New Directions in Traffic Calming

Old School: Traffic Calming as Punishment

Getting drivers to slow down and yield to pedestrians has always been a challenge in residential and commercial business districts, especially when paved with conventional asphalt. The quick municipal fix to residential traffic calming often is posting three- or four-way stop signs at intersections. A slightly more committed approach involves inflicting some pain on the driver (and passengers) by installing jaw-jarring speed bumps. Sometimes a kinder approach is taken by installing lower and longer speed humps. When painted, alert drivers notice the humps and slow down. Non-painted bumps and humps surprise the driver like a slap in the face.

A more systemic calming approach is blocking the end of a residential street with a guard rail or planter to redirect traffic. This is often applied in older neighborhoods with a grid road pattern to discourage drivers from cutting through a neighborhood. They take another street, hopefully a more traveled one. Unfortunately, those living on streets adjacent to the blockage have to change their travel routes as well. Like squeezing a water-filled balloon, traffic gets displaced from one street to another, thereby increasing traffic on streets with limited capacity. Receiving residential streets now have to deal with more traffic within what was once a balanced platform for pedestrian activities, cyclists, skateboarders, street games, etc. All of these calming approaches are single purpose, i.e., slow down vehicle speed and redirect traffic by inflicting driver pain and inconvenience.

Old School: Usually an afterthought, asphalt speed bumps and stop signs calm traffic by punishing the driver.

Residential Streets as Living Rooms

Since the late 1970s the Dutch pioneered innovative approaches to slowing down drivers. Their early design philosophy began in the historic university town of Delft. The invention was called a *woonerf* or a living street (plural: *woonerven*). A Delft city planner, Mr. Grotenhuis, began implementing the idea of exchanging the roles of the driver

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Figures 1 and 2. Conceived in the late 1970s, the Dutch woonerf *or living street created more play space for neighborhood kids.*

and pedestrian. See Figures 1 and 2. This was in response to where most Dutch kids play—in the street—because side and backyard space are practically non-existent. On most streets, pedestrians and especially children are intimidated by passing cars. Working with residents in low-rise multi-family neighborhoods, Mr. Grotenhuis began devising ways to slow down cars by introducing obstacles that defined play areas in the streets.

Figure 3. A portion of Java Street in Amsterdam without traffic calming measures.

Figure 4. An adjacent section of Java Street with concrete pavers and other traffic calming devices.

Street obstacles included grouping parked cars, playground equipment, bollards, trees and small speed humps. The intention was to give drivers a feeling of being an intruder. Instead of the pedestrian being intimidated by the drivers, the driver receives intimidation from pedestrian activities in reconfigured street spaces. Practically all of the *woonerven* included interlocking concrete pavements since they are a standard surface throughout The Netherlands.

Woonerven grew in the Netherlands in the 1980s and Dutch government studies showed that pedestrian accidents were reduced. Like much of The Netherlands, many paver streets are below sea level. Therefore, the soil subgrade settles and requires raising the base 6 to 12 in. (150 to 300 mm) every five to ten years. Concrete pavers are removed, additional base and bedding sand installed, the same pavers are reinstated. This regular maintenance cycle and modular, precast paving, curbs and drainage enabled reconfiguration to woonerven. This traffic calming approach spread to Germany, France and other European countries each adapting it to local neighborhood settings, as well applying it to some business districts, and most projects using interlocking concrete pavement.

The woonerf in The Netherlands implanted the notion that traffic calming should be influenced by existing neighborhood and vehicular patterns. Design was informed by the "urban fabric" e.g., front yard spaces, housing density, the location of driveways and walks to houses, landscaping and trees, pavement types, pedestrian views (or lack of them), driver perception while moving through a neighborhood, vehicle noise, on/off street parking, accessibility for disabled persons, signs, lighting, street cleaning/snow removal, fire/emergency access to name a few. All of these concerns inform the living room design and all play roles in increasing safety. It's essentially a design approach where social behavior directs traffic behavior.

In the mid-1980s, The Dutch government introduced a program called the 30 kph Zone to help reduce vehicle speeds on busier streets with mixed residential and commercial uses. This program consists of a tool box of ways to reduce road or lane widths, introduce (non-jaw jarring) speed humps, trees, bollards and signs to reduce vehicle speeds to about 20 mph. Interlocking concrete pavements played a key role in providing surfaces to help slow traffic.

A recent 30 kph project example in a busy Amsterdam street demonstrates the positive impact of interlocking concrete pavement in reducing vehicle speeds. Amsterdam's urban designer Jan Stigter measured vehicle speeds on Java Street part of which was

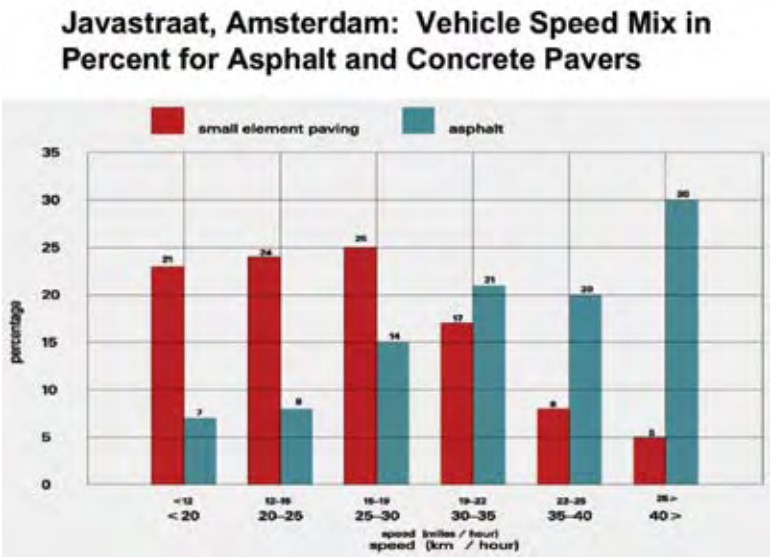

Figure 5.

asphalt and then surfaced with interlocking concrete pavement. Figure 3 shows an adjacent portion of Java Street paved in asphalt. Figure 4 shows the adjacent area converted from asphalt to interlocking concrete pavement. In Figure 5, Mr. Stigter summarizes the reduction in vehicle speeds using interlocking concrete pavement. The diagram indicates a reversal in the percentage of slower vehicle speeds after introducing interlocking concrete pavement.

Ignoring the Essentials

Like the 30 kph program, cataloging of traffic calming devices was done by the U.S. Federal Highway Administration in the 1981 publication, *Improving the Residential Street Environment* as a resource for traffic engineers and neighborhood planners. The publication recognized the message from *woonerven* that American neighborhood traffic planning should account for social and environmental factors. While there's no mention of the role of concrete pavers in slowing traffic, the 1999 Institute of Traffic Engineers/FHWA publication called *Traffic Calming: State of the Practice* lists textured pavements as a traffic calming tool. However, there's no information on its effects or how it works with other tools to make more sociable residential streets.

Even with other U.S. resources like Donald Appleyard's classic book, *Livable Streets*, most traffic calming efforts in North America are small, incremental changes in existing asphalt roads in response to resident complaints about speed, noise and lack of safety. Very few projects seemed to address the social behavior of neighbors and drivers, nor things beyond the sidewalk that influence the street, let alone how segmental paving might contribute to safer places.

Figure 6. No curb, just a change in surface from asphalt to pavers indicates the vehicle path toward a roundabout intersection in central Drachten, The Netherlands. The lack of signs and other distractions forces drivers to pay attention to not just other vehicles, but actually view what's around them and react accordingly.

Figure 7. Closer into the roundabout a driver yields to bicyclists. Note the lack of high curbs and use of a small elevation change at the bike/pedestrian path and the road. It's just high enough and of a different color for the driver to see where to drive.

Traffic Calming as Slow Dancing

The newest approach to Dutch traffic calming is taken by 60-year old traffic engineer Hans Monderman, from Drachten in the northern part of The Netherlands. Featured in 2004 *Wired* magazine article, 15 years of traffic engineering led him to discover that less is more. He has demonstrated that fewer signs, traffic lights, warning stripes, etc., actually improve safety. When there are traffic control devices, they are saying to the driver "it's okay to drive as fast as you want." They are also saying that pedestrian and driver functions are mostly incompatible and should be separated. Mr. Monderman believes these should be mixed in many situations.

According to Wikipedia,

> "His most famous approach has been labeled *designing for negotiation*, which he openly admits works better in some places than others. At busy urban intersections with slow traffic, he has found that it is often safer and more effective to get road users to focus on looking at one another instead of traffic control devices. Rather than crosswalks, signs, lights, etc., he designs the road to make it easier for users to see and negotiate with one another. His goal is to enhance the conspicuity and predictability of users, empowering them to cooperate with one another."
>
> *--Wikipedia at http://en.wikipedia.org/wiki/Hans_Monderman*

Perhaps proof of his effectiveness is that Mr. Monderman has designed many roads and intersections to slow traffic and there have been no fatal accidents. He contends that roads are networks for meeting, and not merely a means to get

Figure 8. Contrast clarity of the street and intersection in Figures 7 and 8 to the typical Dutch street with markings and signs and asphalt pavement to keep drivers moving along and almost ignoring what's beyond the sidewalks.

from A to B (the predominant approach in North America). When drivers have fewer distractions from signs and signals, they slow down and pay attention to what's ahead, including pedestrians and cyclists. Mr. Monderman notes that paving blocks are important in his designs. They "create friction" to get drivers to slow down and pay attention to pedestrians and what's going on around them. Different colors and laying patterns can also suggest boundaries and direction.

Leading by Yielding

In Mr. Monderman's world, concrete pavers are the floor for the dance to begin among drivers and pedestrians. An example is his most recognized project, an intersection in the center of Drachten that handles about 22,000 vehicles per day, not to mention hundreds of pedestrians and bicyclists. There are no traffic lights, no signs and just a roundabout. Café space next to buildings and fountains merges into the intersection with big trucks, tiny cars, people and cyclists. What is witnessed is not just negotiation, but almost a dance, a balance between vehicles who can easily dominate but lead by yielding to those crossing the intersection.

Mr. Monderman's approach contradicts classic traffic engineering that seeks to separate pedestrian/cyclist and vehicular functions, and then provide well-marked spaces for each, especially when the two have to share the same space at an intersection. The use and overuse of signs and signals leads to driver "zombification." He maintains that decreasing or removing traffic control devices slows drivers to actually look at the surrounding people, road and sidewalks, curbs, cafés, building entrances, yes, the larger urban fabric. Like dancing, it's not just your partner that gets attention, but the others on the dance floor, their clothes, the music, lighting and décor all influence behavior and movement.

His refreshing approach is validated by laboring as a municipal traffic engineer in a quest to move vehicles quickly while protecting pedestrians. In Mr. Monderman's 30 years of traffic engineering experience, about 15% of the drivers are dangerous. It doesn't matter whether signs, signals or markings are present or absent, these drivers do what they please. This percentage will always endanger others and themselves. The other 85% will respect and respond to the environment, slow down to engage the people and landscape before them. When asked about the American cultural aversion to risk and its litigious environment, he says, "Our daily environment is full of risk. That is a condition of life. What we're creating is a place where driver behavior and pedestrian behavior mix to create safer streets for both."

Mr. Monderman continues to redefine and expand his notions of traffic calming as a consultant. He has found ways to get drivers to pay attention to pedestrians by removing distractions. Dance floors don't have lines and traffic signals. He advocates shared space where a slow dance occurs with interlocking concrete pavement as the ballroom floor. Dutch traffic calming where the street as living room has now evolved to a dance floor. There is no driver punishment, no stepping on each other's feet. Indeed, the dance is slow and considerate where drivers and pedestrians even say kind words to each other. ❖

The Netherland's Hans Monderman is redefining traffic calming as shared social space.