the width of the street and the distribution of the traffic flow over the day.[2] The entrances and exits of a *woonerf* should be designed in such a way that they can be clearly recognized. Traffic signs themselves are inadequate and other physical measures restricting speed are required; the kerb of the approach road preferably should be lowered and continued. Before a *woonerf* is created, all the parking problems must be resolved and full account must be taken to the growing demand for parking in the future. On those parts of the road intended for use by motor vehicles, features must be added to restrict the speed; to be effective they have to be closely spaced (not more than 50 m apart).

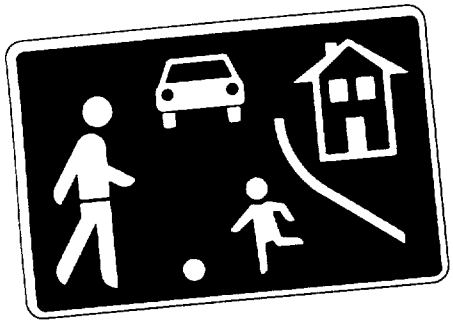

Figure 1. Traffic Restraint Precinct

Sooner or later other European countries followed the idea. Denmark added a new code to the road traffic regulations in November 1978 allowing under certain circumstances to change the status of streets from "traffic streets" with priority for vehicles to "living areas" with priority for pedestrians. The latter demands the implementation of different physical measures, among others a speed limit of 15 km/h.[3] For example, Austria (July 1983) and Switzerland (May 1984) joined the club as stragglers. The history of traffic calming schemes in Germany started in March 1977 in the state of Nordrhein-Westfalen to test the Dutch experiences by a large field trial at many small spots; measures were very much traffic-engineering minded.[4] As a result the road traffic regulations were supplemented in August 1980 by the sign "Traffic Restraint Precincts" (Figure 1), in which the following rules apply:

- *Pedestrians may use the entire width of the street; children are allowed to play everywhere.*

• *Vehicular traffic must proceed at walking speed.*

• *Motorists may neither endanger nor impair pedestrians; they must wait if necessary.*

• *Pedestrians may not unnecessarily impair vehicles.*

• *Parking outside the marked and signed areas is not permitted except loading.*

Though these rules are very unambiguous, reality differed from this after some years:

• *Playing by children is impossible due to the excess of parking.*

• *A high court decision fixed "walking speed" at 4 to 7 km/h, though speedmeters cannot indicate those low values.*

• *Streets covered by the sign must, by virtue of their design, give the impression that the recreation and social function predominate. As a rule, level surfacing over the entire width of the street will therefore be necessary. That seems to be by the way a contradiction to the sign, where the dividing kerb is still to be seen.*

Due to the huge amount of money for conversion of existing streets, traffic restraint precincts are doomed to failure as an area wide measure in Germany and installed at best in new residential developments. The Netherlands altered the old regulations in 1988; the introduction of the word "erf" instead of "woonerf" shows that the regime now may have a wider application (i.e., shopping areas or old city centers). For the same reason the old sign was abandoned. It is also allowed now to maintain or create separate space for pedestrians.

Research for the second generation of traffic calming schemes started in 1978 in the Netherlands and 1980 in Germany. The purpose was

• *to find low-cost and area-wide measures,*

• *to include main roads,*

• *to look for environmental aspects and*

• *to consider all modes of transport.*

Table 1 shows the really wide range of application. As one of the results, a new sign appeared in the German traffic regulations in 1990; in the speed limit zone, 30 km/h are common but not fixed. The innovation is the zoning approach, because formerly the sign had to be repeated at each junction for turning traffic. Each zone should be a recognizable urban unit; streets within the zone should have or get similar features; carriage ways are limited to 6 m wide. The size of the area is restricted so that drivers reach the nearest main road after 1000 m.

Table 1: Area-wide traffic calming schemes

CITY	TEST AREA (ACRES)	INHABITANTS	POPULATION DENSITY (PEOPLE/ACRE)
Berlin-Moabit (G)	300	30.000	100
Borgentreich (G)	620	2.300	4
Buxtehude (G)	670	10.800	16
Eindhoven (NL)	250	10.500	42
Esslingen (G)	370	11.000	30
Ingolstadt (G)	300	5.500	18
Mainz (G)	620	12.000	19
Rijswijk (NL)	250	13.000	52

Though this approach is the most widespread (about 25000 applications) and rather successful, the third generation is already on the way. They are working with:

• *integrated measures [i.e., car-reduced central business districts (Aachen)],*

• *transportation system management (Lübeck, Bologna) and*

• *push and pull effects [i.e., parking space management and improved service of public transport (Zürich) respectively split of green time at signals (München, Salzburg)].*

Figure 2 shows "the triangle" of the three most important features: speed reduction (SR), transportation system management (TSM) and improvement of ecological modes of transport (EMT); the summary on the three coordinates proves to be 100 percent for each city.

WHY SHALL WE DO IT?

Traffic calming is nowadays a town planning and transportation planning concept that shall serve and conserve the standards of living. The aims of traffic calming can be divided into three main points:

• *Improvement of the quality of towns specified for dwellings, housing estates and environment as well.*

• *Improvement of ecological aspects by less noise, less pollution, more trees, energy savings and less sealed surface.*

• *Improved traffic conditions (i.e., more safety, change in modal split, levels of service) that are suitable for urban areas or more parking facilities for residents and delivery services.*

Some of the aims are contrasting, and you will never reach the optimum for *every* aspect at the *same* time.

IN WHICH WAY CAN IT BE DONE?

This chapter concentrates on second generation traffic calming schemes. The starting points are basic measures for different modes of transport [i.e., the width of sidewalks for pedestrians (min. 1.50 m) and within one mode for different speeds if it is a motorized one]. The roadway width is designed by standard design vehicles you want to meet as regular (i.e., two passenger cars 4.0 m, lorry/passenger car 4.75 m or two buses 6.0 m). One of the basic options are modifications in the structure of the road network by dead-end streets, hairpin bends, diagonal road closure and one way streets. From a traffic engineering point of view specific elements can be added to a network for slowing down; those *physical means* could be:

• *Vertical deflections in the road surface, such as road humps, raised crossings, platform junctions raised at pavement levels, speed cushions.*

• *Horizontal alterations such as constrictions, corner blips, narrowings, planted central reservations, bends in the traffic route.*

• *Traffic throttles, bollards, angled parking on alternate sides of the street, bicycle racks, lamp posts, etc.*

This engineering work has to be well-done by the aid of guidelines.[5,6,7] But what we use, too, are *legal means.* Specific regulations already have been discussed at the beginning; others deal with priority rules/right of way. This aspect should be extended until parking rules and speed in the traffic calmed areas are enforced. Regarding *social means,* it is important to inform residents and users on the suggested layout and try to reconcile conflicting opinions. A really engaged public relations campaign should tell people the reasons and effects of the measures and don't forget the *no*-reasons and the *no*-effects. People need "directions for use" not only for shavers and cooking-machines but for cars and roads, too. Regarding the social means as important as physical ones can manage the process from "lack of interest" over "suspicion," "conflict" to "participation."

WHAT ARE THE RESULTS?

For second generation traffic calming schemes, there are a great deal of surveys and research works, mostly before/after studies, which would exceed the scope of this contribution. That is why there are only flashlights from different countries. The results of the first large-scale demonstration project in Rijswijk and Eindhoven (Netherlands) indicated that a reduction of injury accidents was achieved of more than 80 percent.[8] This was mainly due to reduction of motorized traffic (16 to 25 percent), reduction of average speed (22 to 40 percent) and the magnitude of the existing problems in the areas. A 1993 study, held under Dutch municipalities in 151 30 km/h-zones, turned out a reduction rate of 22 percent for injury accidents. The effects on accidents vary enormously for different redesigned areas. Probably this has to do with the road safety problems in the before period and the qualities of the measures taken. The Danish experiment[3] looked for accident frequencies of 30 km/h-streets and 15 km/h-streets; the main effect was a significant change in accidents per road-km in 30 km/h-streets of -24 percent and a change in casualties per road-km of -45 percent. The long running test in six German cities seemed to be rather successful.[9] Though the number of accidents partly increased (up to 21 percent), the number of casualties decreased (30 to 56 percent). This last figure is very encouraging, as severe accidents do not appear to have migrated onto the surrounding road network. Recent research in Great Britain[10] and Austria[11] corroborates the trend with a decrease of casualties respectively—24 percent (Graz) and 31 percent (London).

Depending on the wide variety in culture, legislation, climate and behavior, Europe has created a lot of different traffic calming schemes that have been designed with professional knowledge and responsibility. Most of them are working well and can give incitations to planners and engineers abroad. ■

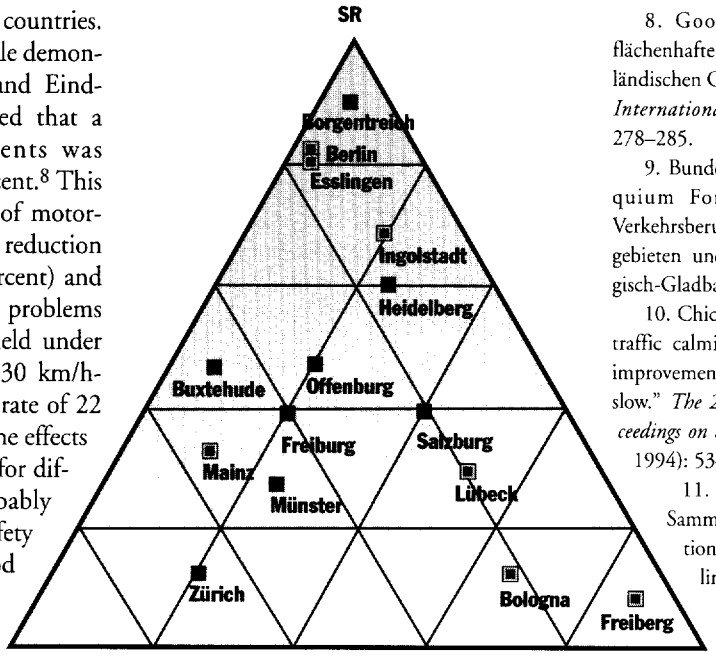

Figure 2. "Triangle" of measures (3rd generation traffic calming schemes)

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