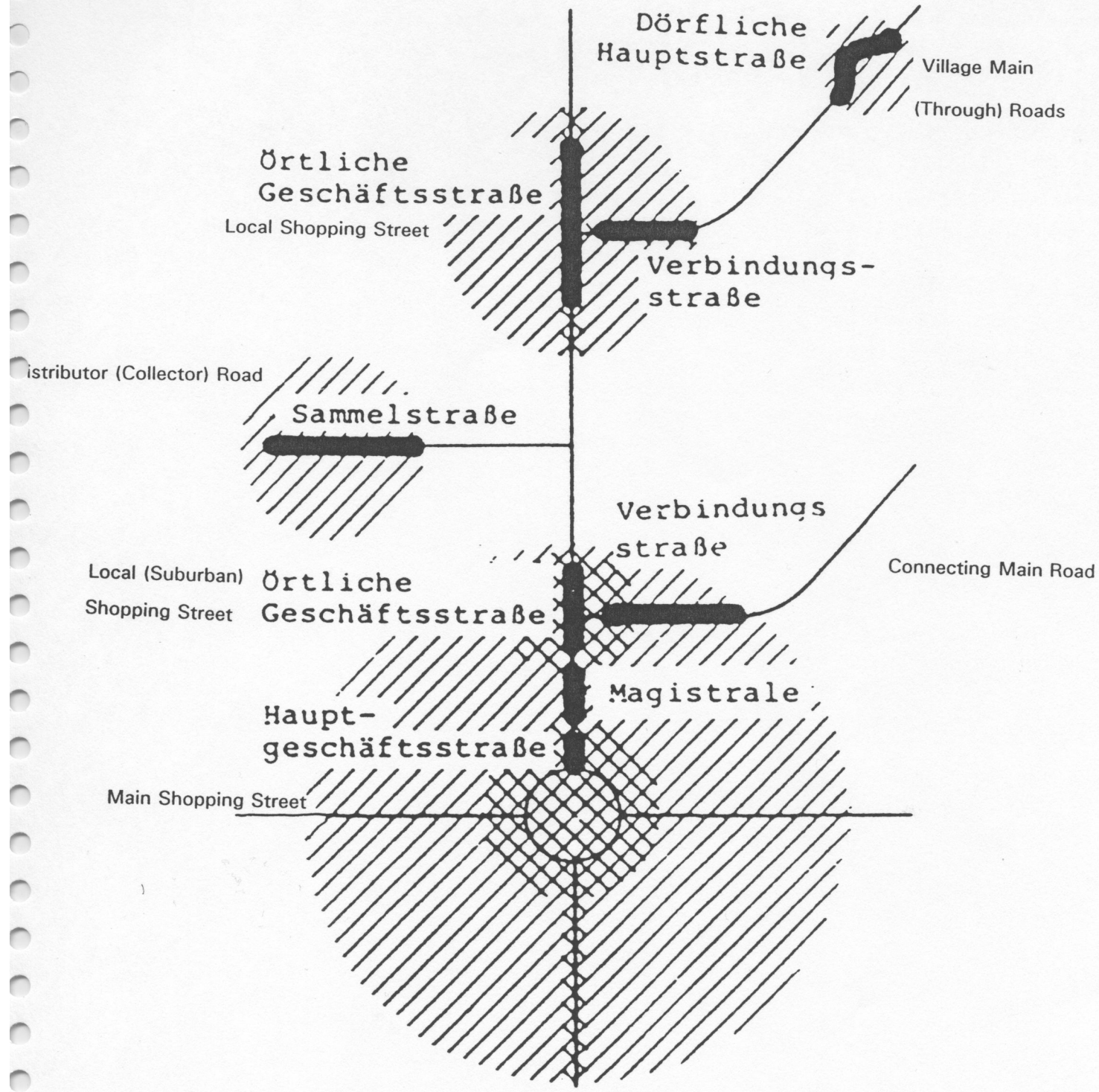
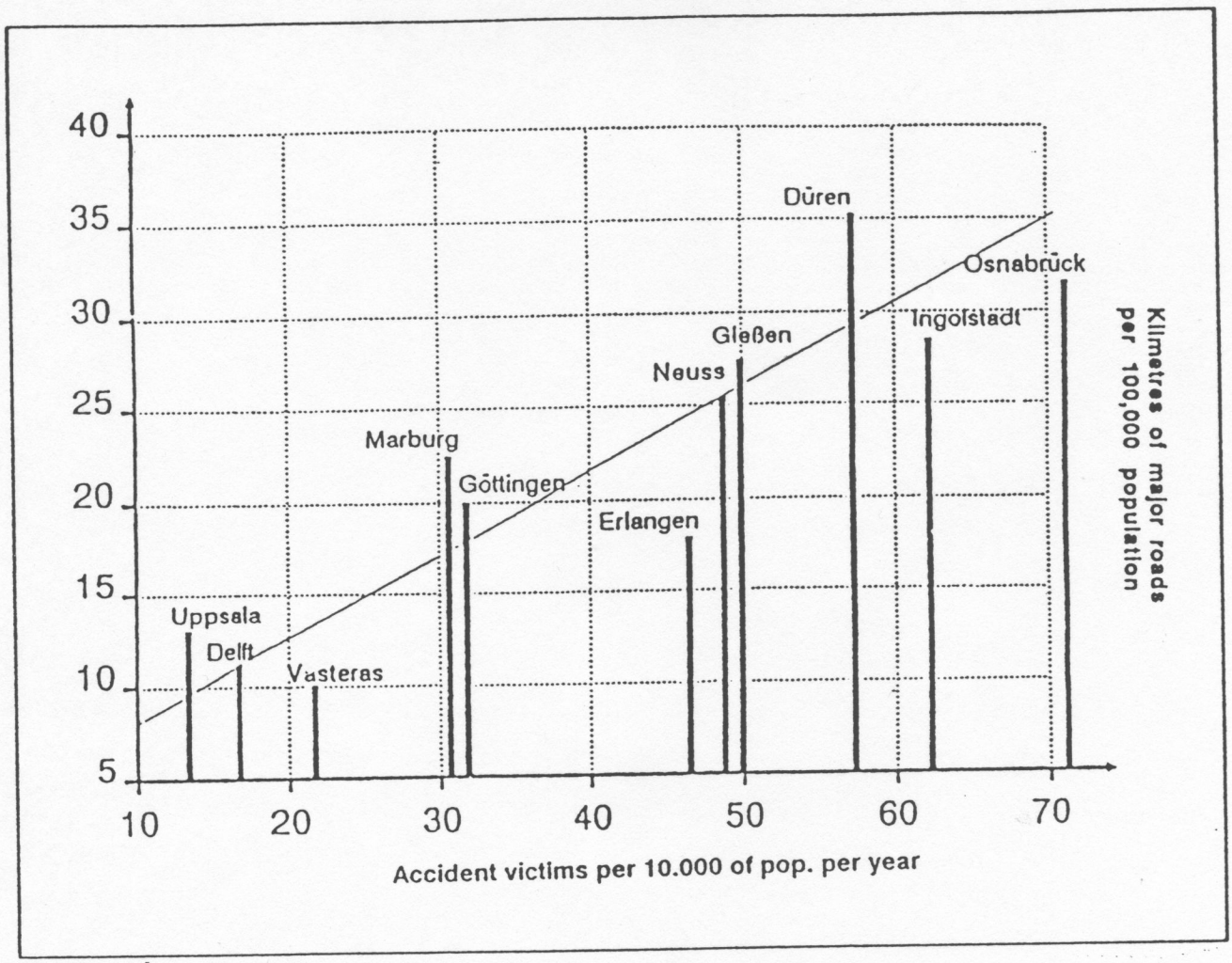
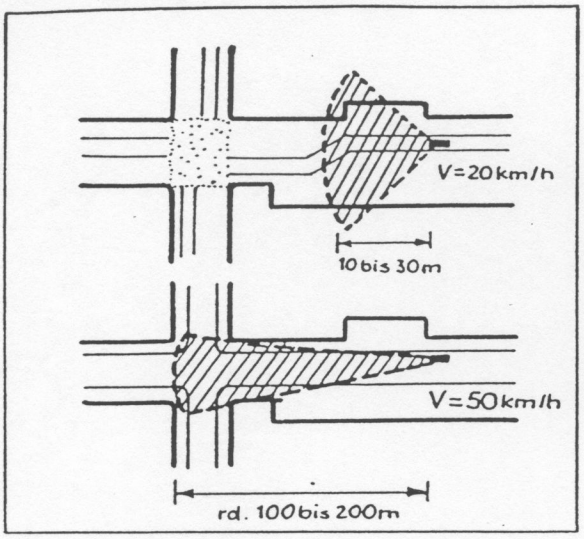


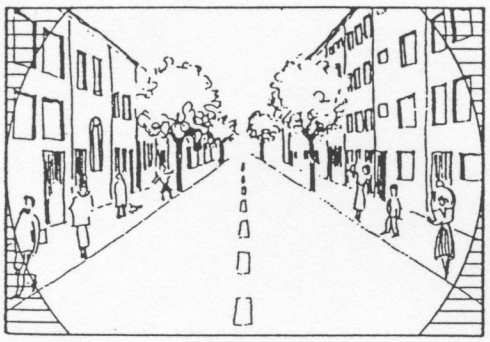
Typical Urban Main Road Situations.
(Source : ILS 1986)



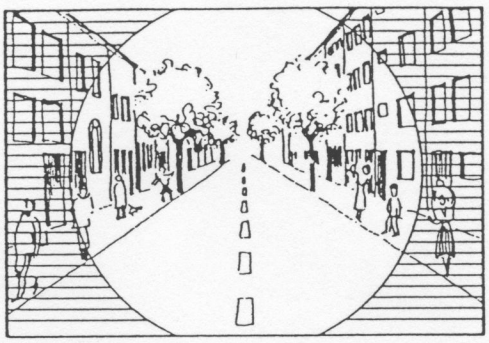
Accident Exposure In Relation To Length Of Main Street Network.
(Source : Just 1992)



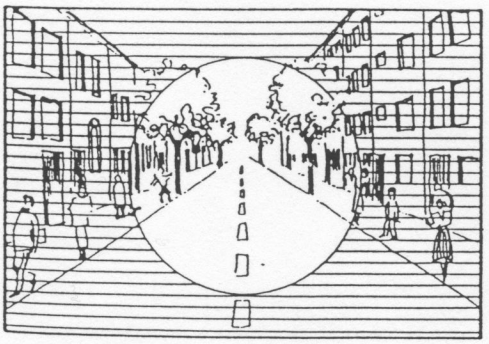
Schütte (1982)



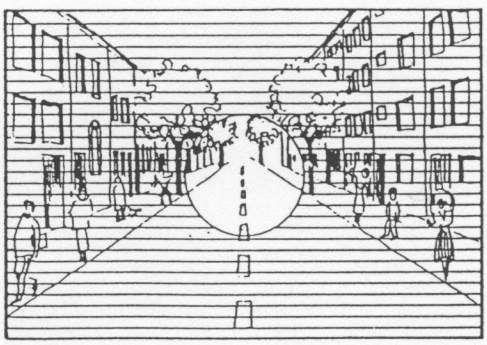
V = 20 km/h



V = 30 km/h



V = 40 km/h

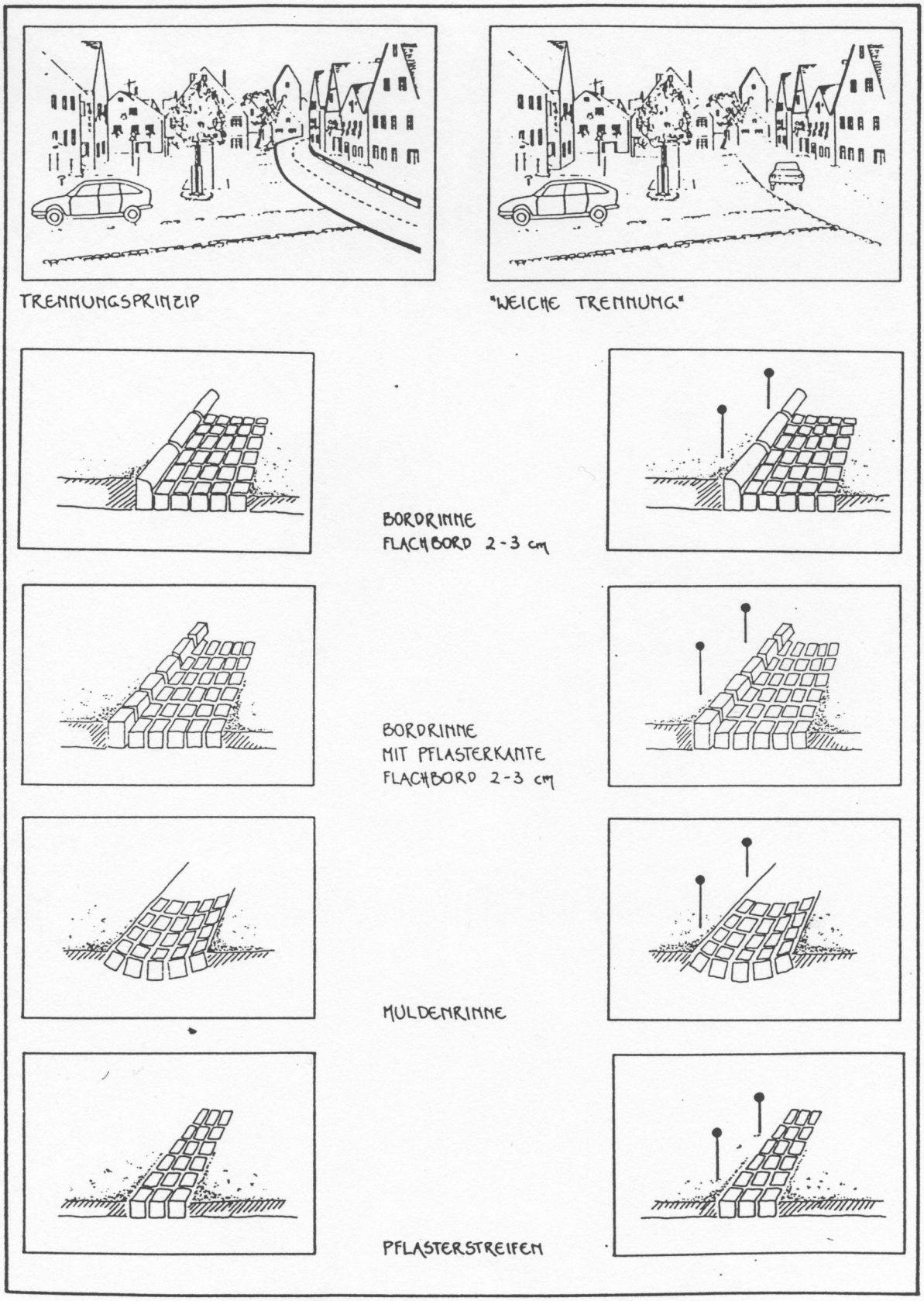


V = 50 km/h

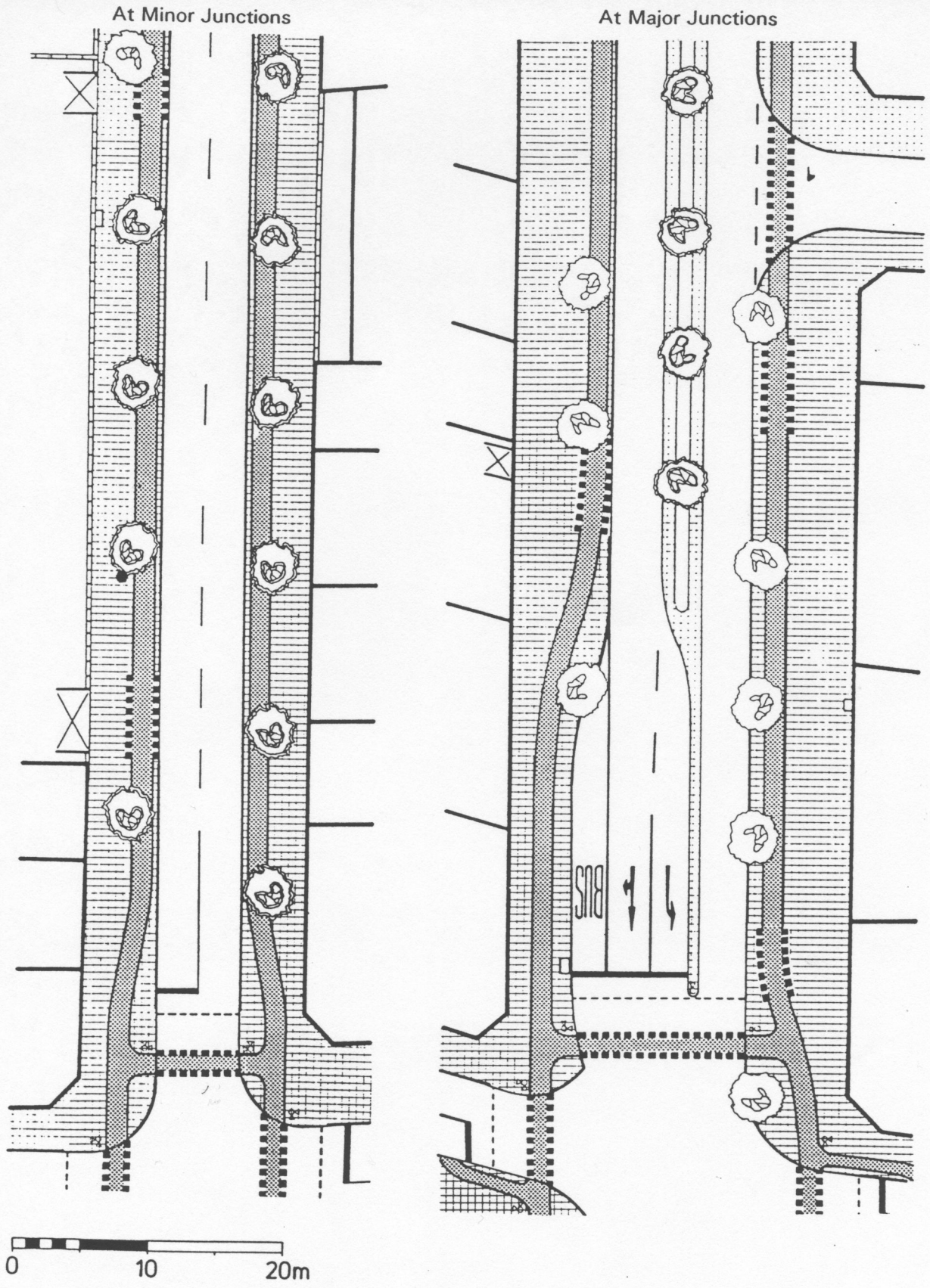
in Anlehnung an Resch (1986)

Drivers field of vision narrows with speed. On main roads, this explains why pedestrian crossings should not be across the full carriageway width (unless light controlled). Median strips / islands bring pedestrians into drivers field of vision.

Measure 1 : Strips / Reservations.



Measure 2 : Overall Unity Of Street Space Using "Soft Separation."



PEDESTRIAN SAFETY MEASURES FOR NON-RESIDENTIAL URBAN ROADS

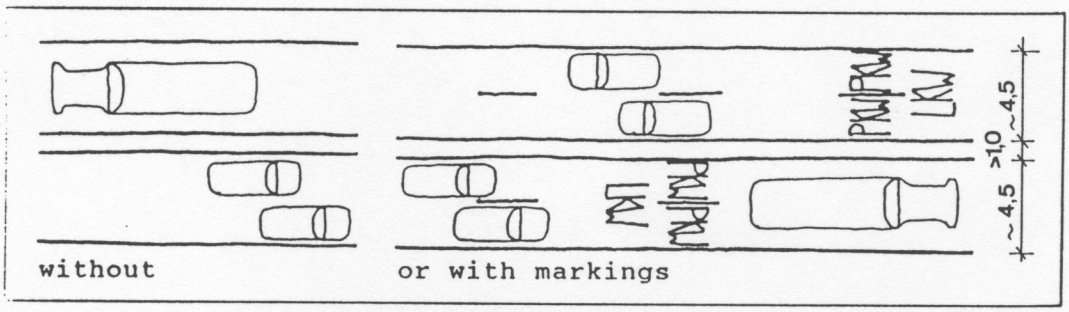
Measure 3 : "Two Plus Turns".

Halcrow Fox

Figure 5

In many four lane streets there is no space available for other usages and four lanes are needed. In such cases the "almost four lane carriageway" might be a remedy - that means, lanes in the same direction about 4.5 m wide, which can handle cars in two lanes, but trucks in only one lane.

Two 4.5 m-lanes and 1.0 m-center strip lead to a total carriageway width of 10 m compared to a four lane carriageway without a center strip,

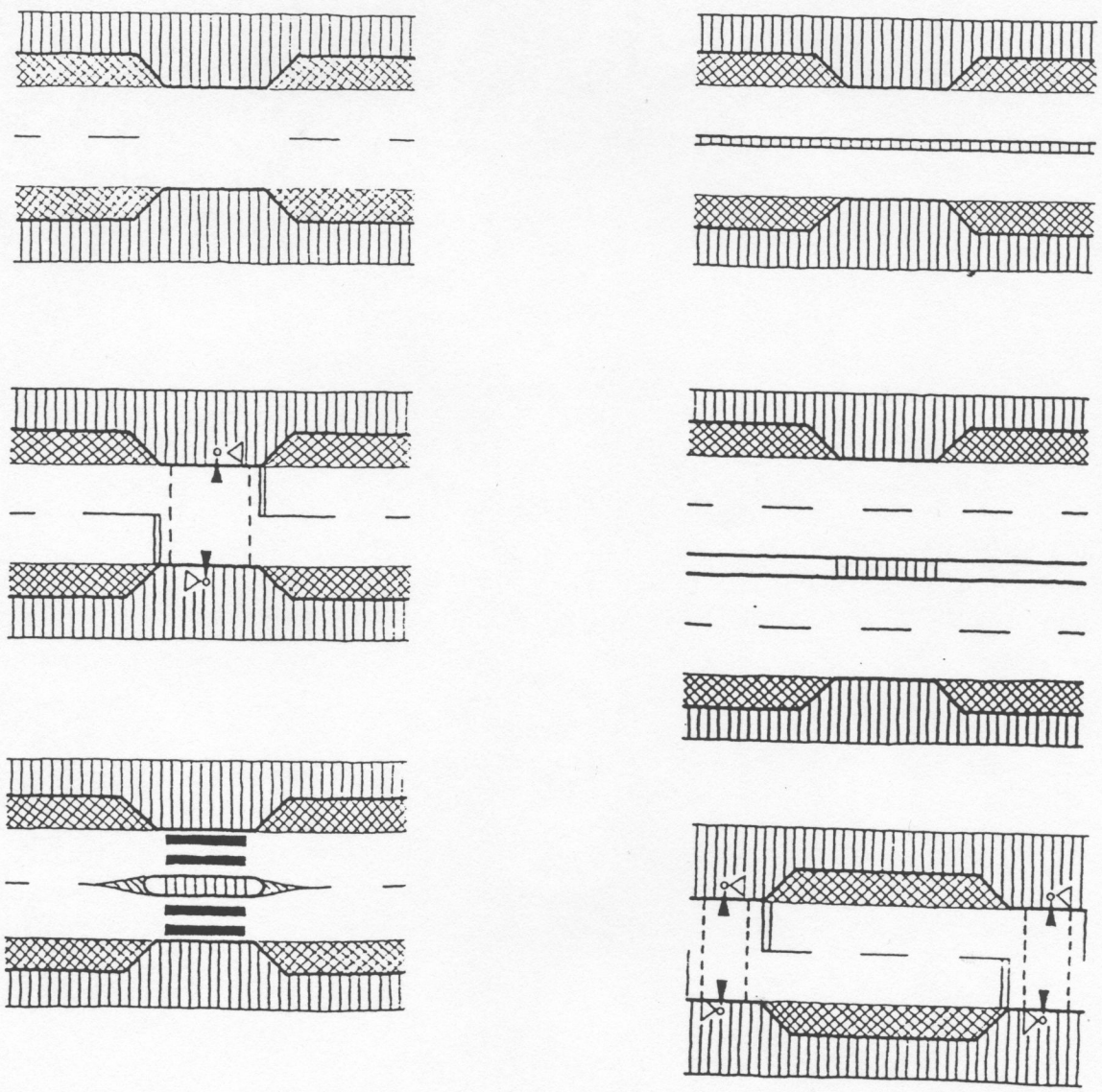


which is usually about 12.5 m.

Since rush hour traffic in many urban arterial streets contains only about 5 percent trucks and buses the capacity at homogenous traffic speeds below 50 kph of a 4.5 m-lane is slightly less than that of a 6.5 m-lane.

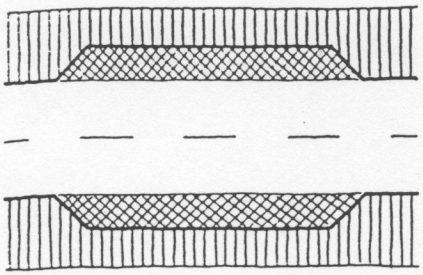
Investigations into drivers' behavior (Göttsche, 1987) in respect to side-to-side distance, passing and speed have shown that streets with "almost four lane carriageways" of lengths up to 800 m are not any worse by comparison than usual four lane streets in similar situations. The effect of speed reduction is, however, slight, unless the "visual width" of the carriageway is reduced at the same time as the "useable width". Furthermore, the question whether streets with "almost four lanes" are basically acceptable that means without limit to length - cannot be finally answered by the investigations conducted until now.

Measure 4 : "Almost Four Lanes."

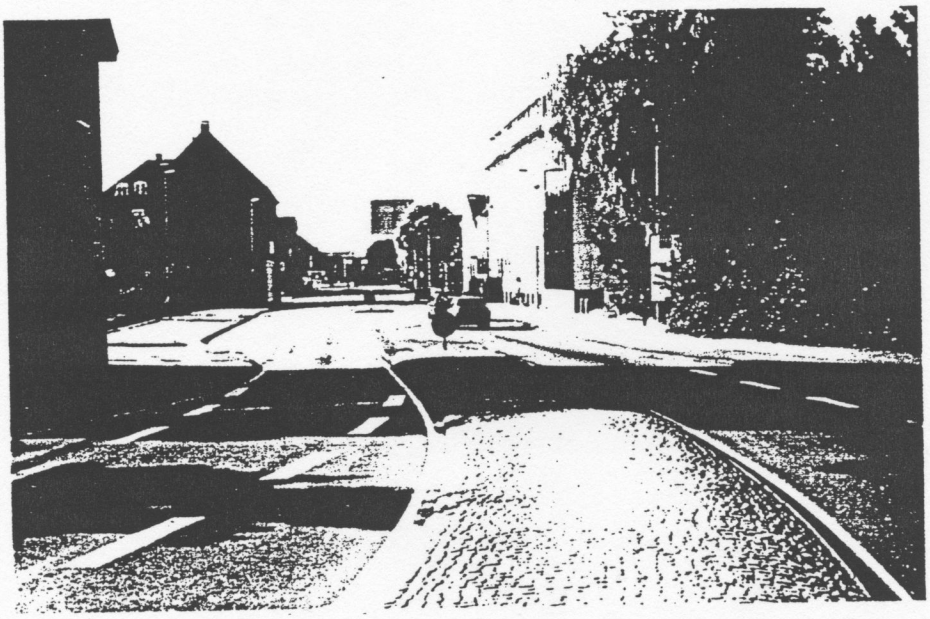


Examples Of Measure 5 In Various Situations.

Measure 5 : Carriageway Narrowings.

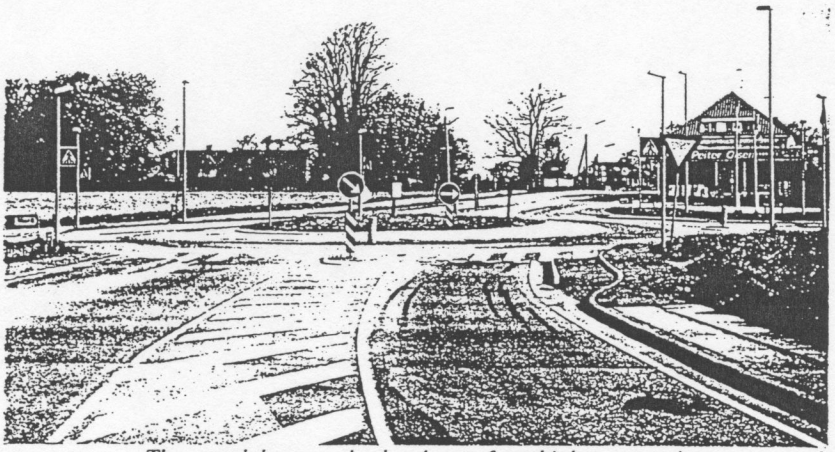


Narrow Carriageway (perhaps as part of "two plus turns" design).

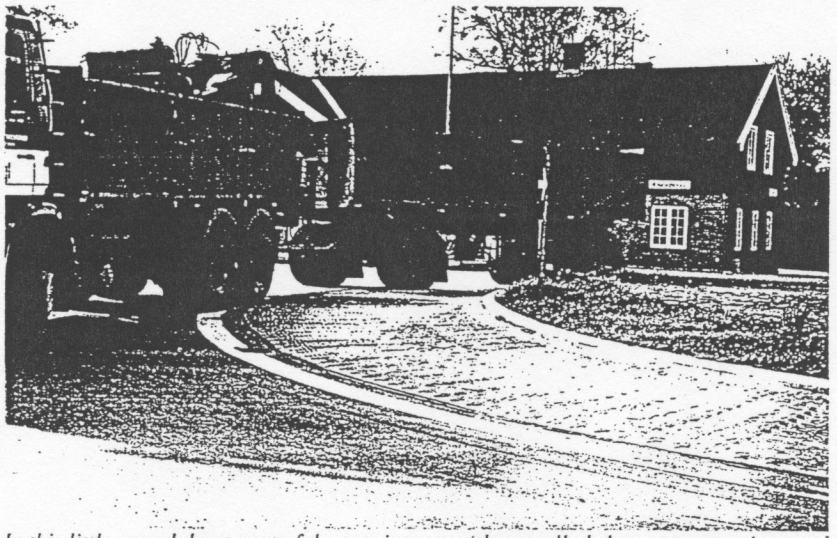


The 2 lanes are narrow due to the new traffic island and the cycle tracks.

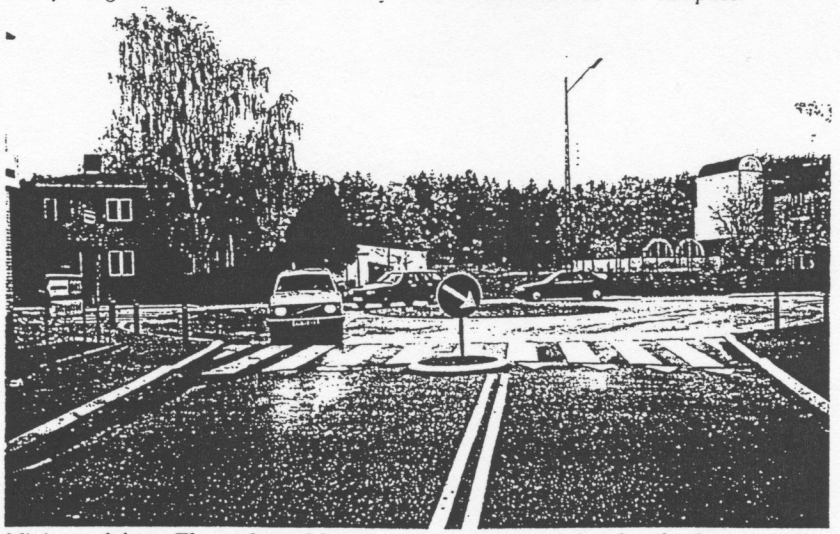
Measure 6 : Narrow Carriageways / Lanes.



The roundabout marks the change from highway speed to town speed.

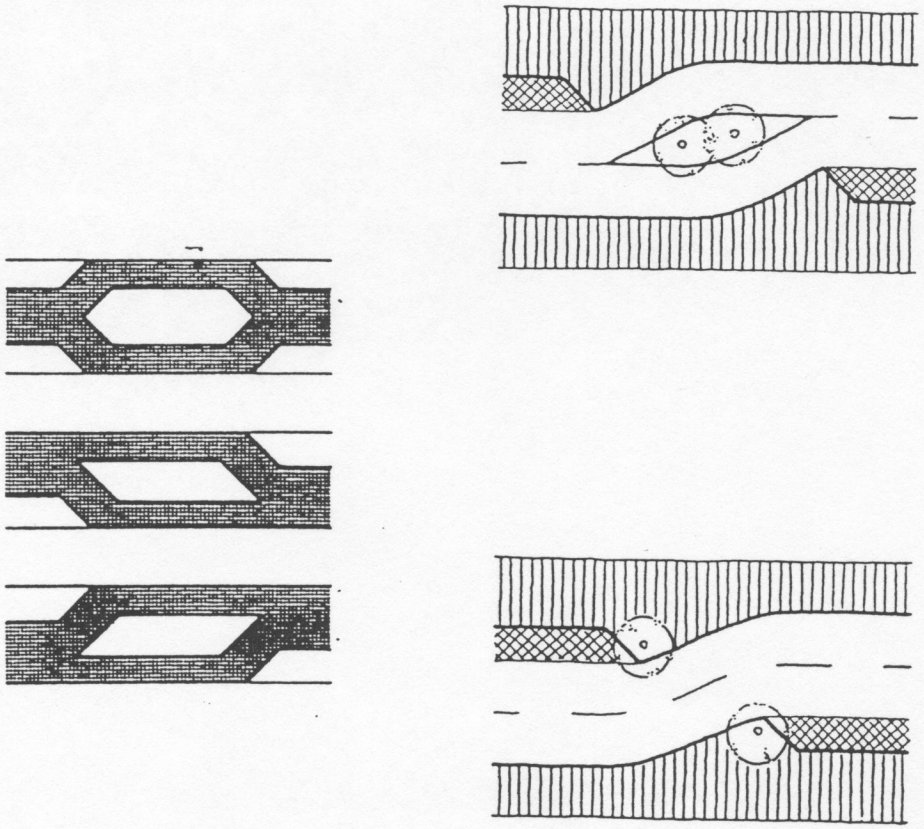


In this little roundabout part of the carriageway (the socalled short-cut-area) is paved with paving stones that the cars will try to avoid but which lorries can pass.

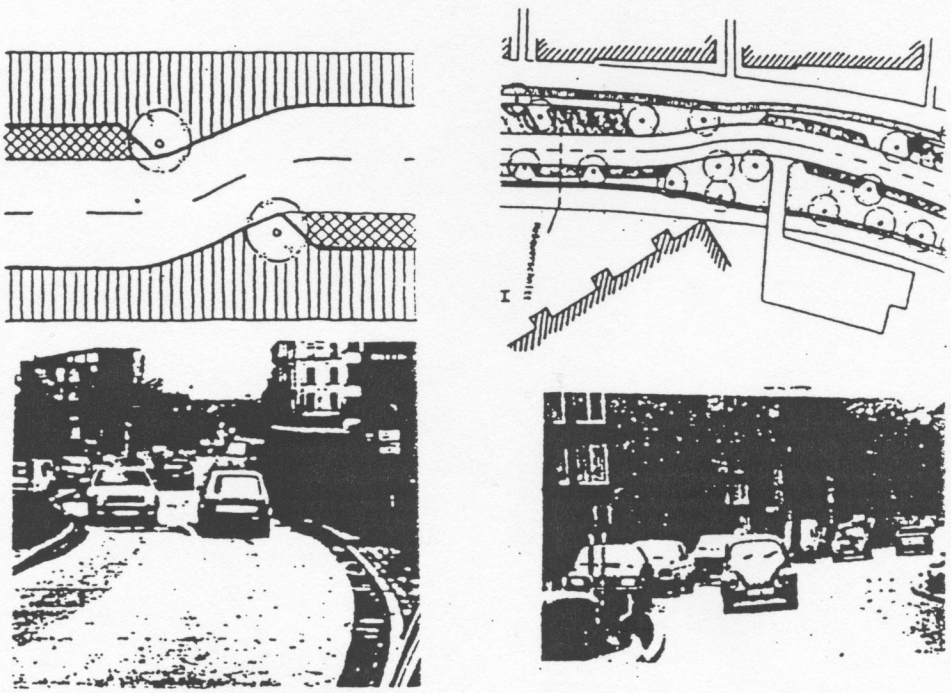


Mini roundabout. The surface of the central island is consolidated so that large vehicles can drive over it.

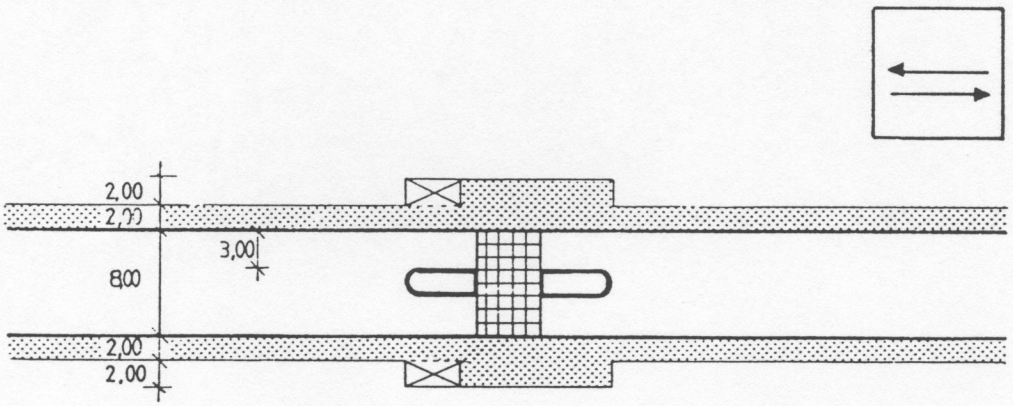
Measure 8 : Roundabouts.



Examples Of Layout Of Lateral Shifts.

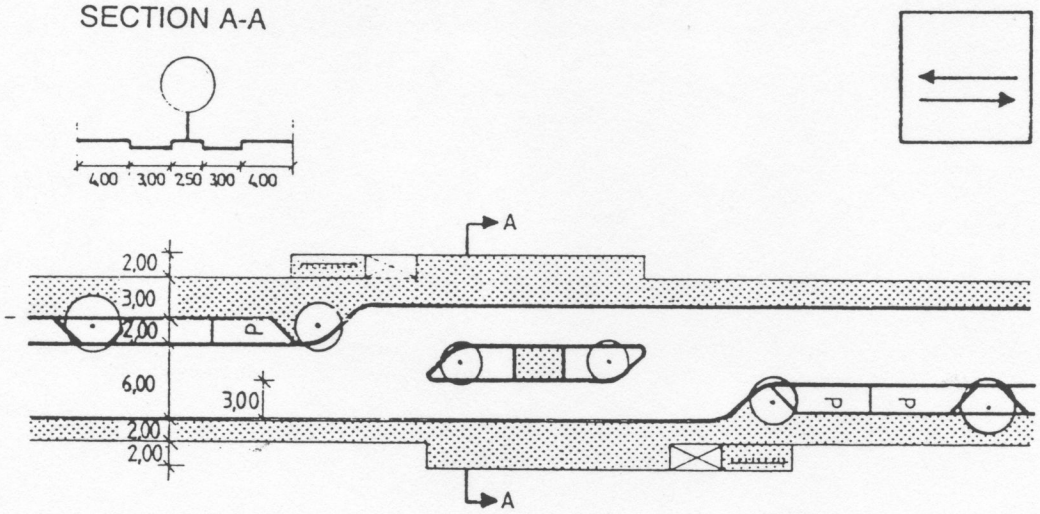


Measure 14 : Lateral Shifts In Carriageway And /Or Lanes.



Central reserve

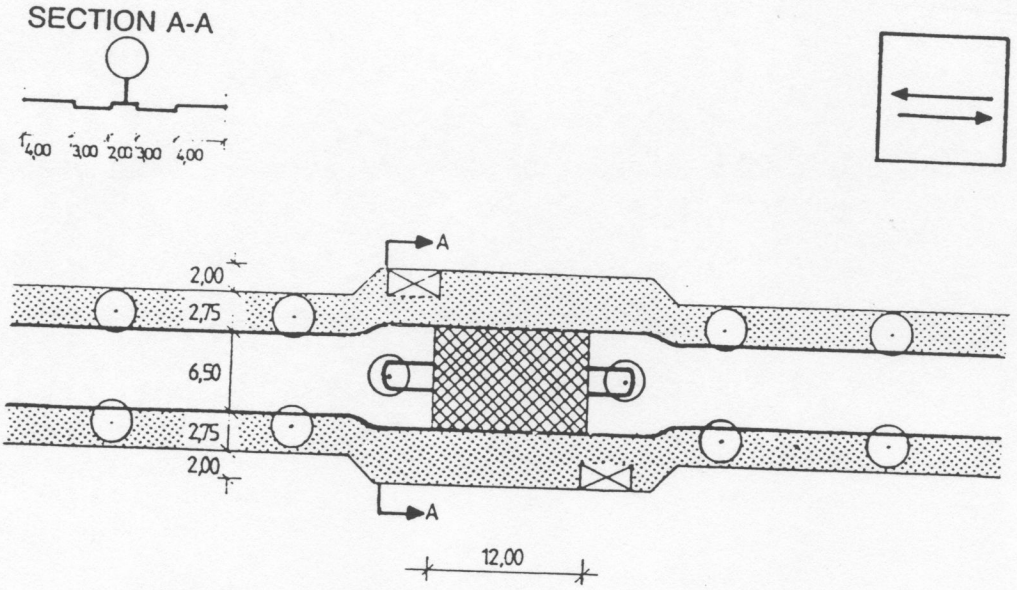
Narrowing of the carriageway where a stop for two vehicles is provided, by means of a divided traffic island in the carriageway centre. For the purpose of additional marking, one lane of the carriageway between the islands is shown as a crossing area by means of special material.



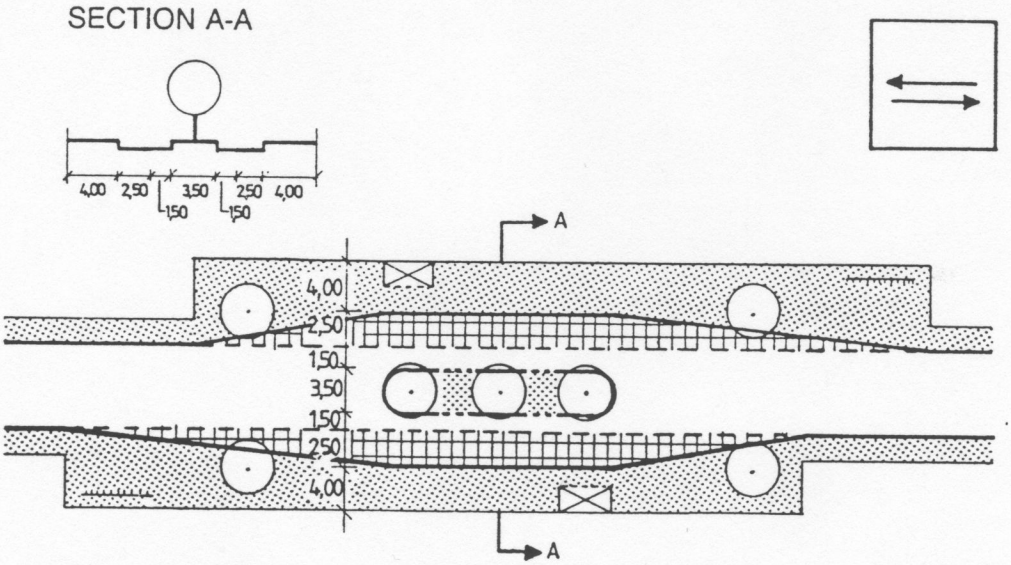
Central reserve — staggering of the carriageway

Stop in carriageway alongside staggered section. The bus heads for its stopping position along a straight line and has to follow the staggering only when starting up again and leaving the stop, thus not being impaired. While a bus is waiting, vehicles going in the same direction cannot pass the location. The planted central island also helps pedestrians in crossing at a place where motor vehicles proceed at a reduced speed owing to central island and staggering.

Measure 17 : Bus Stops Located In Single Lanes.

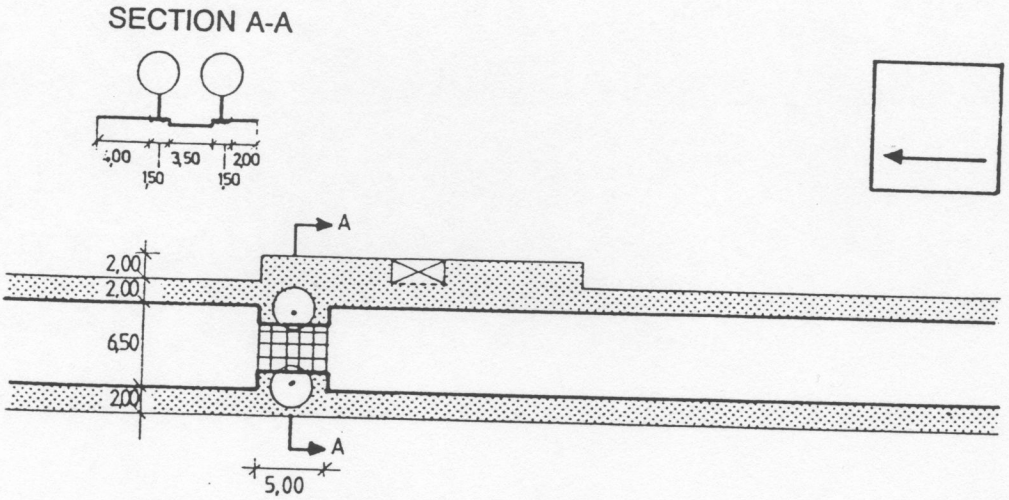


Central reserve — carriageway staggering
Planted central islands where a stop for two vehicles is provided. The bus operates on a rough surface which additionally characterises the stop area and, in addition, is perceived as acoustically unpleasant by the driver who drives fast within this area (owing to the potential noise nuisance for local residents the use of this measure is limited). These effects do not occur in the case of the bus, which is going at a very low speed in the immediate vicinity of the stop.



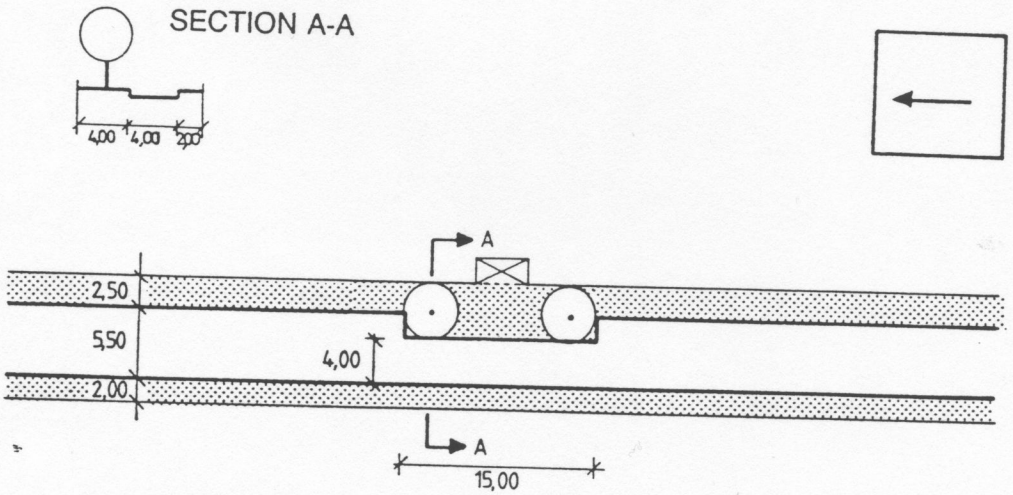
Central reserve — carriageway staggering (in conjunction with a stop only)
Alongside bus bays, provision of a planted central island in such a way that a carriageway width of only 1.50 m remains between the dropped kerbs of the bus bay and the elevated kerbs around the central island. While the scheduled bus is in the bay, motor cars cannot pass the site; however, bicycles can pass the bus. Motor cars can pass the central island only by partly using the somewhat higher bus bay which will normally be done at a reduced speed.

Measure 17 : Bus Stops Located In Single Lanes.



Narrowing of the carriageway

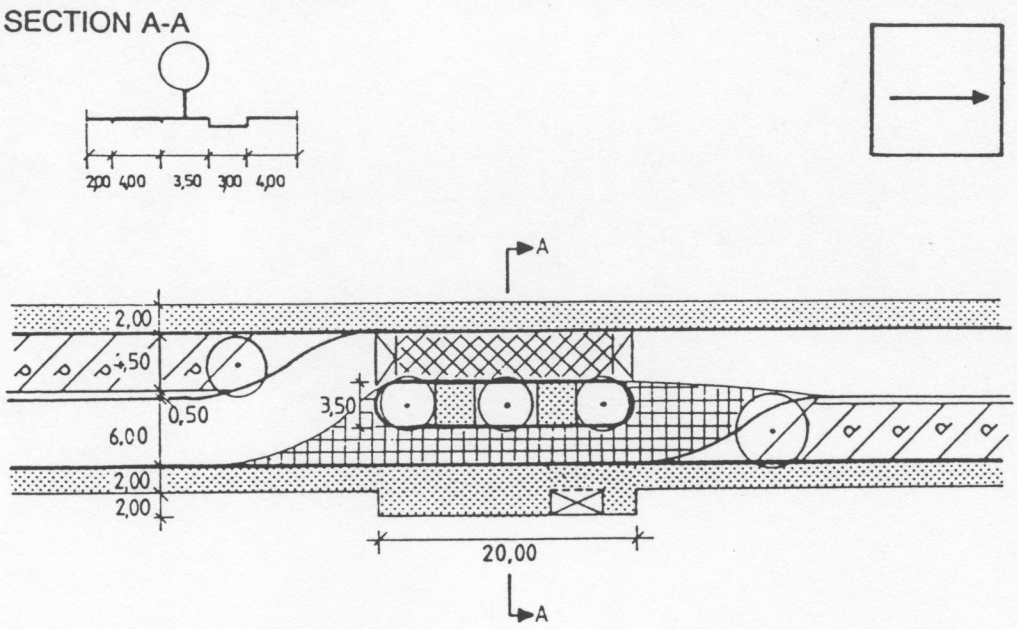
Symmetrical narrowing of the carriageway immediately downstream of a stop. Right after leaving its stop, the bus must pass a narrowed point which is planted and where the carriageway is specially marked in terms of material; at the same time it also assists pedestrians in crossing, particularly passengers on the way to the stop. Public transport is not impaired, because the bus passes the narrowed point immediately after starting up again



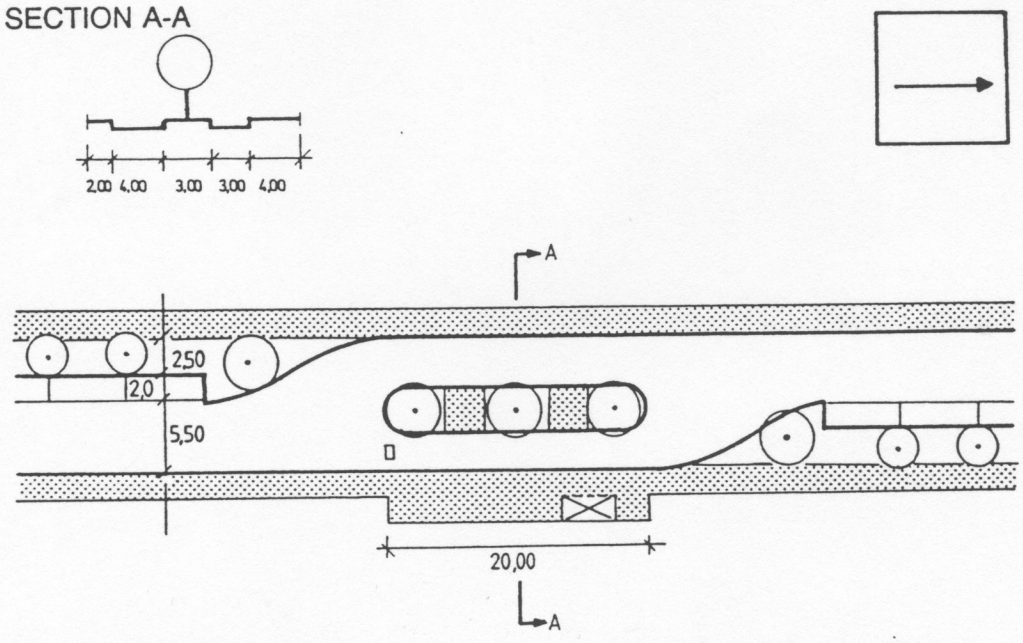
Carriageway narrowing

Provision of a stop at a unilateral carriageway narrowing. In this area the carriageway is narrowed to a width of 4.00 m, so that the bus blocks the passage for any other road users (with the exception of pedal cyclists) while waiting. The remaining carriageway width of 4.00 m at the narrowed point allows private cars to pass each other slowly. The unilateral narrowing does not impair the bus, because it is going slowly anyway in the vicinity of the stop.

Measure 17 : Bus Stops Located In Single Lanes.



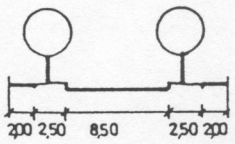
Carriageway staggering, central reserve (in conjunction with a stop only)
Staggering of the carriageway at a stop. The bus passes a mode-specific barrier and enters the stop area along a straight line, and only when starting up again and leaving the stop does it have to follow the staggering. Carriageway and bus bay are separated by a planted central island which, at the same time, assists pedestrians in crossing. Level with the central island the carriageway remaining for private transport has been raised to footway level. The carriageway width of 4.00 m permits private cars to pass each other slowly.



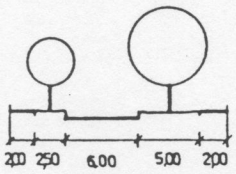
Carriageway staggering
Staggering of the carriageway at a stop. The bus passes a mode-specific barrier and enters the stop area along a straight line, and only when starting up again and leaving the stop does it have to follow the staggering. Carriageway and bus bay are separated by a planted central island which, at the same time, assists pedestrians in crossing. The carriageway width of 4.00 m permits private cars to pass each other slowly.

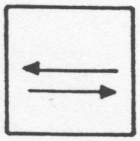
Measure 17 : Bus Stops Located In Single Lanes.

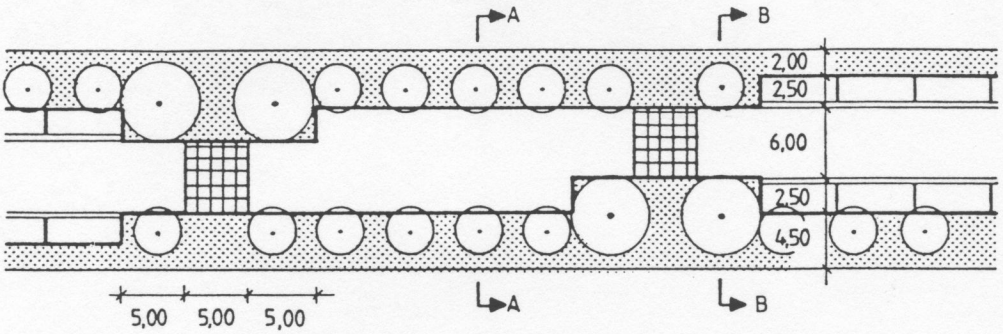
SECTION A-A



SECTION B-B



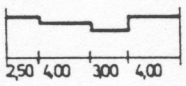


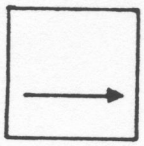


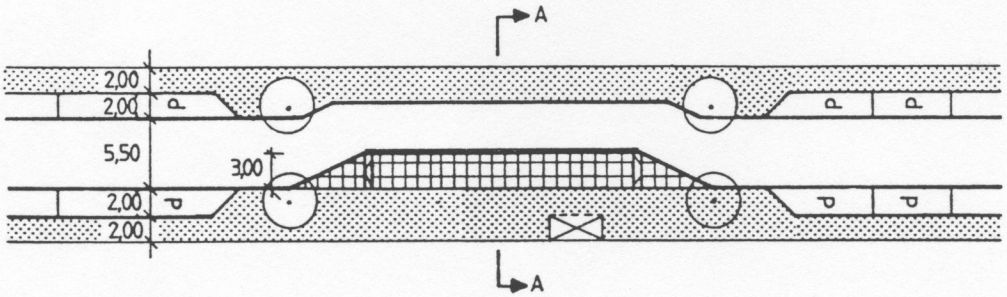
Carriageway staggering

Elongated staggered section of the carriageway in conjunction with pedestrian crossings which stand out in the carriageway by means of a different material and additionally by trees. The longidutinal parking spaces are separated from the carriageway by a multi-purpose lane, which is 0.50 m wide and can be driven over so that a useful width of 6.50 m is available, which is narrowed to 5.50 m at the pedestrian crossings.

SECTION A-A





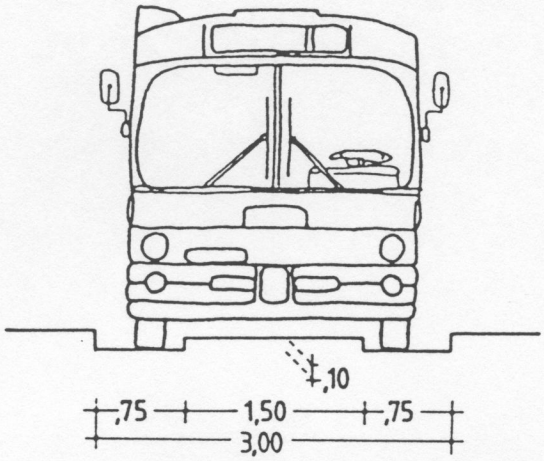


Carriageway staggering (in conjunction with a stop only)

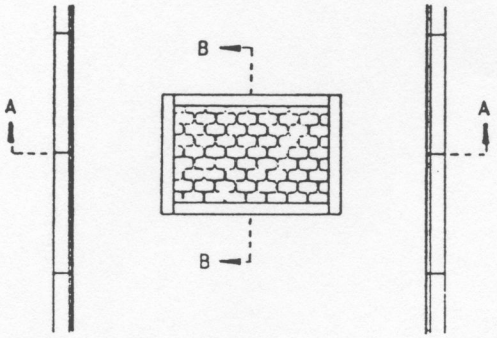
Staggering of the carriageway at a bus stop. The bus enters the stop area, which is about 5 cm lower, on a straight line via a short ramp (about 0.50). This serves the purpose of making the other road users follow the staggering of the carriageway completely and of ensuring that they do not use the bus bay; on the other hand, the higher kerb at the bus bay which ensues from this measure facilitates passenger boarding and alighting. The level difference between carriageway and stop, which is situated right within the stop area, is passed over at a low speed, so that there are hardly any appreciable impairments of public transport.

Measure 17 : Bus Stops Located In Single Lanes.

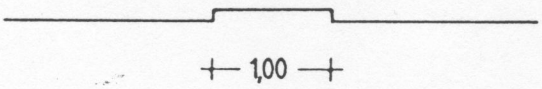
SECTION A-A



floor plan



SECTION B-B

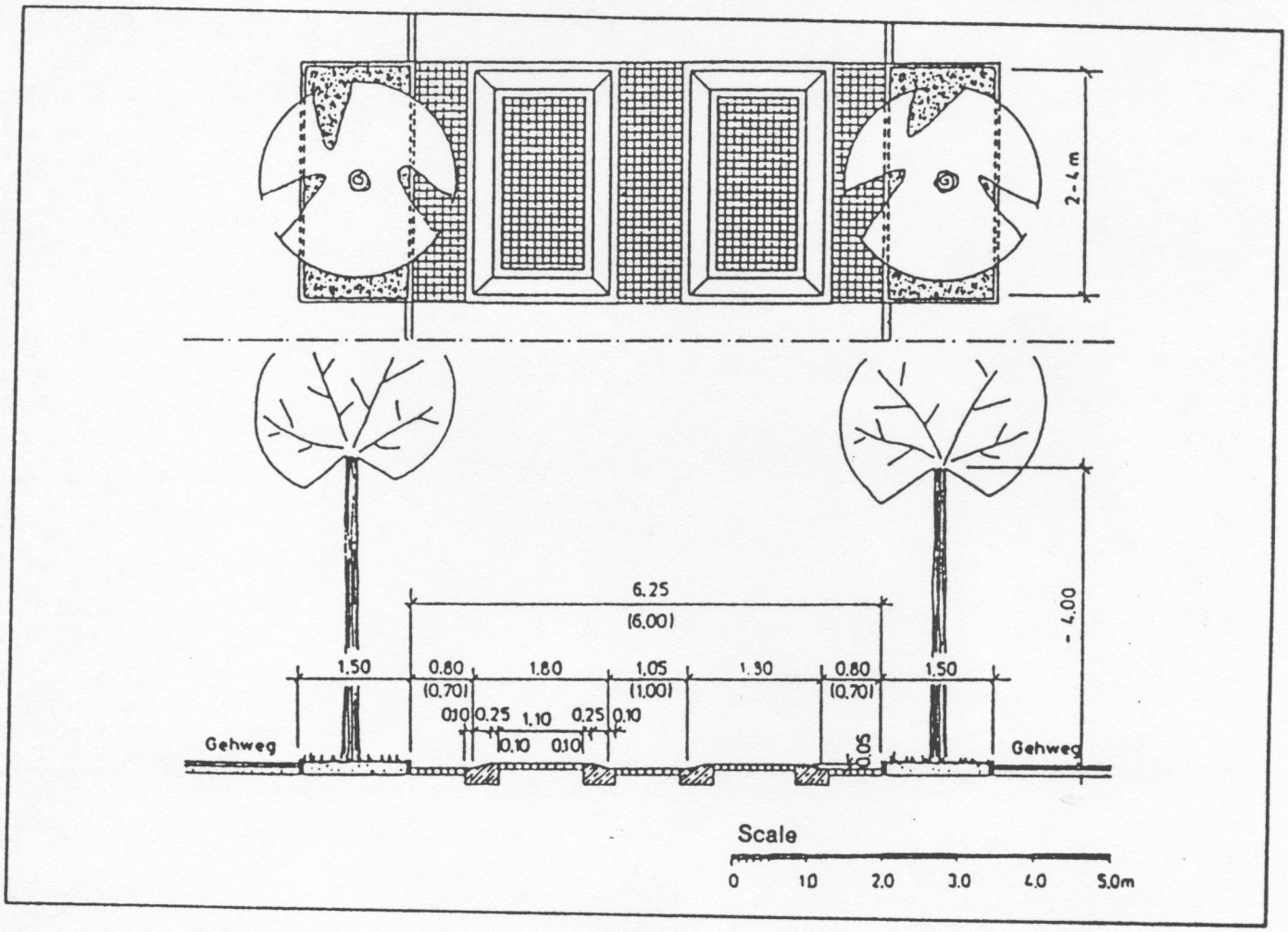


Mode-specifically effective barrier — buses and cyclists can pass

The elements of traffic restraint have been put together according to types of measures, with the typification relating to the carriageway for motorised private transport.

- central reserve
- narrowing of the carriageway
- staggering of the carriageway
- change in horizontal alignment of the carriageway
- raising of the carriageway
- interruption of the carriageway

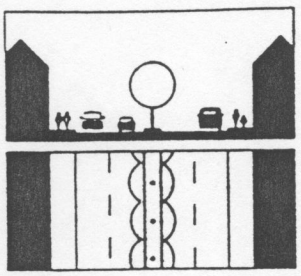
Measure 19 : Mode-Specific Speed Limiters. Buses And Cyclists Can Pass.

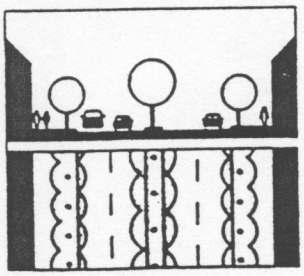


Measure 19 : Mode-Specific Speed Limiters.
Road Humps Designed To Fit Axle Width Of Buses.

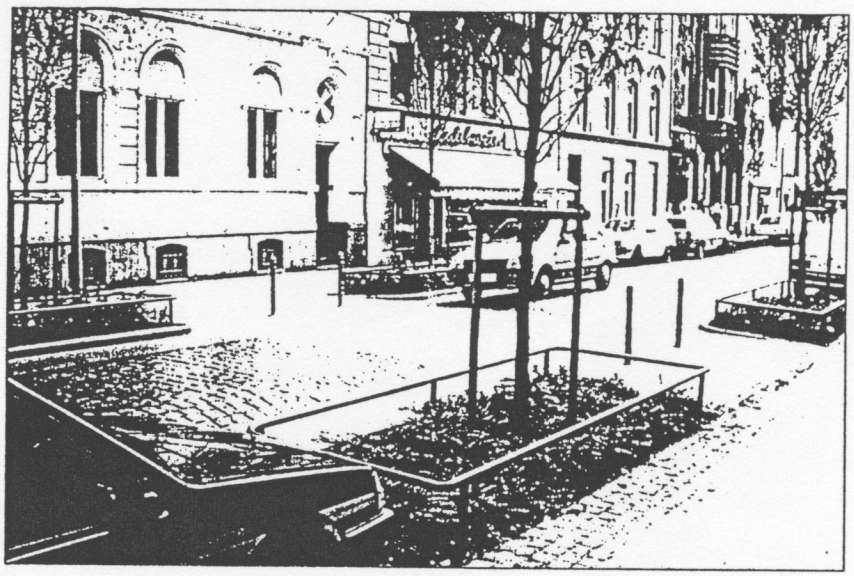
Halcrow Fox

Figure 12b





Example Of Creating A
Reduction In Optical Width



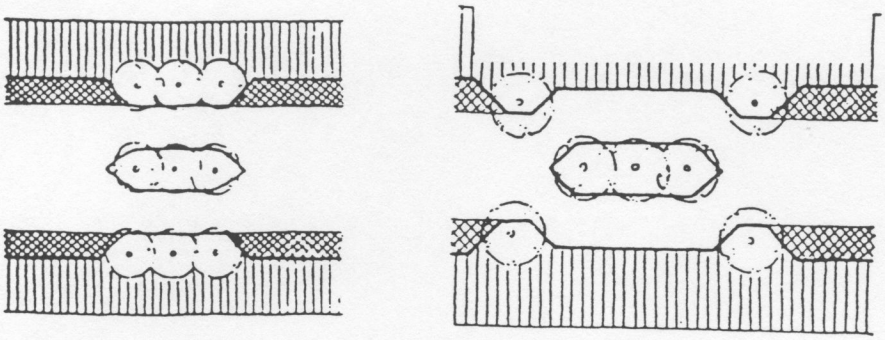
Clearly Defined Crossing Point On A Street With High Traffic Volume.

Shopping Street With Cobbled Central Reservation.

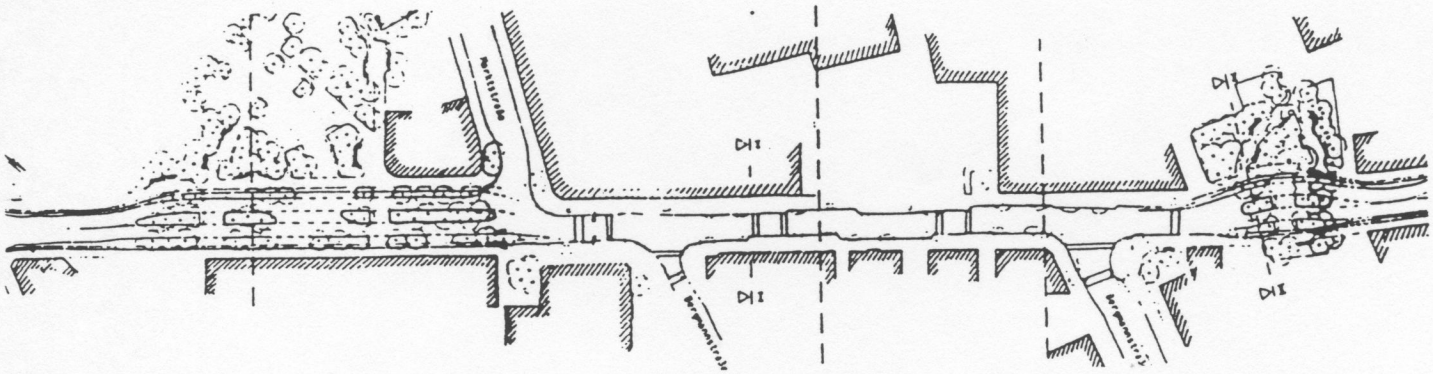
Measure 20 : Examples of Reductions in Optical Width.

Halcrow Fox

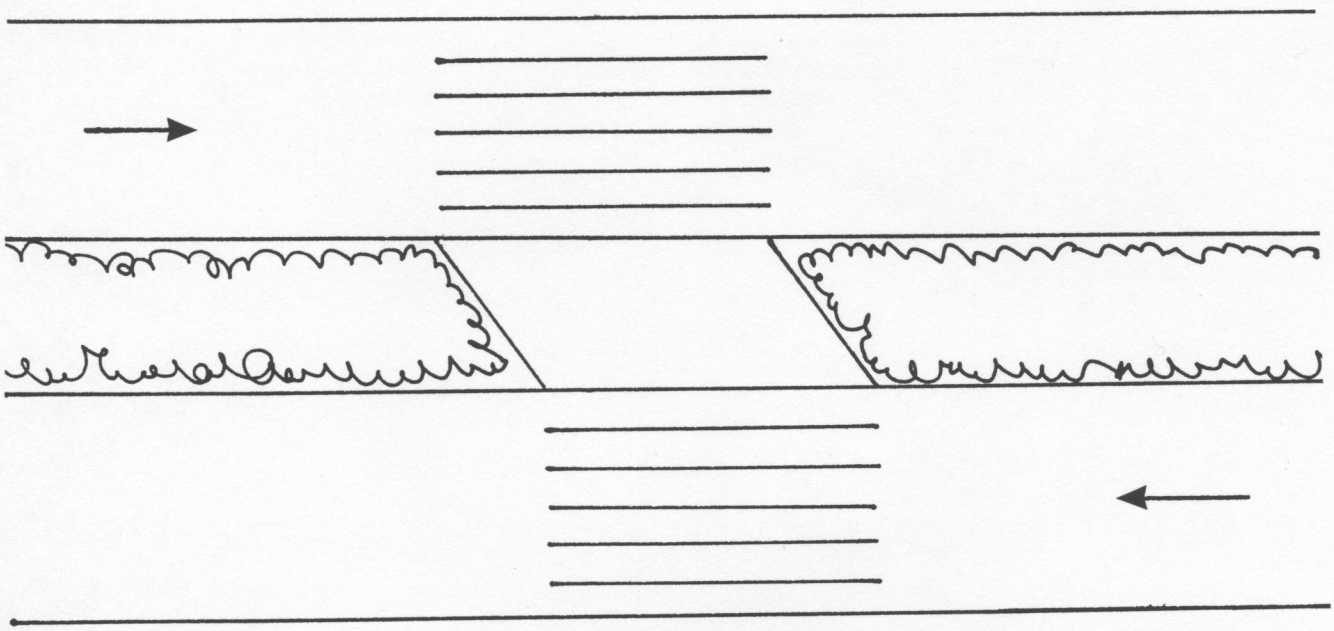
Figure 13



Sections Through A Gateway Effect.

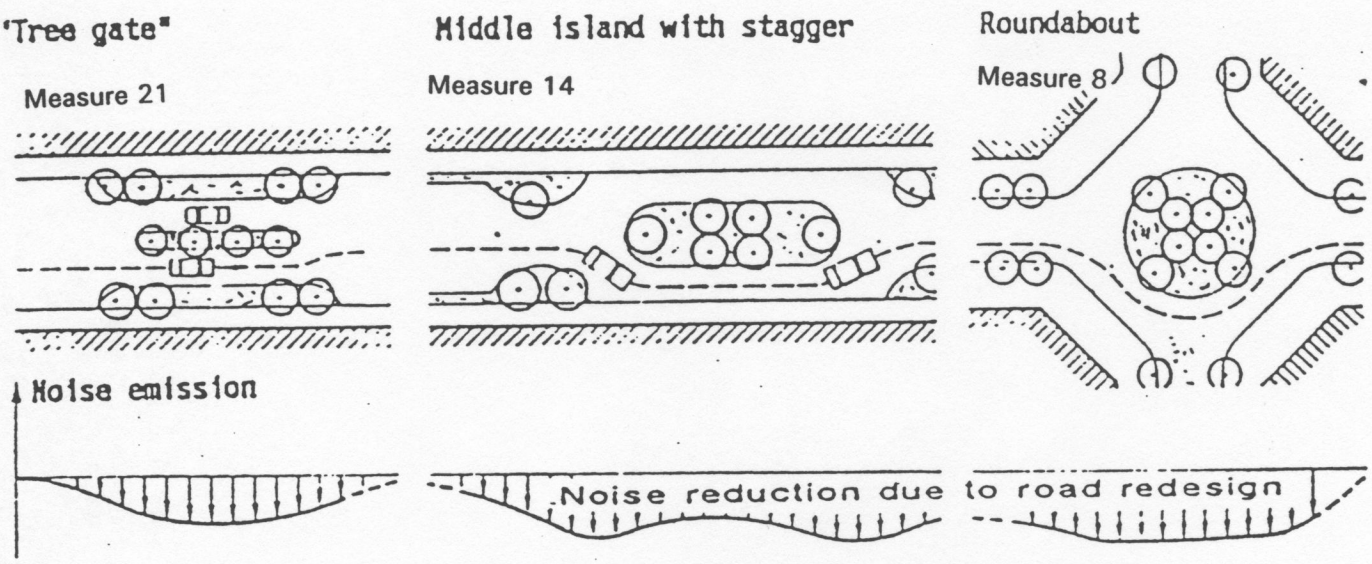


Measure 21 : Examples Of Gateways.



Pedestrians turn towards oncoming traffic, improving awareness and visibility.

Measure 22 : Oblique Centre Reserve Pedestrian Crossing.



Combination Of Measures 21, 14 and 8.
Typical Redesigning Measures To Reduce Speeds, Noise And Air Pollution On Main Thoroughfares.
(Source : Federal Environment Agency, 1988)

Combination Of Narrow Carriageway, Occasional Strips And A Bus Stop Located In A Single Lane

Combination Of Measures 6, 7 and 17 : Multi Purpose Lane And Bus Stop At Traffic Island.

Main Type		Road Class		Desired Speed (km/h)			Annual Day Traffic (ADT)	
		Traffic Road	Local Road	≥60	50	≤40	>3000	≤3000
1	Pre-warnings	x	x	x	x	x	x	x
2	Gates	x	x	x	x	x	x	x
3	2-lane raised areas	x	x		x	x	x	x
4	2-lane humps	x	x		x	x	x	x
5	Staggerings	x	x	x	x	x	x	x
6	Staggerings with raised area	x	x		x	x	x	x
7	2-lane narrowings from road centre	x	x		x	x	x	x
8	2-lane narrowings from roadside	x	x		x	x	x	x
9	Narrowings to 1 lane	(x)	x			x		x
10	Narrowings to 1 lane with raised area	(x)	x			x		x
11	Narrowings to 1 lane with humps	(x)	x			x		x
12	Staggerings with narrowing to 1 lane	(x)	x			x		x
13	Staggerings with narrowing to 1 lane and raised area	(x)	x			x		x
14	Staggerings with narrowing to 1 lane and humps	(x)	x			x		x
(x): To be used only in special cases								

Examples And Uses Of Various Speed Management Measures.