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On a Partially New Approach towards Traffic Planning and Street Design in Sweden

In the middle of the fifties we decided in Sweden not to allow cars to drive faster than 50 kilometres an hour in our cities. We also decided that the exceptions to the speed limit mentioned above were to be very few. This decision was based on the fact that we wished to control an increasing car traffic, but also because of the fact that it was considered "comfortable" to drive the car at that speed because of the cars' construction. Earlier there was no speed limit at all for car traffic in towns.

But the streets, or maybe better "the public places" in a town, must meet a lot of different demands and wishes from the inhabitants. Of course it must be possible to go by car in the streets in a city, at least in most streets. But it must also be possible to go by foot, by bicycle and by public transport. The public places in a town have a great potential for planned and for unplanned encounters which should be made possible, and even enhanced, by the construction of the streets in a city. The public places in a town are open to everybody, including children, elderly and disabled people, and it should certainly not only be open to those who have a driving licence.

In Sweden we got guidelines for traffic planning in 1968 and in 1982. In both cases it was a clearly hierarchical division of the streets, but we kept the speed limit of 50 kilometres an hour for practically all streets, in contrary to what happened for instance in Holland and in Denmark.

In order to satisfy as many as possible of the different demands and wishes the inhabitants have on public places in a town, we now try a partially new approach towards traffic planning and street design. This means that we basically look upon speed as a very important and integrated factor.

From a traffic safety point of view it is briefly as follows:

- Where a car can hit a pedestrian or a bicyclist, the car is not allowed to go faster than 30 kilometres an hour
- Where a car can run into an other car's side, the car is not allowed to go faster than 50 kilometres an hour
- Where there is a risk for a head-on collision, the car is not allowed to go faster than 70 kilometres an hour

More or less as a logic consequence from the thoughts above we try to introduce a hierarchical division of streets and roads according to speed as follows

- 30 kilometres an hour streets for car trips within a district and for car trips to or from a 50 kilometres an hour street
- 50 kilometres an hour streets for car trips between quarters of the town, but when passing zebra crossings cars are not allowed to go faster than 30 kilometres an hour
- 70 kilometres an hour roads for long distance trips with car in a town, where no pedestrians and no bicyclists are allowed

Also we want to use

- 7 kilometres an hour streets ("woonerfs") for car traffic when going to a destination along the street or a street nearby, and of course we also want to use
- Lanes for pedestrians and bicycles (pavements, footpaths, squares, bicycle-lanes and so on where no motor vehicles are allowed - a domain for pedestrians and cyclists.

When a person is in a street she should be able to understand, preferable intuitively, what kind of street she is in, what traffic behaviour is expected from her and what traffic behaviour she can expect from others. For that reason the different streets must have clearly distinct designs. It must be obvious for a person what kind of street she is in, and it must be obvious for her what different kinds of qualities are given priority in the streets by its street design. For instance the accessibility of cars in 70 kilometres an hour roads, and considerations to children, elderly and disables in 7 kilometres an hour streets.

So these are **The five distinct different kinds of streets or lanes** which we want to work with in Sweden from now on.

I now want to describe the five levels more in detail - as a vision. I will begin with

1 Lanes for pedestrians and cyclists (The car free area)

It includes all the city's footpaths and bikeways, walkways, parks, recreation areas, market squares and playgrounds as well as all the neighbourhood areas where cars have been prohibited. The main goal is to interconnect as many as possible of the different parts of this area so that people as far as possible can walk or cycle in the car free area without having to confront the risks, conflicts and disturbances associated with motor traffic. Another goal is to expand the car free area.

The walking areas and pedestrian and bicycle paths have moderately steep inclines, surfaces are smooth and even, and the street furniture is well designed. There are attractive outdoor spaces protected from the natural elements for meetings, play and recreation. There are clear guidance markings, good street lighting as well as other design details that make everyone, including children, the elderly and disabled, feel safe and secure. Motor vehicles can be granted exemptions to enter the car free area, but only on the terms set by pedestrians and cyclists, the car is not allowed to go faster than a person walks, and that is something between 5 and 10 kilometres an hour, depending who walks, maybe as an average 7 kilometres an hour.

2 Woonerfs (Pedestrian Streets, 7 kilometres an hour streets)

is designed as communal outdoor space shared by everyone living on the street, it is a street especially for children, elderly and disabled, and it provides very great potential to create an attractive, pleasant street space.

It is a street for car traffic when the car is going to a destination along the street or a street close nearby. This type of street has often been created on the initiative of the property owners and the local residents, and both parts support the implementation and maintenance operations. This type of street is not divided into separate lanes for different types of traffic. The street has been designed and regulated so that the maximum speed for cars does not exceed walking speeds, which is something between 5 and 10 kilometres an hour, depending who walks. Pedestrians always have the right of way. In the year 2010 we think woonerfs will constitute 20-25% of the street network.

3 (Local) Residential Streets (30 kilometres an hour streets or 30/30 streets)

are also included in the local street network and are used only by local bicycle and car traffic that has its origin or destination in the neighbourhood. There is more car traffic here than on woonerfs due to the fact that there are more houses and buildings, shops, offices, etc. Furthermore, the residential street provides great potential to create an attractive, pleasant street space and an environment suitable for children, the elderly and the disabled.

Pedestrians and cyclists can arbitrarily cross a residential street either anywhere along the street or at street crossings. There are thus no marked pedestrian crossings, bicycle crossings, bicycle paths or traffic signals in a residential street. Traffic calming measures guarantee the safe and secure interaction between pedestrians, cyclists and motorists. In the inner city areas, residential streets provide for part of the need for short-time parking. Parking spaces have been designed and located with care and are aesthetically attractive in the street environment.

In the year 2010 we think residential streets will constitute 25-30% of the street network.

4 Main streets (50/30 streets)

can serve several traffic functions. A main street has often local traffic and collector traffic, sometimes there are also some through traffic or access traffic.

The carriageway has only one traffic lane in each direction for cars, and the volume of car traffic is thus limited to some 1 500 vehicles per design hour. There is a special bus lane on main streets with heavy bus traffic. There are both wide bicycle lanes and wide walkways on main streets affording cyclists and pedestrians good accessibility, safety and security. Furthermore, these areas provide the potential to create an attractive, pleasant street space and an environment suitable for children, the elderly and the disabled.

Destination points in the surroundings are concentrated together and located so that pedestrian and bicycle traffic needing to cross streets can be steered naturally to specific intersections. These are designed so that cars cannot drive through them at speeds exceeding 30 km/h. This ensures a safety level comparable to that on 30 streets.

Where the situation demands, and where the city plans permit, the main street has a central reserve with a safety fence to ensure that pedestrians and cyclists only cross the street at designated places. Marked pedestrian crossings are designed with children, the elderly and disabled in mind. On stretches where there is no crossing pedestrian or bicycle traffic, cars are permitted to drive a maximum of 50 km/h.

There are special areas for loading and unloading on main streets but as little curb-side parking as possible.

The streets, terminals and parking spaces within the residential and main streets are designed so that pedestrians and cyclists are given as much space as possible, while the area for car traffic is limited in line with the purpose of the street traffic.

Based on the street surroundings and the purpose of traffic, the streets within the residential and main streets are classified according to the desired speed and the degree of segregation that this speed demands. The street design also means that the flow of traffic is limited with respect to the demands inherent in the purpose of the traffic. From a traffic safety point of view, speed is the most important criterion, and the types of street are designated according to the standard of speed desired.

In the year 2010 we think that main streets will constitute 20-25% of the street network.

5 Traffic Routes (70/50 roads or 70 roads)

Traffic routes has thoroughfares traffic, access traffic and through traffic. These streets are segregated from pedestrian and bicycle traffic and any road connections to adjacent neighbourhoods are intended for car traffic only. There are mainly two types of street: 50/50 streets and 70/50 streets. Some traffic routes are for 70 or 90 kilometres an hour traffic. The alignment is of high standard and the distances between intersections are sufficiently long with respect to the intended speed level. Furthermore, there is no parking permitted on traffic routes.

Traffic routes are situated further away from buildings and the distances between intersections are longer. There is roadside space available to enhance the safety of errant vehicles. The speed limit is mostly 70 km/h on unbroken stretches and 50 km/h through intersections. Due to the longer distances between intersections, the accessibility gains on the 70 km/h stretches are more obvious. Despite the higher speed level, the environmental impact on the surroundings is moderate due to the greater distance to houses and buildings.

Rigid, stationary objects in the roadside areas have been either positioned, designed or shielded so as to protect motorists from serious injury in the event of head-on or side collisions when unintentionally driving off the carriageway.

The speed at intersections may not exceed 50 km/h if there is any chance of side impact collisions.

This is ensured through traffic calming design measures or, ultimately by using RTI technology.

The speed on 50/50 streets is 50 km/h both on unbroken stretches and at intersections. These streets are situated close to buildings which often means that the roadside area cannot fulfil the clear roadside concept. Thus, great care is placed on the design and positioning of poles and other rigid, stationary objects that of necessity must be located at the side of the street. The speed limit is ensured through a traffic calming design, even on unbroken stretches. The low speed here is accepted by motorists because higher speeds would only have a marginal time-saving effect due to the relatively short distances between intersections. The speed limit is also felt to be well motivated due to the close proximity of housing developments.

The thoroughfares consists of those streets and other traffic facilities where priority is given to the efficient transport of people and goods by car at steady, moderate speeds within a street and road network capable of handling the prevalent traffic volume. The good accessibility offered to motorists within the motor transport space is perceived as so advantageous that they choose this network for everything except the shortest local trips. There are no pedestrians or cyclists in the traffic routes. These vulnerable road-users have been provided with grade-separated interchanges for crossing the

motor transport space. For movement parallel to the motor transport space network, there are pedestrian and bicycle paths that have been totally segregated from car traffic by vegetation or safety fences.

In the year 2010 we think that traffic routes will constitute 10-20% of the street network.

Design criteria for urban roads and the need of research

We are now concentrating our work to find the "right" design and lay out for each of the street categories; *woonerfs*, residential streets and main streets.

The main purpose with a *woonerf* is as a communal outdoor space shared by everyone living on the street. It is a street especially for children, elderly and disabled, and it provides very great potential to create an attractive, pleasant street space.

How can we by the design, layout and materials of the street communicate the message above to (as far as possible) everybody in the street?

We think that it is important that a *woonerf* is not divided into separate lanes for different types of "traffic". The same surface is used for children's play, grownup's talk, pedestrians, cyclists and car traffic. We also think that it is important that *woonerf* has a design and layout and is regulated so that the maximum speed for cars does not exceed walking speed.

A residential street is a street in a residential area. In a residential area is given priority to the inhabitants in the area. The normal way to move within a residential area is for most of us by foot or by bike, for others with help of a stick or by "rollator" or in a wheelchair. Young parents often have a pram.

Within a residential area it is of course natural to cross a street as a pedestrian or a cyclist arbitrarily either anywhere along the street or at street crossings. For that reason there are in a residential street no marked pedestrian crossings, no bicycle crossings, no bicycle paths and no traffic signals. The street is as small as possible, something between four and six meters, thus the pavement is as broad as possible which provides great potential to create an attractive, pleasant street space suitable also for children, the elderly and the disabled.

Traffic calming measures guarantee the safe and secure interaction between pedestrians, cyclists and motorists. One good traffic calming measure is an elevated crossing, signalling that in residential areas one gives priority to pedestrians. This solution will help elderly people to move, especially those in a wheel-chair and those with a pram. Another good solution is using a roundabout.

But we need more good solutions for streets crossings in residential areas.

The most important purposes with a *main street* is to enable for the busses, the car and the bicycle traffic to go from one part of the town to another, adjacent or near by. But a main purpose is also to enable the pedestrians and the bicyclists, children, elderly and the disable, to cross the main street safe and secure. For that reason it will not be allowed to cross the pedestrians crossing and those for bicyclists faster than 30 kilometres an hour. For that reason there must be some traffic calming measure connected to the pedestrian and bicycle crossing, also make it reasonable convenient for buss passengers. It will not be allowed for pedestrians and cyclists to cross a main street elsewhere than on pedestrian and cyclists crossings. A very important thing about the main street is that we will not allow the carriageway to have more than one traffic lane in each direction for cars. And the same is for roundabouts; only one lane for incoming car traffic, only one lane in the roundabout and only one lane for outgoing traffic. The carriageway is 6 to 6,2 meter broad.

Of course we are not quite sure that the suggestions mentioned above are good solutions in every details, on the contrary a lot of work is ahead of us. But all the same, already next year we hope to be able to build some projects - probably between five and ten - containing some woonerfs, some residential streets and some main street for research and developments, and hopefully also for demonstrations.