30 km/h zones

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Summary

A 30 km/h zone is also known as a ‘zone 30’ or a 'residential area'. The zone is mostly situated within an urban area and consists of connected access roads with a 30 km/h speed limit. The areas have a residential function where slow traffic and motorized traffic mix. For this reason speeds must be low (30 km/h maximum). For example, infrastructural measures at both road sections and intersections (think of humps, plateaus and road narrowings) can be used to realize such a low speed. In fact, many areas have been given a sober layout, sometimes with a ‘Zone 30’ traffic sign only, sometimes with just speed-reducing measures at 'dangerous' locations such as intersections.

Compared to 50 km/h roads, a well-designed 30 km/h zone has a positive road safety effect. The risk of a fatal crash is very small at a maximum speed of 30 km/h. However, relatively many casualties occur in these zones, about 6% of the total number of road deaths, mainly cyclists and elderly road users. This is presumably due to the fact that motorized traffic often drives (much) faster than the limit. Measures to improve safety in 30 km/h zones and 30 km/h roads will therefore need to focus especially on reducing the speeds driven, for example by giving the zones a suitable and therefore less ‘sober’ layout, by making the 30-limit more credible and, where still necessary, by traffic enforcement.

1 What is a 30 km/h zone?

A 30 km/h zone, also known as a ‘zone 30’ or a ‘residential area’ is generally situated in an urban area and consists of connected access roads with a 30 km/h speed limit. In the Sustainable Safety vision (see also SWOV Fact sheet *Sustainable Road Safety*) 30 km/h zones have a residential function, for example for living or shopping. In addition, there are also isolated 30 km/h roads that provide access to ‘erfs’, urban yards with houses, shops, offices et cetera. Generally, through-traffic is not welcome in 30 km/h zones; car traffic without its origin or destination in that zone must be banned.

According to the Sustainable Safety requirements residential areas must be ‘as large as possible’. The size of a residential area is dependent on the structure and density of a road network which are often determined by the geographical features. In addition, criteria for road safety, quality of life and accessibility determine the size of residential areas. In fact, there are large variations in the size of 30 km/h zones areas.

2 What does a 30 km/h zone look like?

30 km/h zones are used by both slow and motorized traffic. This means that in principle there are no separate facilities for cyclists, and sometimes not for pedestrians either. Through car traffic is kept out by restricting the number of accesses (entrances) to the areas, by applying one-way traffic or by constructing a 'cut' in a formerly main route [1]. Low driving speeds are physically enforced, for example by constructing road humps, plateaus, road narrowings or chicanes [2].

The beginning and the end of a 30 km/h zone must be clearly identified by a gate construction: traffic signs, supported by an entry and exit construction. Within a 30 km/h zone traffic from the right has priority; in principle there are no priority roads or priority intersections. Exceptions to this are the main cycling routes and bus routes: priority crossroads are allowed here. When leaving a 30 km/h zone through the exit construction, priority must be granted to all other traffic.

A01-30-ZB

Beginning of zone with 30 km/h speed limit

A02-30-ZE

End of zone with 30 km/h speed limit

Access road ending in an exit construction (Source: CycloMedia)

Sober design

In the past, many of the 30 km/h zones were given a sober design. Sometimes only a Zone 30 sign was placed, sometimes the speed-reducing measures were limited to 'dangerous' locations e.g. by constructing a plateau or a mini roundabout at an intersection [3]. This sober design was particularly recommended for the implementation of the start-up phase of Sustainable Safety which commenced late 1997 (see also SWOV Fact sheet *Sustainable Road Safety*). Its goal was to realize many 30 km/h zones in a short time at comparatively low cost. This sober design was not intended to be the final situation, but was considered to be a transitional situation to a more complete design. However, in actual fact most of the 30 km/h zones with a sober design still have this sober layout [4].

30 km/h roads

In addition to 30 km/h zones there are also isolated 30 km/h roads. These are situated in both urban and rural areas. Generally, 30 km/h roads are only indicated by a 30 km/h speed limit sign: infrastructural measures to support the speed limit are usually lacking. These roads often have a distributor function in addition to a residential function. In this case a 30 km/h road must be considered a 'grey road'. A 'grey road' can be defined as a road with multiple functions, namely flow and access, whereby (usually spatial) conditions obstruct meeting the functional and operational requirements in full. Therefore, use and design are not entirely compatible (see also SWOV Fact sheet *Principles for safe road design*).

A01-30 Maximum speed 30 km/h

3 Why a 30 km/h limit?

The speed choice for 30 km/h zones is primarily from road safety considerations. A crash is rarely fatal at an impact speed below 30 km/h. This is also the case for crashes between a car and a vulnerable, unprotected cyclist or pedestrian. At an impact speed of 30 km/h more than 95% of the pedestrians survive a crash with a passenger car; at an impact speed of 50 km/h approximately 85% of the pedestrians survive such a crash ([5]; see also SWOV Fact sheet Fact sheet *Speed and speed management*; and *Figure 1*). Therefore, it is relatively safe for slow and motorized traffic to mix at speeds up to 30 km/h. In addition, a 30 km/h limit has a positive effect on the quality of life in these areas: the sound level of the traffic is lower, crossing the street is easier, and emissions are lower.

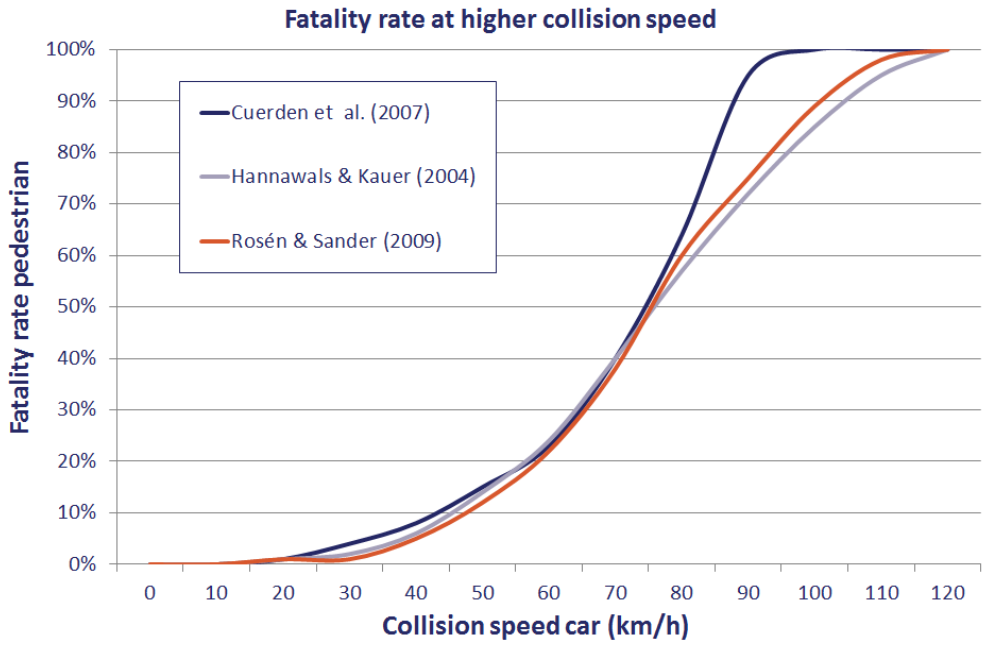


Figure 1. The relationship between impact speed and fatality risk of pedestrians in crashes with a passenger car according to some recent studies (in: Rosén et al., 2011 [5]).

4 What is the number of casualties on 30 km/h roads?

The number of road deaths on 30 km/h roads fluctuates over time (see *Table 1*), but with an average of 32 deaths per year has remained virtually unchanged for the past 10 years [6]. In this period, the proportion of road deaths on 30 km/h roads has risen from less than 5% to over 6%. On other road types progress has been made in reducing the number of road deaths. On 50 km/h roads, for example, the number of casualties has been declining with 6.7% per year and on provincial roads with a limit of 80 km/h or higher the annual decline has been 5.9%. A possible explanation for the failure of a decline on 30 km/h roads is that the number of these roads (the road length) has increased over the last 10 years. This means that in a relative sense these roads have had to process more traffic than roads with a different speed limit. However, recent information on the road lengths per road type is not available; therefore this possible explanation cannot be investigated.

Table 1. The number of road deaths in the Netherlands and the proportion of road deaths of the total number of road deaths on roads with a 30 km/h speed limit (urban and rural, excluding road works) in the period 2007 - 2016. Source: I&W.

	Number of registered road deaths	Proportion of all registered road deaths
2007	35	4.9%
2008	32	4.7%
2009	28	4.3%
2010	31	5.8%
2011	25	4.6%
2012	35	6.2%
2013	41	8.6%
2014	25	5.3%
2015	36	6.8%
2016	33	6.2%

No recent information is available on the number of serious road injuries and the circumstances of the crashes on roads with a 30 km/h speed limit. Presently, these crashes are rarely registered by the police. Up to 2009 the data was more complete. *Table 2* shows that during the period 1998-2009 the police registered about 500 to 600 serious road injuries per year in 30 km/h zones. The proportion of serious road injuries in 30 km/h zones relative to all serious traffic injuries in the Netherlands that were registered by the police in this period has risen to more than 11% in the years 2007-2009. At the same time it can be observed that the increase in the road length of 30 km/h roads in this period (annual average 20%) was much greater than the increase in the number of serious traffic injuries (an average annual increase of 20 %). This means that in the period 1998-2009 the number of casualties on 30 km/h roads developed relatively favourably.

However, we must point out that the numbers presented here are the serious road injuries that haven been registered by the police and that the police are far from recording all traffic crashes with serious road injuries. It is well known that especially cycling crashes in which no motorized traffic is involved are hardly registered; their number is estimated to be less than 10%. At the same time, we know that many serious road injuries occur in these crash types (see also SWOV Fact sheet *Cyclists*). In recent years this concerned over 50% of all serious road injuries [6]. Therefore, the numbers and percentages that are presented here are (substantial) underestimated.

Table 2. Number of police-registered serious road injuries (injury severity MAIS2+), proportion of the total number of police-registered serious road injuries and the development of the road length of 30 km/h roads during the period 1998-2009. Source calculation serious road injuries: SWOV based on I&W and DHD; Source road length: [4]).

	Registered serious road injuries	Proportion of all registered serious road injuries	Development road length 30km/h roads
1998	533	6.2%	
1999	586	6.6%	
2000	527	6.6%	
2001	460	6.5%	+ 225%
2002	522	7.4%	
2003	580	8.4%	
2004	525	8.5%	
2005	557	9.7%	
2006	502	10.1%	
2007	602	11.4%	+73%
2008	605	11.6%	
2009	493	11.1%	

5 Who are the casualties in crashes on 30 km/h roads?

In the years 2014, 2015 and 2016 (N = 94), the elderly are slightly overrepresented among road deaths in crashes on 30 km/h roads compared to 50 km/h roads (N = 385). On 30 km/h roads is about 60% of the road deaths are 60 years or older, and 40% are 75 years or older; on 50 km/h roads about 52% of the road deaths are older than 60 and is 35% are 75 years or older (*Figure 2*). In 2016, 48% of all road deaths were 60 years or older [6].

On 30 km/h roads there are slightly more fatalities among cyclists and pedestrians than on 50 km/h roads. On 30 km/h roads about 47% of the road deaths are cyclists and about 17% are pedestrians; on 50 km/h roads the percentages are 43% and 15% respectively (*Figure 3*). These percentages are 30% and 8% respectively for all road deaths in 2016 [6].

A car is the crash opponent in about one third of the fatal crashes on 30 km/h roads, in over 11% this is a truck or bus and in more than 10% of the cases the crash opponent is a van. These percentages are similar to the percentages for all fatal crashes. A quarter of the fatal crashes are single vehicle crashes; this is the case for more than a third of all fatal crashes [6].

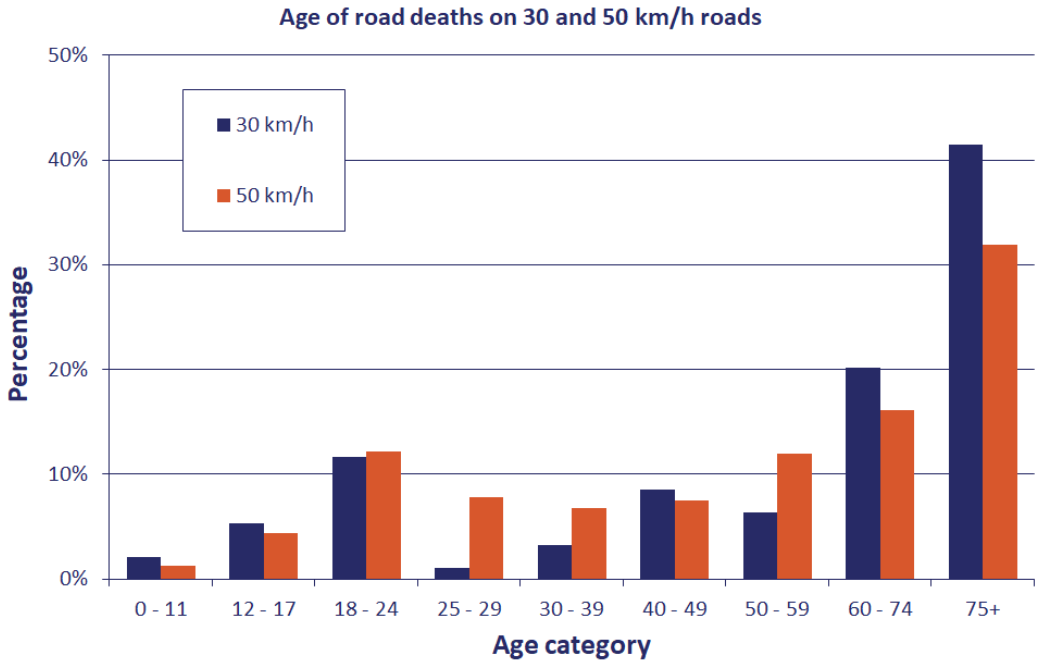


Figure 2. Distribution by age of road deaths (period 2014-2016) on 30 km/h roads (N=94) and 50 km/h roads (N=385), excluding temporary speed limits due to special circumstances (e.g. road works, road closure, other crash or congestion). Source: IenW.

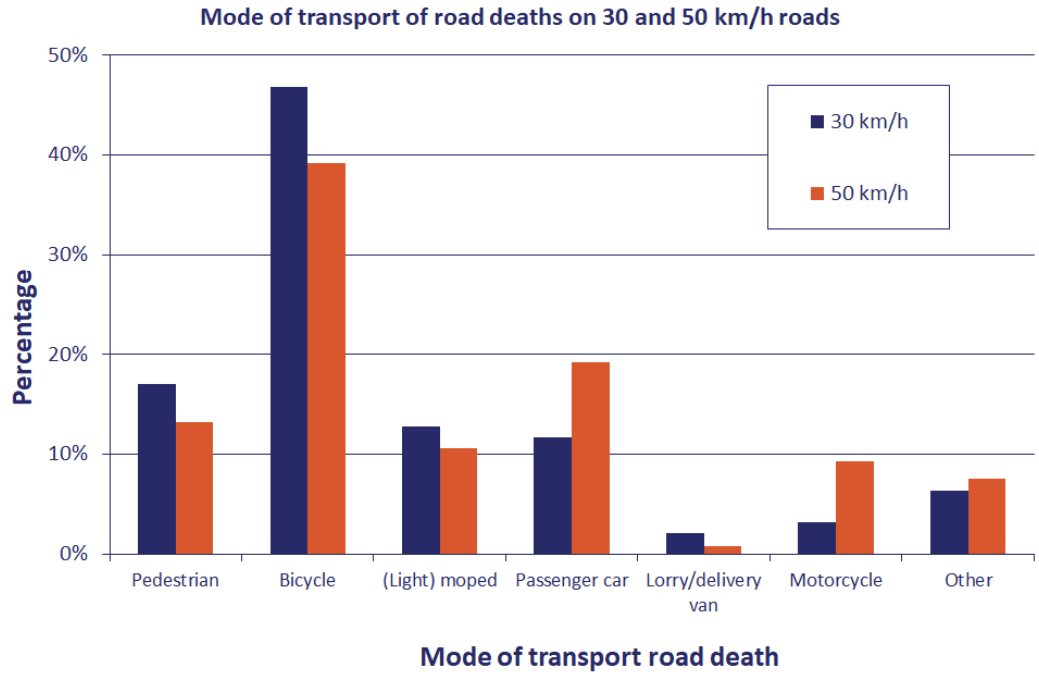


Figure 3. Mode of transport of road deaths (period 2014-2016) on 30 km/h roads (N=94) and 50 km/h roads (N=385), excluding temporary speed limits due to special circumstances (e.g. road works, road closure, other crash or congestion). Source: IenW.

Categorizing the serious road injuries on 30 km/h roads in more detail is not helpful. As stated, the data is dated and especially the crashes not involving motorized vehicles are rarely registered by the police (see also the question *What is the number of casualties on 30 km/h roads?*). Further detail would therefore present a distorted picture.

6 How do crashes in 30 km/h zones occur?

In 2009 SWOV analysed the circumstances of the (police registered) crashes in 30 km/h zones in the period 2005-2007 [7]. It was found that in crashes between pedestrians and motor vehicles 'wrong road crossing' is the most common cause (43%). If the pedestrians are children the percentage is as high as 3%. The most common cause of crashes between cyclists and motor vehicles is 'failing to give way' by either party (54%). In more than 80% of the crashes that were studied the infrastructural design may have played a role [7]. Crashes during special manoeuvres (reversing, parallel parking), or as a result of the sudden opening of the car door, are not strongly related to the road design. This concerns approximately 20% of the crashes on 30 km/h roads.

7 How do people experience safety in 30 km/h zones?

There are no national data on the extent to which people feel safe or unsafe in 30 km/h zones. In a general sense feeling unsafe seems to occur especially when many road users are speeding. In 30 km/h zones feeling unsafe is also the case if there is much motorized traffic [8]. People also appear to feel less safe when:

- different types of road users need to mix;
- there is a large proportion of heavy traffic; and
- traffic situations are unclear [9] [10].

Residents in many residential areas see speed as a problem and they ask the municipality to take measures (see also the question (*How can 30 km/h zones be made (even) safer?*). This suggests that road safety is often not experienced as optimal. Moreover, it must be noted that the relationship between feelings of safety (the subjective safety) and the actual number of crashes (the objective safety) is weak (see the archived SWOV factsheet *Subjective safety in traffic*).

8 Which are the considerations for and against 30 km/h zones?

Compared to 50 km/h roads, a 30 km/h zone has a positive effect on road safety (see also the question *What are the road safety effects of 30 km/h zones?*) and also on the quality of life: the noise level of the traffic is lower, the street can be crossed more easily, exhaust emissions are lower.

A 30 km/h zone has, by definition, a negative effect on the traffic flow, travel time and access for motorized traffic. The travel comfort also is negatively affected by road humps, plateaus, road narrowings and chicanes. The question is how heavily these disadvantages should weigh. After all, a 30 km/h zone is a residential area and by definition not intended to facilitate traffic flow, accessibility and short travel times. But if the area is too large, there is too much traffic on the entry and exit streets of the zone. Van Minnen [11] recommends a maximum size of 200 ha.

Whether an area is designed as a 30 km/h zone and the size of that area is the decision of the road authority. Different aspects must be weighed: wishes regarding traffic flow and accessibility, current traffic volumes, the presence of alternative routes, wishes of local residents, requirements for response times of emergency services, public transport routes (buses), and supplying shops and businesses. Of course the costs also play a role. In 2000, SWOV estimated the cost of measures to give 30 km/h zones a sober layout at 22,000 euro per kilometre [12]; at the 2016 price level this is about 29,350 euro per kilometre[1].

9 What are the effects of 30km/h zones for emergency services and public transport?

By definition the travel times for motorized traffic are longer in a 30 km/h zone than in an area with 50 km/h roads: the speeds driven are lower. The larger a 30 km/h zone, the longer the response times of the emergency services (ambulance, fire, police). In a 30 km/h zone of 25 hectares an auxiliary vehicle requires 11 seconds extra response time, in an area of 200 hectares, this extra response time increases to 31 seconds; both in comparison with a 50 km/h area of equal size [13].

In principle buses do not belong in a 30 km/h zone, but for pragmatic reasons a bus route is often present in the larger areas. For a bus the extra driving time in a 30 km/h zone of 70 hectares is about 1 minute [13].

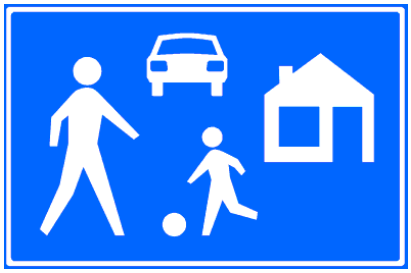
In addition to extra travel time driving comfort also plays a role. Especially road humps and plateaus, but also road narrowings and chicanes make it less comfortable for occupants of motorized vehicles. For ambulance personnel and patients and for bus passengers this can be a disadvantage [14].

1 http://visualisatie.cbs.nl/nl-NL/Visualisation/PrijzenToenEnNu

10 What is the difference between a 30km/h zone and a woonerf?

A 30 km/h zone is a residential area for living, working and shopping. It has a 30 km/h speed limit which discourages motorized traffic. In the Netherlands these areas have existed since 1984. Woonerfs have been present in the Netherlands since 1976 under the woonerf scheme. In addition there were informal farmyards and shopping precincts. In 1989, these different kinds of yards were all called 'erfs' and all placed under the 'erfs regulation'.

A woonerf also has a residential function. It is only accessible for traffic that has the erf as its origin or destination. Beginning and end of a woonerf are indicated by the following signs:



G05 Woonerf

G06 End of woonerf

The speed limit in a woonerf is 15 km/h (originally referred to as walking pace). Speed-reducing facilities must be used to enforce this speed; this means that a sober layout is not allowed. In a woonerf pedestrians may use the entire width of the street to walk and play; there are no pedestrian facilities such as a sidewalk or footpath. Parking is only allowed in special parking spaces (marked with a P in the road surface). Like 30 km/h zones, a woonerf also has no bicycle facilities and any intersections that may be present are intersections without any designated priorities.

11 How many 30km/h zones are there in the Netherlands?

No recent data is available on the number of 30 km/h zones in the Netherlands, nor on the number of 30 km/h roads or the total road length.

The Start-up Programme Sustainable Safety has been a great stimulus for the realization of 30km/h zones [4]. In 1998, when the Start-up Programme commenced, approximately 15% of the total urban road length had the 30 km/h zone layout. When the Start-up Programme (1998-2002) was concluded this percentage had increased from 45% early in 2003 to about 70% in 2008. The

layout of the new 30km/h zones often is very sober with only a Zone 30 sign or speed reducing measures at 'dangerous' locations.

12 What are the road safety effects of 30 km/h zones?

Reducing the speed limit in a 50 km/h area to 30 km/h results in considerable safety gains. The greater the decrease in actual driving speed, the greater the safety impact.

Many of the effect studies date back to the last century, when 30 km/h zones were introduced on somewhat larger scale. In the Netherlands Vis & Kaal [15] analysed 150 30 km/h zones without through traffic and with sufficient speed-reduction measures. They saw an average decrease in the number of injury crashes of 22%. However, there were large differences in effect between zones. These were mainly related with differences in zone size, degree of urbanization, nature of the chosen speed-reduction measures and the changes in traffic volume that were realized. Weijermars & Van Schagen [4] estimated that in the ten years between 1998 and 2008 the construction of 30 km/h zones saved a total of 51 to 77 road deaths.

Other countries than the Netherlands also report positive experiences with the introduction of 30 km/h zones, even though the reported effects differ. A meta-analysis of the results of 15 studies from the 1970s and 1980s by mainly Scandinavia, but also by Great Britain and Australia, showed a reduction in the number of injury crashes of 24% [16]. A more recent before-and-after study of the effects of 78 30 km/h (20mph) zones in and around London, Great Britain [17] showed a reduction of 42% in injury crashes and a reduction of 53% crashes with fatalities or serious road injuries. A Swiss before-and-after study [18] reports an average decline in crashes of almost 15% and an average decrease in casualties of 27.5% after the introduction of 30 km/h zones at 21 locations in different parts of Switzerland.

13 Should 30km/h be made the standard within urban areas?

At present, 50 km/h is the starting point for the standard speed on roads in urban areas. Some organizations have recently advocated making 30 km/h the norm here (e.g. the Dutch Cycling Association [11] and the Dutch Traffic Safety Association (VVN) [19]). With a solid introduction, this can result in important safety gains and improve quality of life (see also the question *What are the road safety effects of 30 km/h zones?*). However, this 'solid introduction' has a number of conditions attached:

- The safety gains will only be achieved if the speeds driven can really be no faster than 30 km/h and this requires a good layout (see also the question *What does a 30 km/h zone look like?*). If the standard speed in urban areas is set at 30 km/h, the design requirements that now apply for 30 km/h zones will then apply in all urban areas.
- Ensuring a good traffic flow within a city will also require corridors where speeds of 50 or 70 km/h can be driven. Point of interest here is the size of the areas where 30 km/h is the (standard) limit. If these areas are large, the surrounding 50 or 70 km/h roads will need to process many motor vehicles per hour. This reduces the quality of life on those roads and will hamper crossing those roads by pedestrians and cyclists in particular. For cyclists and pedestrians, the 50 and 70 km/h roads must at least be constructed with separated infrastructure, i.e.: bike paths and sidewalks must be separated from the roadway.

14 What are the actual speeds driven on 30km/h roads?

Most of the drivers exceed the limit on 30 km/h roads. Often this is done at speeds more than 10 km/h too fast. However, there are big differences between locations. This is shown by occasional speed measurements at specific locations. On a national scale there is no representative data of the driving speeds on 30 km/h roads.

The occasional measurements are generally carried out in the framework of an investigation into the effects of speed measures. The pre-measurements of these studies give an indication of the speed driven on road sections without physical speed inhibitors such as road humps or road narrowings. For example, measurements in ten 30 km/h locations in the Province of Zuid Holland in 2010 [20] found that the average driving speed was 36 km/h. On average, about 70% of drivers violated the limit. About half of them violated with more than 10 km/h. On some of these roads was the share of offences was below 30%, on others the share was as large as nearly 95%.

In 2012, similar results were found by measurements on more than twenty 30 km/h locations in Limburg [21]. Per hour the average speeds ranged from 33 to 40 km/h, and per hour the percentage of drivers who exceeded the limit by more than 10 km/h ranged from 34 to 40%.

In 2017, more recent measurements were made at ten 30km/h locations in the Province of Zuid-Holland [22]. These measurements found average speeds driven ranging from 25 to 37 km/h. The share of vehicles that exceeded the limit ranged from 26 to 85%.

15 How can 30 km/h zones be made (even) safer?

At a maximum speed of 30 km/h the risk of a fatal crash is very small and it would therefore be possible to mix motor vehicles and slow traffic safely (see also the question *Why a 30 km/hr limit?*). However, every year there are about 30 road deaths in 30 km/h zones and, according to the police registration, 500 to 600 serious road injuries[2] (see also the question *What is the number of casualties on 30 km/h roads?*). A logical explanation is that motorized traffic often drives (significantly) faster than the limit on 30 km/h roads (see the question *What are the actual speeds driven on 30 km/h roads?*). Measures to make 30 km/h zones (even) safer, will therefore need to focus especially on reducing the driving speed. Research [23] has shown that on roads in urban areas a speed reduction of about 10% will lead to (approximate and on average) 20% fewer serious road injuries and 30% fewer road deaths per year (see also SWOV Fact sheet *Speed and speed management*). Furthermore, some more general infrastructural measures can be taken, in the first place aimed at predictability, crossing facilities and priority situations.

The following is an overview of (speed) measures that can make 30 km/h zones (even) safer.

Physical speed reduction measures and a credible speed limit

Many of the 30 km/h zones and roads have a 'sober' (not optimally safe) layout and have insufficient physical speed inhibitors (humps, chicanes, road narrowings, plateaus). Especially on the straight road stretches these are often missing. More of such speed inhibitors contribute to reduction of the driving speed. Also making the 30 km/h limit more credible can make a contribution, e.g. narrowing of roads, offering one lane for both directions, avoiding long straight road stretches and the use of brick pavement instead of asphalt. SWOV has previously calculated that if all 30 km/h roads would have a credible limit, this would annually prevent about 200 serious road injuries, especially among cyclists [7].

Police enforcement

Police enforcement is also a proven method to combat speeding (see SWOV Fact sheet *Speed and speed management*). For an optimum effect, the subjective probability of apprehension must be sufficiently large, for example by making controls visible, regular repeats, and accompanying enforcement with (neighbourhood) targeted communication and information (see also SWOV Fact sheet *Traffic enforcement*). The police however, indicate not being very much inclined to enforce speeds in 30 km/hour zones with a sober layout[3].

2 In fact, this number is significantly higher, because bicycle crashes not involving motorized vehicles are hardly registered by the police. It is estimated that more than 50% of all serious road injuries in the Netherlands were involved in precisely this type of crash [6].

3. https://demonitor.kro-ncrv.nl/artikelen/politie-geeft-toe-nauwelijks-te-handhaven-in-30-kmu-zones

(Area-restricted) ISA

A very effective speed measure is the Intelligent Speed Assistant (ISA) that makes physically impossible for a vehicle to exceed the limit of 30 km/h (see the archived SWOV Fact sheet *Intelligent Speed Assistance (ISA)*). This can be a general ISA or an ISA which functions in 30 km/h zones only. The basic technique is there, but there are still various (political, social and legal) barriers which stand in the way of large-scale implementation in the short term [24].

Neighbourhood approach

Often it proves to be the local residents who see a problem in the (very) high speeds in their neighbourhood and ask for measures to be taken. To meet this request, the Dutch Traffic Safety Association (VVN) has developed a method for a neighbourhood approach with the Neighbourhood Label Safe Traffic: https://vvn.nl/wat-we-doen/met-bewonersgroepen/buurtlabel-veilig-verkeer. In 2016, more than 670 neighbourhood activities were carried out and more than 80 working groups were active [25]. The types of activities varied greatly, for example sticking of 30 km/h stickers on dirt containers, a stopping distance demonstration, or asking children to design traffic signs. The effect of such actions is not yet known.

Predictability, crossing facilities and priority intersections

To prevent crashes caused by children crossing incorrectly (see the question *How do crashes in 30 km/h zones occur?*), Berends & Stipdonk [7] advise making major walking/play routes of children more noticeable: no parked cars or bushes near these routes. If there are many parked cars, sufficient crossing facilities must be present. To prevent bicycle crashes due to priority errors, Berends & Stipdonk advise improving safety at priority intersections, including separate priority cycle paths, or to replace them with intersections without any designated priorities.

Publications and sources

Below you will find the list of references that are used in this fact sheet; all sources can be consulted or retrieved. Via Publications you can find more literature on the subject of road safety.

[1]. CROW (2012). *ASVV Aanbevelingen voor stedelijke verkeersvoorzieningen*. CROW, Ede.

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