1. SHORT HISTORY OF ROAD TRAFFIC PLANNING IN SWEDEN DURING THE LATTER PART OF THE 20TH CENTURY

During the 1950s and 1960s, motor-vehicle traffic in Sweden increased at a tremendous rate. In order to manage the problems, decisions were made to separate different types of traffic and to differentiate motor traffic. During the 1970s and 1980s, many new housing estates were built in Sweden according to this principle. We also made some attempts to separate and differentiate in existing areas, but without good results. It is fair to say that we failed to cope with the situation in existing built-up areas. However, in the early 1990s, we began a more fruitful process in respect of existing build-up areas. And that is what I am about to give an account of.

In the mid-fifties we decided not to allow motor vehicles 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 as few as possible. This decision was based on the fact that we wished to control increasing motor-vehicle traffic, as well as on the fact that it was considered “comfortable” to drive the motor vehicle at that speed because of the motor vehicles’ construction. Earlier there was no speed limit at all for motor-vehicle 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 motor vehicles. 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 by the construction of the city. The public places in a town should be open to everybody, including children, the 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 road traffic planning in 1968 and in 1982. In both cases it was a matter of a clearly hierarchical division of the streets, but we kept the speed limit of 50 kilometres an hour for practically all streets.

In order to satisfy as many as possible of the different demands and wishes the inhabitants have today, and say for fifty years to come, in respect of public places in a town, we are now trying a new approach to road traffic planning and street design.

In 1997 the Swedish Government decided a new direction in road safety work. Road safety was given additional weight amongst the other planning objectives. The objective set is that none will be killed or seriously injured within the Swedish road transport system – a goal referred to as Vision Zero. Instead of concentrating on the ability of the individual road user to negotiate the system, the emphasis was altered to how the entire system can operate safely.
2. VISION ZERO

The lack of safety in the road transport system has gradually developed to a major, and global, public health problem. Reductions have been seen in some countries, but not to the extent that the road transport system can be said to be Safe.

For a long time the goal in traffic safety policies has been a continuos decrease in fatality rates. The ultimate goal then per definition is set to zero fatalities.

A concept called the "Vision Zero" has developed in Sweden. The Vision Zero defines the traffic safety problem, not as a crash problem but instead as an injury problem. Fatalities and severe/impairing injuries are focused. Property damages and minor injuries are not considered first priority problems.

The safety philosophy behind the Vision Zero is not to allow mobility over the limit for the risk of being killed or seriously injured, and to build a system that is forgiving to human mistakes and misjudgements. This is partly different from the current philosophy where the road users are supposed to act perfect within the road transport system.

To radically change the situation the traffic system must be redesigned to be more forgiving to driver mistakes. Compared to other man/machine systems the traffic safety system is very little developed.

The human tolerances to extreme forces are limited and to a large extent know. If designing a transport system to the biomechanical limits on the human changes in many of today’s must be made. A theoretical model for the transport system has been developed.

The introduction of the Vision Zero on the political area has been successful. In the long time planning process the Vision Zero has become very important.

In Sweden a movement has started for a speed limit set to 30 km/h where cars and unprotected road users share the street. Results can already be seen in development of new street design types, The New Approach, which is in short

1. On roads where there is a risk for head-on collision a motor vehicle is not allowed to drive faster than 70 km/h.
2. On streets where there is a risk for a side impact collision a motor vehicle is not allowed to drive faster than 50 km/h.
3. On streets where a motor vehicle can hit a pedestrian or a bicyclist a motor vehicle is not allowed to drive faster than 30 km/h.

More or less as a logical consequence of these basic premises, a hierarchical division of streets and roads, based on speed, has been introduced as follows

1. Through-Traffic Route (70 km/h roads)
2. 50/30 Street (Main Street)
3. 30 Street (Residential Street, Wohnstrasse, Rue Residentielle)
4. Walking Speed Street (Woonerf)
5. Lanes for pedestrians and cycles (pavement, cycle path, square etc.)

So we change the standard 50 km/h streets in built-up areas to 50/30 streets, 30 streets and walking speed streets wherever pedestrians, cyclists and motor vehicles share the street.
3. ACCOUNT OF THE NEW APPROACH

3.1 Urban Planning

People have many different demands and desires with respect to the streets in their cities. They want to be able to move about by using different kinds of vehicles (motor vehicles, buses, cycles) as well as on foot, and traffic should be safe and secure and flow reasonable quickly. Streets are to be attractive and pleasant and offer the opportunity for spontaneous, relaxed interaction between people. Naturally, communal places in a city shall be accessible to everyone, including children, the elderly and disabled persons.

During the past few decades, urban planning, road networks and street design in European cities have been adapted to suit cars. The point is now reached where people have become increasingly aware that motor vehicle dominance has been at the expense of certain other values held by people in society.

It is quite obvious that our society is nowadays extremely dependent on cars. It is a question of finding a balance - a new balance between different modes of transport - that better reflects what people want with respect to the public places in European cities.

Town planning with regard to the location of buildings, community and sports halls etc. is of great significance in determining the constellation of traffic in a city, the vehicle composition and the distribution of traffic on the different streets. The less spread out homes, places of work, business and service establishments as well as sports and recreation halls are, the shorter every trip becomes. This means that walking and cycling can do more trips.

Decentralisation of places of employment and locating them in city outskirts is not conducive to pedestrian and cycle traffic. This also applies to shops and shopping centres. A good example of town and community planning can be found in Groningen, Holland, where large new offices have been built close to the railway station. These are easily accessible through good pedestrian and cycle paths and ample bicycle parking facilities have been arranged. Moreover, there are very few parking spaces for cars at the railway station and ample parking facilities for cyclists.

In recent years, many European countries have been working on developing their public transport systems, and more importantly will be continuing to do so, especially with regard to the very safe and environmentally friendly modes of public transport run on electricity: trains, commuter trains, the metro, trams and trolley buses. Many of these countries have invested heavily these past ten or so years in developing new types of trains and in up-grading the railway network, railway stations, travel information centres, etc. It is important that these facilities be adapted to bicycle traffic. The combination of cycle and public transport makes it possible to reach all the destinations in a town, irrespective of how large the town is.

Much can be done to develop the combination of cycling and environmentally friendly public transport. It is therefore necessary to examine and improve the pedestrian and cycle path network in the proximity of and connecting to railway stations and bus stops.

So support of public transport should entail support for the cycle as well, because public transport has to take its feeders into account.

It is also essential that cycles can be parked easily and safely. Like planning for motor vehicle parking, planning for cycle parking is needed. This means cycle stands at all the larger and more important destination points for cycling, as well as special locking devices or even the possibility of leaving bikes either in a locker or under guarded supervision. This may be combined with bike repair and arrangements for cycle rentals. When travelling shorter distances by train, commuter train or metro, the option to take the cycle along is important.
3.2. Road Network and Street Design

3.2.0. Introduction

On a number of occasions, the Swedish Government and Parliament have expressed various goals that are to be met within the framework of the transport system. These goals mainly relate to a high degree of road safety, good traffic environment, good transport quality, good accessibility for commerce and industry and the private individual and a good regional balance.

In addition, Government and Parliament wish us to achieve a greater proportion of pedestrian and cycle traffic. Government and Parliament also wish us to achieve a much better situation for children, the elderly and the disabled when it comes to their ease of movement, safety and security.

The goals for road safety are a maximum of 400 fatalities and 3,700 seriously injured in 2000, and a maximum of 250 fatalities in 2007. The long-term goal of Vision Zero is a situation with no fatalities and no seriously injured in road traffic.

Work is under way to break down the goals expressed by Government and Parliament into specific components. The New Approach is to be seen as part of this work. The content of the New Approach will form the main part of the remainder of my address.

During 1999 and 2000, work has been under way to further develop and concretise the New Approach. This work consists partly of a theoretical component, where we make the vision of the goals more and more concrete. We have formulated this work so that we shall come to an agreement on criteria and principles for what is meant by a "good example". In parallel with this work, we are building up some concrete projects, one in Trollhättan and one in Borlänge, the latter adjacent to the Swedish National Road Administration's head office, which is situated in Borlänge. These processes are in progress and are not dealt with in the rest of my talk. It may be possible to return to them at a later date.

In many European countries, perhaps especially in Sweden and in the Netherlands, the conviction arose that the current policy on road safety was no longer capable of reducing the present level of risk, and that a new and radical future scenario had to be defined to improve the situation. Both the concepts of "Vision Zero" (Sweden) and "Sustainable Safety" (the Netherlands) state that if we wish to change the road safety situation radically, we must stop defining road fatalities as a negative, albeit largely accepted, side effect of the road transport system. Both concepts describe the road safety problem as a public health problem, which can no longer be ignored.

Central elements of the Swedish Vision Zero/The New Approach and the Dutch Sustainable Road Safety System are regard to the intended function of and the intended (traffic) behaviour on the roads that are being planned. The design has to comply with the demands of function and behaviour. If function, design and behaviour are not well balanced, adjustments in one, two or all three of them have to be made to find a proper balance.

In both Vision Zero/The New Approach (Sweden) and Sustainable Safety (The Netherlands) the classification in different road and street types with well-described characteristics is considered to be a very important aspect.

The concepts are characterised by:
1. A limited number of categories of urban roads and streets
2. Clearly distinctive design
3. Distinctly different types of roads and streets
4. Recognisability and legibility of each individual type of road and street,
5. making clear which behaviour is appropriate.
6. The design of the road categories must be easily recognisable.
7. The design alternatives will be limited to create uniformity.
8. The street design must more or less be adapted to force a low driving speed.
9. In residential areas, pedestrians and cyclists are allowed to cross the streets anywhere. In general, no crossing facilities for pedestrians and cyclists are necessary because of the low speeds.

So, when a person is in a street she should be able to understand, preferably intuitively,

1. What kind of street she is in,
2. What traffic behaviour is expected from her and
3. What traffic behaviour she can expect from others.

Until now, a street in a town has often been classified according to how it is used by motor vehicles. We talk about thoroughfares, through-traffic roads, local streets, collector roads and access roads. The list does not stop here. However, from these designations the impossibility of having one type of street for every word or phrase is quite obvious. Too many different kinds of streets and too many levels in a hierarchical structure become unwieldy and unfeasible.

Also, it is a fact that a local street, for instance, does not only have local traffic. Very often there is traffic on a local street that is travelling more or less through; often there is also some collector traffic.

We are now presenting a system of street classification that is very clear, based on the speed permitted. One advantage of this road and street classification is the possibility of including an accurate description concerning

1. (desired) function,
2. (street) design and
3. (traffic) behaviour,

a description worth aiming at for each type of street.

We are now working on finding the “right” formations for each of the four street categories:

1. **Through-Traffic Route** (70 km/h Road)
2. **50/30 Street** (Main Street, Urban Arterial Road)
3. **30 Street** (Residential Street, Local Residential Street, Wohnstrasse, Rue Residentielle)
4. **Walking-Speed Street** (Woonerf).
5. (Motor-Vehicle-Free Area not dealt with here)

### 3.2.1. Through-Traffic Route

**Function**

The through-traffic route is intended for longer motor-vehicle journeys through built-up areas passing by one or more residential areas. The through-traffic routes consist of those roads where priority is given to the efficient transport of people and goods by motor-vehicle at steady, moderate speeds within a road network capable of handling the prevalent traffic volume.
Design

The alignment of a through-traffic route is often of high standard and as far away from nearby buildings as possible. The carriageway often has two traffic lanes for motor-vehicle traffic in each direction, sometimes even more. There is often road space available to enhance the safety of errant vehicles. Rigid, stationary objects in the roadside area have been positioned, designed or shielded so as to protect motorists who unintentionally drive off the carriageway from serious injury in the event of head-on collision or side impact collision.

A through-traffic route is segregated from pedestrians and bicyclists, and any road connection to adjacent neighbourhoods is intended for motor-vehicle traffic only. As there are no pedestrians or cyclists on a through-traffic route, there are no pedestrian pavements and no cycle-tracks.

Pedestrians and cyclists are provided with grade-separated interchanges for crossing through-traffic routes. For movements parallel to the through-traffic route network, there are pedestrian and cycle paths that are totally segregated from motor-vehicle traffic by means such as vegetation, a safety fence or sufficient distance between the carriageway and the pedestrian and cycle path.

Behaviour

The speed limit of motor vehicles is mostly 70 km/h on through-traffic routes. The speed at intersections may not exceed 50 km/h if there is any risk of a side impact collision. This is ensured through traffic calming measures, e.g. a roundabout, or - ultimately – through road informatics technology.

If there are short distances between the intersections, the speed limit is restricted to 50 km/h, even on unbroken stretches. The speed limit is ensured through a traffic calming design, even on unbroken stretches. Often the speed limit is also felt to be well motivated due to the relative proximity of housing developments.

The speed of 90 km/h is sometimes possible even in built-up areas if the alignment and the intersections are of very high standard, and if the distances between intersections are long.

Walking and Cycling and Through-Traffic Routes

Pedestrians and cyclists pass through-traffic routes at grade-separated crossings. If this is not possible, motor vehicles pass pedestrian and cyclist crossings at 30 km/h, the speed ensured with the help of measures such as roundabouts. Green ways running along through-traffic routes often have very few or even no points of confrontation with motor vehicles. Their alignment is often attractive for fast-moving, long-distance bicycling. This means that they would be a natural component in the trunk cycle network.

From the perspective of promoting walking and cycling, it could be important to develop the through-traffic route network for motor vehicles only if this would reduce the number of motor vehicles on those streets where motor vehicles, pedestrians and bicyclists intermingle, i.e. on 50/30 streets, on 30 streets and on walking-speed streets. However, building more through-traffic routes for motor vehicles solely to satisfy the increasing capacity requirements of motor-vehicle traffic would only contribute to creating a society that is more and more motor-vehicle-oriented and detrimental to walking and to cycling.

There is a danger that through-traffic routes will constitute a barrier for cycle and pedestrian traffic. Only frequent grade crossing possibilities can prevent the barrier effect.
3.2.2. 50/30 Street

Function

The 50/30 street is used by motor vehicles and by bicyclists going from one neighbourhood to another nearby or -for motor vehicles- to a through-traffic route. Car parking can be permitted along a 50/30 street, especially in central areas.

Very often a 50/30 street is not a boundary between two neighbourhoods, and therefore pedestrians, cyclists, children, the elderly and disabled persons very often need to cross 50/30 streets.

Design and Behaviour

The carriageway normally has only two lanes for ordinary motor-vehicle traffic, one lane in each direction. This means an approximate width of 6.2 metres between the kerbs on opposite sides of the street.

The 50/30 street also has wide cycle-tracks and wide pedestrian pavements, affording pedestrians and cyclists ease of movement, safety and security. Furthermore, these wide pedestrian pavement and cycle-tracks provide the potential for creating an attractive, pleasant street space that is also suitable for children, the elderly and disabled persons.

Where there is heavy bus traffic, the 50/30 street is designed with bus lanes.

An intersection between two 50/30 streets has always pedestrian and cyclist crossings. These crossings are designed so that a motor vehicle cannot drive through them at speeds exceeding 30 km/h. The pedestrian and cycle crossings should be designed to meet the needs of children, the elderly and disabled persons. Where there is a special need, some pedestrian and cycle crossings are designed as a pedestrian pavement on which motor-vehicles are not permitted to drive faster than at walking speed, i.e. between 5 and 10 km/h.

On unbroken stretches where no pedestrians or cyclists cross, motor vehicles are permitted to drive a maximum of 50 km/h.

There are special areas for loading and unloading on 50/30 streets but as little kerbside parking as possible.

Walking and Cycling on 50/30

There are three very important reasons for constructing cycle-tracks along 50/30 streets. Firstly, this promotes bicycling. Secondly for safety. The third reason is to enable road-users to intuitively perceive that they are in a 50/30 street.

Cycle track

50/30 streets often have a straight, direct alignment. The cycle-tracks along these streets will therefore almost of necessity become a natural link in the trunk bicycle network. This means that they will be at least 2 metres wide for one-way cycle traffic and at least 4 metres wide for two-way cycle traffic. The high biking speed also motivates the necessity of taking measures to separate pedestrians and cyclists. A sufficiently wide pedestrian pavement and a sufficiently wide cycle-track should then be arranged; 2 metres would appear to be an acceptable minimum for both the pavement and the cycle-track.

The differences in speed and the differences in mass between motor vehicles and cyclists mean that a dividing strip ( verge) at least 0.5 metres wide is necessary between the carriageway and the cycle-track. This strip should be up to one metre wide if there is any risk of kerbside parking with the ensuing risk of motor vehicle doors being opened into the cycle-track of oncoming cyclists.
Some kind of divider strip is required between the pedestrian pavement and the cycle-track. This should obviously be in a type of material different from the pavement and from the cycle-track. The texture of the dividing surface should be felt and recognised easily, both by pedestrians and cyclists. A difference in level of some kind between the walking and cycle surface would also be suitable, and this should be designed in such a way that pedestrians will not stumble over it and that cyclists will not be knocked off their bikes upon impact.

It is particularly important that there are different colours and textures on the parts intended for walking or cycling respectively. It would be good if the pavement surface were in a colour generally associated with walking, preferably light grey. The same applies to the cycle-track, with a reddish brown colour probably being most suitable. The pavement surface should reflect its intended use, with flat slabs or stones being a suitable material. As far as the cycle-track is concerned, asphalt would be the material most closely associated with a cycle surface.

There are, of course, some 50/30 streets that are so narrow that it would not be possible to completely satisfy all of the above. We would then firmly contend that it is better either to build a cycle-track of at least minimum standard, say 1 metre, or to “downgrade” such a street to a 30 Street. It is not possible to have a cycle-track width of 1 metre width for more than a short distance, say some hundreds of metres. After that the cycle-track must be 2 metres wide again.

There are advantages of using two-way cycle traffic on cycle tracks:

- A cyclist with a departure point and destination on the cycle-track side of a road never needs to cross the road if a road has many more side roads adjoining on one side;
- A cycle track with two-way flow on the side of the road with the least roads adjoining, is safer for through cycle-traffic than a one-way cycle-track on each side of the road;
- If the access function is slight, it is more comfortable to cycle on a track 4.00 metres wide with two-way traffic than on two cycle tracks with one-way traffic.
- The space taken can be less, because a dividing verge is only needed once.

But one must be extremely careful with the crossing facilities.

Crossing facilities

The design of crossing facilities is crucial. If best practise is not used, road safety might deteriorate. The safety effectiveness of cycle facilities is often reduced completely by a lack of proper solutions on crossings. A literature inventory of roundabouts shows that speeds do decrease at roundabouts but that the safety effects are not always those anticipated. And the safety effect applies mostly to the motor vehicles, and to a less extent to other vehicles. The efficiency is much increased when there is a proper design of the roundabout, taking into accounts all road users.

Intersection between two 50/30 streets

There are typically pedestrian and cycle crossings (PCC) at intersections between two 50/30 streets. These crossings should always be marked.

Figure 3.2.2a page 18 Functional requirements and measures at pedestrian and cyclist crossings (PCC) at intersections with right-hand priority between two 50/30 streets.

Figure 3.2.2b page 19 Functional requirements and measures at pedestrian and cyclist crossings (PCC) at signal controlled intersections between two 50/30 streets.
Both figures illustrate how countermeasures can achieve a clear and understandable environment, a design according to driver expectations, supporting feelings of mutual responsibility, low vehicle speeds, improved visibility; all supporting a good interaction.

To make the environment clear and understandable an association between surface structure and type of road user is important, especially at crossings. It is therefore very appropriate to use reddish brown colour on cycle lanes at pedestrian and cycle crossing (PCC).

In most cases, it should not be possible for a driver to overtake at pedestrian and cycle crossings, so normally there should be only one incoming lane for motor vehicles.

In signal-controlled intersections there should be no turning motor vehicles when cyclists and pedestrians have green. This is of special importance to children.

Right-hand priority, mini roundabouts and wide traffic islands can support feelings of mutual respect. Green waves deteriorate feelings of mutual respect.

Important countermeasures to improve interaction and reduce accident severity by reduced speed are speed reducing devices, refuges in crossings and mini roundabouts.

Important features to improve visibility are advanced stop lines at signalised intersections.

To improve interaction it is also important to improve sight conditions. Car parking may be forbidden for a distance of 25 metres ahead of pedestrian and cycle crossings (PCC) instead of the present-day 10-metre regulation. This would considerably increase the amount of eye contact and hence the interaction between motorists and vulnerable road-users, thereby reducing the danger encountered by pedestrians, bicyclists and motor vehicles at intersections between 50/30-km/h-streets.

Intersections between a 50/30 street and a 30 street, and between a 50/30 street and a walking-speed street

To improve interaction where a 50/30 street crosses a minor street (30 street or walking-speed street) the pedestrian and cycle crossing is raised to the level of the pavement. The pedestrian and cycle crossing is designed as a pedestrian pavement, and therefore motor vehicles drive through at walking speed. Where there are many people who require extra supportive measures in order to be able to cross the street, the design is particularly useful. If a 50/30 street or a 30 street runs through a square that extends to both sides of the street, this street can become an integral part of the square. Motor vehicles then drive through the square at walking speed.

Leden, Gårder & Pulkkinen (1998) studied the effect on bicyclists’ safety of raising urban cycle crossings to the level of the pavement. Their results show that the raised cycle lanes attracted 50 percent more cyclists, and that the safety per cyclist was improved by approximately 20% thanks to the increase in cycle flow, and by an additional 10 to 50% owing to the improved design.

A raised intersection (pavement) makes it much sauer and easier especially for children, elderly and disabled persons and those using a wheelchair, rolator or pram.

At signalised intersections, an advanced stop line for bicyclists improves visibility, mobility, interaction and safety, particularly for cyclists turning left.

Speed reducing devices

Vertical measures such as road humps and speed cushions often have greater speed reducing effect on passing vehicles than horizontal measures, such as chicanes and width restrictions of the carriageway. The speed reducing effect of a speed-reducing device is
strongly dependent on the detailed layout and on the surrounding environment and traffic structure in the area.

3.2.3. 30 Street

Function

The 30 street is a street mostly in a residential area, where priority is given to the local inhabitants, thus designating its function. The 30 street should be an attractive, pleasant street space and an environment suitable for children, the elderly and disabled persons.

As far as vehicles are concerned, a 30 street is used only by local motor-vehicle traffic that originates in or has a destination within the neighbourhood. As regards motorised vehicles, 30 streets nearly always have access traffic, sometimes collector traffic, but never through traffic.

For cyclists, 30 streets may have a distribution and also a through traffic function, since cyclists need smaller margins in their network.

Design

Apart from streets with a through traffic function for cyclists, a 30 street has pedestrian pavements and a carriageway. The carriageway is as narrow as possible, i.e. between four and six metres. Thus, there is space for the pedestrian pavement to be as wide as possible, providing great potential for creating an attractive, pleasant street area suitable for children, the elderly and disabled persons alike. Especially in the inner city areas, 30 streets provide part of the need for short-time parking. Parking spaces are designed and located with care, paying consideration to their being an aesthetically attractive element within the street environment.

Traffic calming measures guarantee safe, secure interaction between pedestrians, cyclists and motorists. A good traffic calming measure is an elevated crossing, signalling that in residential areas priority is given to pedestrians. Motor vehicles pass an elevated crossing at walking speed. This solution will help children, the elderly and disabled persons to move about, especially those in wheelchairs and using rollators.

Behaviour

Within a residential area it is natural to cross a street as a pedestrian or a cyclist arbitrarily, either anywhere along the street or at street crossings.

Walking and Cycling on 30 Streets

On 30 streets the speed is limited to a maximum of 30 km/h. Where motor vehicles and cycles share the same space, and where a 30 street has an obvious residential function, lower speeds should probably be recommended for both cyclists and motorists.

30 streets are designed with varying kinds and levels of traffic-calming measures. It goes without saying that cyclists can use the entire width of a 30 street and motor vehicles can be required to wait before overtaking until this can be performed without risk of danger.

It is not out of the ordinary that a 30 street is made one-way for motor vehicles in a 30 km/h area. However, it is not usually necessary to make such a street one-way for cyclists as well. Depending on the situation, it could suffice to simply use signs to indicate that bi-directional traffic for cyclists is permitted. However, it could also be necessary to use both signs and a painted line to delineate a cycle lane in the direction facing oncoming motor-vehicle traffic, i.e. what is known as a “contra-flow lane”. It would be appropriate to construct this cycle lane in a material and colour associated with cycling, e.g. reddish brown asphalt. A traffic island could be required at the beginning and at the end of the cycle lane. When the traffic volume
is intensive on such a one-way street, it may be necessary to construct a curb cut to separate the cycle traffic facing oncoming motor vehicles.

**Cycle Street**

A cycle street can cut across a 30 km/h area. Such cycle streets are characterised by distinctly more through cycle traffic than what can be found on a normal 30 street. One possible reason for this situation could be that the 50/30 streets in the vicinity are so far apart that they are unable to capture all the fast-moving bicycle traffic on the cycle-tracks. Cycling is very much affected by detours, and therefore needs more direct routes. Another reason could be that the cycle-tracks along the 50/30 streets have not yet been constructed for some reason or another. Cyclists along a cycle street have the right of way at intersections within a 30 km/h area. Motor vehicles cross cycle streets at walking speed.

The design of a cycle street reflects the extremely important conditions and behavioural aspects mentioned in the foregoing. To ensure that motor vehicles crossing a cycle street drive at walking speeds, an elevated curb about 10 cm high between the normal street and the cycle street is normally required.

To emphasise the presence of a cycle street where priority is given to cycle traffic, the cycle street should be constructed in a material and colour that is associated with cycling, e.g. reddish brown asphalt. It is definitely not enough simply to put up signs to indicate a cycle street. This can only be regarded as a temporary measure.

**Cycle Parking**

The pedestrian pavements along 30 streets are to be wide enough to allow for parking cycles without jeopardising the intended use of the pavement. The type of cycle parking in mind would primarily be in cycle stands or by locking the cycle onto a fixed object. In any event, the measures undertaken in a 30 km/h area should always make it completely obvious to motorists that it is both faster and easier to use 50/30 streets or Through-traffic routes for longer, faster trips than 30 streets or walking-speed streets in residential areas.

**3.2.4. Walking-speed Street**

**Function**

The walking-speed street is a communal outdoor space shared by everyone living by the street. It is a street especially for children, the elderly and disabled persons. A walking-speed street is an attractive, pleasant street space for meetings, play and recreation. It is used by motor vehicles only when they come from a destination or go to a destination along it or a street close nearby.

**Design**

The entire walking-speed street is intended for everybody; it is not divided into separate lanes for different types of “traffic”.

It is designed entirely at the same level, i.e. there are no curbs.

**Behaviour**

Pedestrians and cyclists always have the right of way.

The walking-speed street is designed and regulated so that the maximum speed for motor vehicles does not exceed walking speeds, i.e. 5 to 10 kilometres per hour, with an average speed of around 7 kilometres per hour depending on who is walking.

This type of street has often been created on the initiative of the property owners and the local residents, with both groups supporting the construction and maintenance operations.
Walking and Cycling on Walking-speed Streets

Needless to say, it is safe and secure to bicycle on a walking-speed street since the speed of the motor vehicles is limited to walking speeds. Children, elderly, disabled persons and those not used to cycling ought particularly to appreciate being able to cycle here. The major purpose of walking-speed streets - i.e. being a pleasant and attractive outdoor area for those living and working along the street or in its immediate proximity - means that it cannot be used for biking at very high speeds and to a very great extent.

The melange of residential area streets, 30 streets and walking-speed streets, should mean that cyclists do not have to travel at walking speed or at 30 km/h for more than a few hundred metres, and this normally occurs at the beginning and at the end of a trip.

Walking-speed streets should be designed so that cycles can be parked on the street without this jeopardising its intended purpose. The type of cycle parking in mind would primarily be in a bike stand or by locking the cycle onto a fixed object. The type of parking where cycles are completely locked away inside would not normally come into question on walking-speed streets.

Finally, some pragmatic advice to summarise and to highlight the context for some of the countermeasures discussed in this chapter.

1. Build green ways where any confrontation with motor vehicles is practically non-existent, for instance in green corridors in park areas, without motor vehicles and with grade-separated intersections where the paths intersect with high-volume or high-speed roads.

2. Build significant shortcuts for pedestrians and cyclists, for example connecting cul-de-sacs and providing grade separated crossings, to improve safety and mobility.

3. Build cycle tracks along all 50/30 Streets.

4. Gradually ensure that motor vehicles do not drive through at-grade pedestrian and cycle crossing (PCC) at speeds above 30 km/h.

5. If necessary, physical traffic calming measures are to be used.

6. Build special routes for cyclists or cycle streets (Fahrradstrassen) in residential areas where priority is given to cyclists.

7. Ensure that motor vehicles do not drive at speeds above 30 km/h in residential areas/30 km/h area.

8. If necessary, physical traffic calming measures are to be used.

9. Build separated pedestrian and cycle paths, green ways, along through-traffic routes and grade-separated intersections where pedestrians and cyclists cross through-traffic routes.
4. CALM STREET! AND ITS APPLICATION IN BORÅS AND NORA

A method has been developed to apply The New Approach to the road network of a city. The first two applications were Borås and Nora. Borås is quite a big city, at least according to Swedish circumstances, and Nora is a small town. Today nearly all cities in Sweden have done a classification according to The New Approach, and a transformation of the streets according to The New Approach has begun.

5. TARGETS AND MEASUREMENTS ANNUAL FOLLOW-UP TO THE MINISTRY 1998-2002

In Sweden, as is probably the case in most other countries, we want our organisations to be as flat as possible. In other words, we want them to have as few levels as possible. We also want decision-making to be as decentralised as possible.

This naturally leads to our seeking increasingly to govern less with the aid of peremptory directives and more with the help of management by objectives.

The Swedish Government and Parliament have set up a number of general goals that they wish to be realised in the transport sector. A considerable amount of work is in progress in an effort to break down these general goals into more operational targets. The New Approach can be seen as part of this work.

During the period 1998-2002, the Government has decided that annual measurements are to be carried out as regards measures adopted in order to achieve better road safety for unprotected road users in the mixed traffic systems of built-up areas. The Swedish National Road Administration is carrying out this work on the instructions of the Government and will report back to the Government on an annual basis in this respect. In 2003, the Swedish National Road Administration will draw up a final report on this work. This report will also include the Swedish National Road Administration's proposal on amendment of the present nature of road safety efforts.

6. ROAD TRAFFIC SAFETY INSPECTION

On the basis of "Vision Zero", we in Sweden have analysed the shortcomings of today's legislation with regard to the system designer's responsibility for a safe road transport system.

Swedish road transport legislation, which lays the sole responsibility for road accidents and road traffic injuries onto individuals, in all probability contributes to an erroneous outlook on how we can develop road safety and is actually counteractive to traffic safety endeavours. Those who build up the system, such as road managers, vehicle manufacturers, legislators and those who use the system professionally, also exert considerable influence on road safety. In order to achieve a safe road transport system, system designers should be given clearly defined responsibility for designing the road transport system on the basis of human capabilities, thereby preventing the occurrence of those cases of death and serious injury that are possible to predict and prevent. In light of this, we propose that the parliamentary decision based on the principle of "Vision Zero" and the responsibility of the system designers for safety in road traffic be regulated in law.

According to the legislation proposed, requirements would be imposed on the system designer to manage a quality programme for the purpose of improving road safety.

If a serious accident occurs, it is urgent from a safety perspective to clarify the causes so that similar accidents or mishaps can be avoided in the future. Within the framework of modern quality assurance systems, it is fundamental to know where the problem lies within the area
of operation, solve it, and learn from the past and prevent the problem from arising again. It
is recommended that the system designers themselves study fatal accidents and likewise
present their own proposals about what should be done to prevent recurrence.

The draft legislation is what is known as a “skeleton law”. Thus a special body is needed that
would be commissioned to elucidate and follow up the implementation of the intention of the
law, and reinforce the prerequisites for safe road traffic. This is to be accomplished through
inducing the system designer to assume responsibility for steadily improving and upholding
safe road traffic so that human life and health is not placed in jeopardy. It is recommended
that a special supervisory authority, a road traffic safety inspectorate, be set up and
commissioned to uphold the purpose of the new law.

The tasks of the road traffic safety inspectorate are

To carry out general and specific development and inquiries
To ensure that the system designers conduct accident inquiries of high standards and make
decisions on undertaking adequate and effective measures
To draw up rules and regulations concerning requirements for a quality assurance system for
road traffic safety
To initiate a certain degree of research and development.