



GUIDE OF
**PUBLIC
SPACES
AND FRIENDLY
MOBILITY**

GUIDE FOR PUBLIC SPACES AND FRIENDLY MOBILITY



DEPUTACIÓN
PONTEVEDRA



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One of the aims of the provincial government has been to develop a sustainable mobility model to give priority to pedestrian safety and mobility on every road.

We wish that our cities, towns and villages turn into secure places, by implementing traffic calming measures, with public spaces and squares to be enjoyed by the people. We have worked hard to achieve a clear goal: to build proper towns and cities for the people, where pedestrians and vehicles could establish a new relationship, that is to say, “friendly” towns and cities.

Thus, the mobility policy of the provincial government comprises two main lines: planning and investment. Planning in the drafting and implementation of mobility plans and investments in road design features to improve habitability, safety and accessibility.

With this goal in mind, we have planned and invested in mobility actions all around the province through the Plan of Safe Mobility and Speed (MOVESE), have defined the catalogue of actions in provincial roads and have approved the ordinance for road safety.

We have adapted to new environments, by designing the model Strategy of Mobility 3.0, created with the aim of improving and maintaining the roads and establish collaboration programmes with the town councils of the province. We have also implemented a Plan to remodel and improve safety on roads (Depo-Remse), and have developed municipal mobility plans to promote safe routes to school, based on our commitment to build a province for the people.

To sum up, this government, and all our actions, are aimed at improving mobility in our province. Our priority shall be to regain the public space for the people.

This is a model that will be transferred to institutions, groups of people and professionals as part of the *Basic Guide for Public Spaces and Friendly Mobility*, to be used in their urban planning, a document that is already being used as a model and as an example in Spain.

Carmela Silva Rego
President of the Provincial Council of Pontevedra

Building public spaces as well as designing roads and meeting places for the people are a challenge for every government and technician aimed at improving the quality of life of the people. The *Guide for Public Spaces and Friendly Mobility* is a valuable tool for those who want to implement friendly mobility programmes, but do not know how.

This document includes the guidelines that need to be followed to design and rebuild public spaces that give priority to the people. However, we must be thorough and determined to achieve that aim.

Following the guidelines of the *Ordinance for Road Safety of the Provincial Council of Pontevedra* (2013), which has been latent for a long time in spite of its great vision of future, the new Department of Mobility issued a decalogue of criteria to develop actions in the provincial roads. However, it was necessary to set the lines of action and explore other aspects. Thus, we decided to draft a mobility guide, guided by Fernando Nebot, as part of a collaborative project of the Provincial Council of Pontevedra and the Town Council of Pontevedra.

However, that was not an easy task. In Spain, the last theoretical works on this subject were issued in 1997 by the Ministry of Public Infrastructures. Namely, they were *Calmar el tráfico. Pasos para una nueva cultura de la movilidad urbana*, by Alfonso Sanz, and *Recomendaciones para el proyecto y diseño del viario urbano*, by Juan Santamera and Felipe Manchón. Then, there was also a large number of references on space design published in Australia, New Zealand, USA, Canada, Mexico, South America or Japan.

It was necessary to collect and update new approaches to achieve our goals, but the result, this guide, constitutes the most updated, comprehensive and systematic document existing today. It is not only a compendium of all current theories, from the oldest to the newest, but it also contains practical experiences carried out in the province of Pontevedra. I am sure that it will serve as a practical guide for all administrations and will highlight the work carried out by the Provincial Council of Pontevedra as a promoter of friendly and safe mobility in the province and throughout Spain.

César Mosquera

Vice-president of the Provincial Council of Pontevedra

Our main aim is to achieve a sustainable, safe and inclusive mobility betting on a new change of direction, where people shall be the priority, instead of vehicles; to reduce the number of accidents by taking traffic calming measures; to preserve our heritage and landscape; to regain public spaces for pedestrians; and to support the town councils through feasible actions aimed at improving the places where citizens live. This work was developed by the Mobility Department of the Provincial Council of Pontevedra.

Our main role is to develop actions within our road network and design sustainable projects, building spaces where people and cars can coexist. In the last years, many actions have been carried out, all of them following the same criteria and approaches. We have gained experience on the tools and models to be followed to create friendly and suitable spaces to live in. There have also been many debate and technical matters to be solved, in specific situations, in different places and for diverse aims.

All our experience in our day-to-day work was included in this guide of mobility, in which the city becomes a meeting place for building collective life. It includes information on the integration of pedestrians in the urban and rural life, with recommendations on road and public space design to promote friendly mobility, road safety and urban quality. In addition, it provides the technical characteristics of speed humps and speed bumps, among other devices.

We think that these feasible recommendations on road design, with plenty of work behind, can be implemented not only by us in the province of Pontevedra, but also by any authority or technician of any public body. We invite them to use this guide and go a step further, to create public spaces for the people.

Uxío Benítez
Representative for Mobility

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1. FOREWORD AND INTRODUCTION

By decision of the Provincial Council of Pontevedra of August 2, 2017, the company VIATOBEN, LTD was awarded the development of the present work.

It was drafted by the Civil Engineer Fernando Nebot Beltrán, who is ultimate responsible for its contents.

However, this work would have not be possible without the active collaboration, comments and suggestions, critical remarks and solutions, provision of documentation and experiences, etc. exchanged at follow-up meetings attended and participated by:

- César Mosquera, Vice-president of the Provincial Council of Pontevedra
- Uxío Benítez, Representative for Mobility
- Daniel Romay Díaz, Civil Engineer, Director of the Mobility Department
- Francisco Alonso Fernández, Civil Engineer, Head of the Mobility Department
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- Jaime David Ruibal de Sola, Civil Engineer, Mobility Department
- Noemí Romero Nieto, Civil Engineer, Mobility Department
- Jesús Gómez Viñas, Civil Engineer, Chief Engineer of the Technical Office of Environment, Infrastructure, Engineering and Services (OTMAIES) of the Town Council of Pontevedra
- Jesús Fole de Navia Osorio, Architect, Advisor of the Mobility Department of the Provincial Council of Pontevedra

Thank you to them all.

December 2017

2. THE CITY AS A MEETING PLACE TO BUILD COLLECTIVE LIFE. THE STREET AS A MULTIFUNCTIONAL SPACE

The city, considered the place where people live, is home to a large number of activities. Moreover, it is where many trade exchanges take place, as well as many productive activities, both industrial and commercial; and, above all, it is where people live, where houses and other facilities are built, and where roads, leisure or green areas, which are also part of the urban space, can be found.

In a region like Galicia, it is not only the city that matters but also the town, the village, or the parish. Moreover, the roads are built as an urban continuum (in general, this is the case of most roads, but especially the provincial or local ones), which extends along many kilometres. Here, the roads pass through many villages and towns, with residential areas, schools, different types of facilities, pubs or industrial buildings... This is a symbiosis between the rural and urban world, where roads become streets, and streets become roads. However, people's everyday lives take place in these streets and roads, thus becoming one of the most important public spaces.

Not surprisingly, the city's space has been used for different purposes, and many diverse functions and activities have been carried out in relatively small urban areas.

However, there have been many policies and approaches that provided (and still provide) a functional definition of human needs and define human life as a caricature. Life is much more than inhabiting, working, driving...

According to this functional definition of human needs (and once urban functions are simplified with the aim to give a solution to these fragmented functional needs), it can be concluded that urban chaos is the consequence of a combination of these functions. Thus, to avoid this supposed chaos a solution is to separate each of the spaces where these activities take place.

In line with this approach, there should be separate zones for working, living in, shopping, learning and entertaining. In addition, cars are driven fastly all around these places, the faster the better, because in essence there is not city between these zones. The street, which is the most "urban" element, considered the living room of the city, is a nuisance.

The street no longer exists with the simplistic approach and the concept of single-functional zones.

Given the fact that building cities is easier than building urban life, with the functional separation of city zones the complexity of life is destroyed, and so is its richness. In this way, it will be easier to tackle the easier problems and needs than the more complex ones, although citizens do not really have the easier ones.

Nevertheless, the city has to be considered "the meeting place to build collective life"¹.

The right to enjoy a city "is the right that any individual has to build cities to be able to meet human needs. The right to enjoy a city is not simply the right to enjoy what it already is in the city, but the right to turn the city into something really different".

¹ *Le droit à la ville*. Henri Lefebvre

The idea is to rethink the city from the people's perspective and consider its citizens as the protagonists of a city that the citizens themselves have built.

It is therefore necessary to pursue the right to the city, not to the old city, but to enjoy urban life, to a renovated city centre, to meeting places, to changes, to the rhythms of life and to the use of the time that will allow us to fully enjoy these moments and places.



In a certain sense, it is all about the "right of appropriation" (very different from the right of property) of the city, of its spaces, of its streets. Appropriation of time, space, expectations, initiatives, desire...

Urban public spaces, streets and squares, are, on the one hand, a basic public service, which has to be at the same level as education or health, and, on the other hand, are a fundamental right of the people who live or stay in the city².

As it was already stated in 1999 in Pontevedra, "the city or the town must be the place par excellence for socialising and social cohesion. All urban public spaces must be in good condition to be used by citizens for diverse activities, regardless of their abilities, age or socio-economic status"³.

² *Un novo paradigma dos espazos públicos urbanos*

³ *Pontevedra: Outra mobilidade, outra cidade. A experiencia de transformación 1999-2015*. Town Council of Pontevedra

“The structure of the city should be an invitation and a way to promote public life, not only through its institutions, but directly and symbolically through its public spaces. Its public spaces, its public environment (...) must be open to all members of the community”⁴.



“Then, if we stop to think for a while, we might be able to understand all these ‘innovative’ initiatives as a way to reinterpret the traditional concept of public space: as a meeting place, as a place to be regained by its citizens. Although this use of the street is becoming less common, it is still enjoyed in some small places, where people sit on their own chairs around a table to enjoy ‘the fresh air’”⁵.

There are plenty of activities that can be enjoyed in the public and collective space. Some of them can be considered fundamental and everyday activities, such as going to work, to school or to the market. As regards other types of activities, the most important thing is that one can decide whether or when, or not, to enjoy them: walking, enjoying the fresh air, strolling about, sitting and sunbathing... There are other optional interactive and social activities, such as children playing, people greeting and speaking to each other, activities in groups, observing and listening to what is going on, and many more that take place when people get together.

It is fundamental to make public places suitable for all these activities and for many more. Of course, we must pay attention to design and the common space must be attractive so that these activities can be performed and become widespread.



(Photographs. *Qualité du séjour dans l'espace public*. Samuel Flükiger, Jenny Leuba. 2015)

As we can see, only a few of these actions have to do with mobility.



⁴ *Toward an Urban Design Manifesto*. Allan Jacobs and Donald Appleyard

⁵ *Blog La ciudad viva*. Andrea Robles, 2015

2.1 The need for transport versus the option to move

The need for transport is related to the distance among goods, services, workplaces or residential areas. It can be addressed, at least in theory, by applying two types of policies: by offering indefinitely new and expensive means of transport without reducing the distance in the space between the different land uses, or, on the contrary, by reducing, as far as possible, the distances and the functional specialisation of space rather than increasing the transport supply.

The main feature of the first type of policy is that it tends to gradually increase the people's radius of action (which can be covered on foot) and, in particular, of certain social groups. In addition, this very fact, apart from other causes moving in the same direction, increases the distance between residential areas and workplaces and services, as a feedback process. This innate distribution of space leads to an increasing concentration.

The main characteristic of the second type of policy is that it is aimed at finding as many services and goods as possible within the radius of action of each person or family, with their homes as a point of reference. They need to find most of what they need to live within their own radius of action. Thus, it is necessary that the services and workplaces that generate mobility are distributed in a more homogenous and uniform way, depending on the specific circumstances of each case, in the least concentrated way and with the least functional specialisation of the space.

As can be seen, there is a close relationship between transport and land uses. Therefore, the needs should be addressed both by carrying out measures on mobility and distributing land uses in space, that is to say, by focusing on the concept of the city and on its accessibility.

In many urban centers in Galicia and in many town and city districts, and even in large areas (as is the case of the province of Pontevedra) the aforementioned multi-functionalism has been preserved. However, in other cases, the cities have specialised their functions in separate spaces, distant from each other. In fact, the most usual thing is to observe a progressive functional specialization of space, with dormitory towns, industrial zones, shopping centers, healthcare towns, sport towns, each of these areas with a single use. Thus, people need to move to these areas in order to satisfy their needs. Obviously, this specialisation and separation of land uses would not have been as simple and, ultimately, would not have been possible without the means of transport and the widespread use of automobiles, since the increasing distances between the different land uses cannot be covered on foot.

There is a need to use motor vehicles to cover the increasing distances between the different land uses, both in the region and within the city itself. As a result, the streets have turned into places of passage, instead of places for meeting, walking, chatting or shopping.

Therefore, there has been a progressive **loss of the multi-functionality of the streets**, that is to say, the street areas have been specialised. Roadways have been widened, sidewalks have been narrowed, and priority has been given to automobiles. Thus, pedestrians, who cannot walk freely on foot or use any other means of transport except the private vehicle, have been excluded.

In addition, there are some other cultural conceptions, which are generally assumed by most citizens (by those either using motor and non-motor vehicles), that the progress and well-being of citizens are associated to private vehicle use, and that the disturbances these vehicles may cause to pedestrians or cyclists are not really important and must be accepted.

Therefore, as a general rule, it seems necessary to find a balance among the different land uses so as to reduce the need of means of transport and to shorten distances between the different land uses that today need to be covered with motor vehicles.

Regardless of this, it is possible to **recover** the **multi-functionality** that the street used to have and change our priorities without excluding anyone. Actions do not have to be identical for all streets and areas, but the current priorities need to be changed.

For the materialisation of the ideas included in the present document, which may be regarded as a new approach to road infrastructure, it will be necessary to take new design measures when planning the elements that will constitute the essential structure of the pedestrian and cyclist routes.

Special attention will be given to the techniques and procedures aimed at promoting the coexistence of different means of transport in the urban space.

Some of the aspects of the proposals and recommendations of this document could be included in regulations and by-laws; in other cases, it will be sufficient to implement and develop the existing regulations.

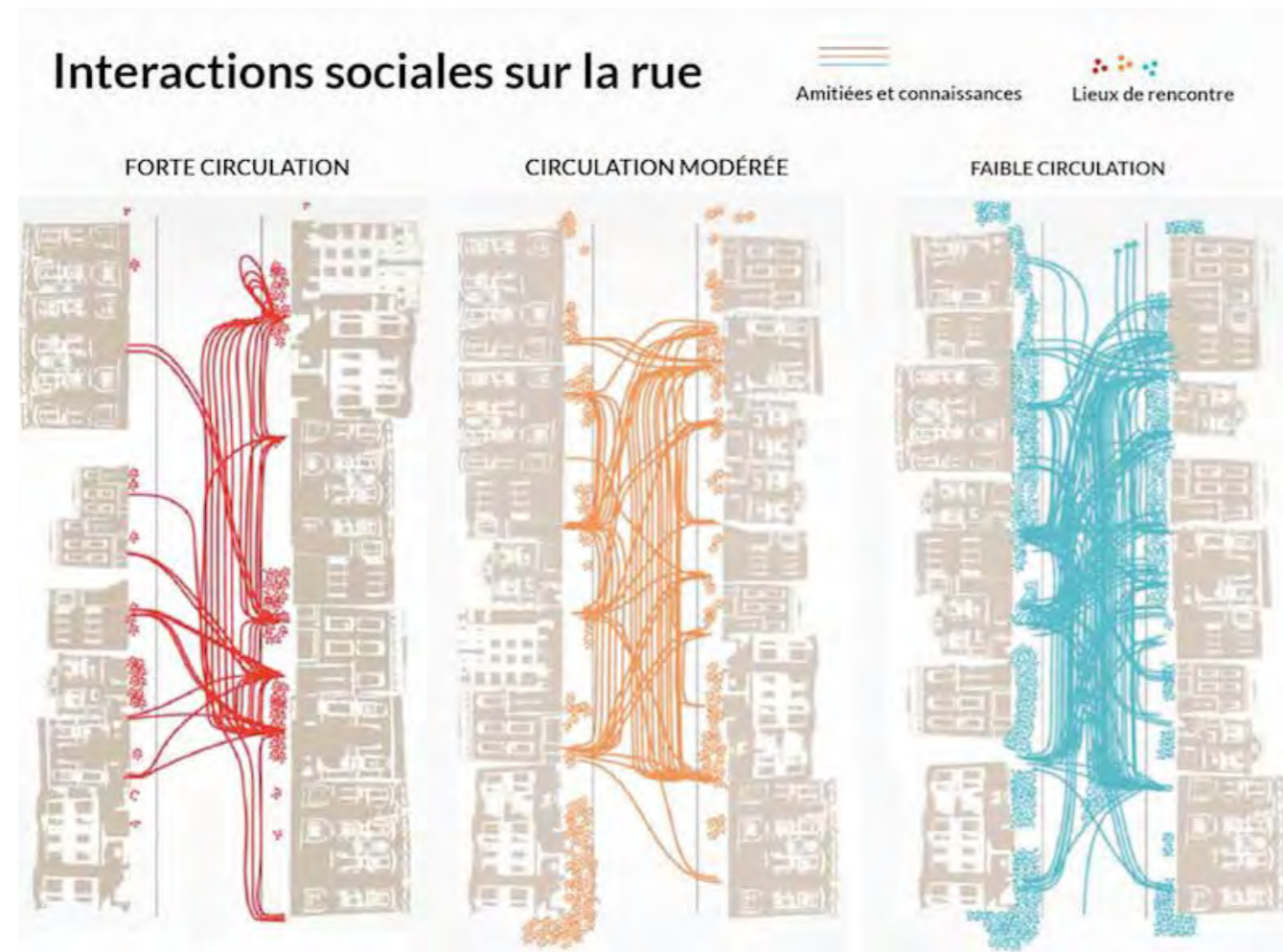
Where appropriate, the improvements resulting from the implementation of the previous recommendations aimed at people living and walking around the city should be accompanied by increasing the environmental quality of the urban space. These improvements should be a consequence of the implementation of the recommendations drawn up here and, on the other hand, of the implementation of the standards that will help to mitigate the negative collateral impacts of motor vehicles.

At least, these standards should focus on three key aspects: noise reduction, reduction of air pollution and enhancement of landscape quality, and mitigation of the visual impact on urban environment.

Finally, one must be aware that if we do not succeed in conveying the essential message to the citizens, which seeks to express clearly the rights of both citizens and pedestrians, these measures would not be effective and lasting.

2.2 The street as a place for staying and meeting

Besides being a means of communication, **the street needs to serve again as a place** where pedestrians can stay and meet.



Although this conception is often ignored, the street is primarily a public space. The figure clearly shows that the residents of a street with a low level of motor vehicle traffic (image on the right) interacted more with their neighbours than the residents living in a street with higher traffic (image on the left). In the first case, social interactions and public life were strengthened, and the street was regained by the citizens living in this street, and, especially, by the most vulnerable population (mostly children and the elderly)⁶. The increasing motor traffic has created a barrier effect.

There is a clear incompatibility between a certain degree of mobility and the concept of humanised space and city. Undoubtedly, they cannot coexist.

In the rural and peri-urban areas of Galicia, people walk along the country lanes or the main roads of towns and villages to commute between their residences, facilities, adjacent properties... However, sometimes they walk along roads for motor traffic. These spaces serve as streets for the locals and, as such, they should be regained for the people.

In addition, one must be aware that we are all pedestrians, including those who are driving or going shopping. We must also bear in mind that there are people who, because of their age, physical condition or economic situation, are always pedestrians, and their rights should be prioritised over those who drive or own a car.

While the rights of car owners and drivers are well known (the right to drive and to park), – there are plenty of institutions and associations responsible for safeguarding them – no such thing happens to pedestrians and their rights.

“It is important, above all, to ensure children’s autonomy to leave home, so that they can play outside with their friends, and be able to go to school on foot and alone. People with functional diversity should also have barrier-free routes with continuity solutions. The elderly need safe pedestrian crossings so as they can meet each other, go to the bank to get their pension money, go shopping, to the cinema, to the church, etc. It is crucial to ensure for all citizens a real possibility of movement, of going to school, to work, to leisure spaces and so on, to entertain themselves using means different from the private car, and give priority to walking or cycling”⁷.



“Every man and woman, every old man and woman and every child on the street is deciding not only on the quality of their lives but also on the quality of the spaces where they live. They are saying that they do not believe in isolation or individualism. They are choosing a world with shared spaces.”

“There are no gratuitous human situations: when the elderly are forced to stay at home, because they cannot get through high sidewalks or badly parked cars, they cannot avoid the rush of traffic lights... We are talking about an unfair society towards the weakest. When the street becomes a place in which children are at risk and they are forced to remain secluded in their homes after school, they are not having the opportunity to grow as part of a community”⁸.

⁶ Excerpted from *Apaisement de la circulation. Collectivités viables*, quoting Donald Appleyard (1982)

⁷ *La città dei bambini*, F. Tonucci

⁸ *Manifiesto de los viandantes. A pie*, asociación de viandantes

Another important issue is that pedestrians are less visible than car users. Apart from being noisier, in many cities, towns and territories, cars, either on the road or parked, occupy a much larger area of the street than other means of transport do.

The design of public space is an element of change itself, to the extent that it can help to identify the priorities and rights of each user. Citizens have different opinions about these rights depending on the historical period or the place they are living. Thus, for example, the priority in the zebra crossings is different in each European country; and even within Spain the respect for the pedestrian changes in each city.

Another example of how the uses of the city have evolved is the widespread belief in the right to drive freely with a car or the right to park. Actually, people have the right to move around public spaces, but not necessarily as they like, driving their vehicles as they please. **Only a few decades ago, leaving a car on the public highway ceased to be forbidden and became an exception, and began to be considered something natural that had to be dealt with by the town councils. It does not happen with any other privately-owned object.**

3. GENERAL CRITERIA. THE CONTEXT OF THE PEDESTRIAN APPROACH. INTEGRATION OF PEDESTRIANS IN THE URBAN AND PERI-URBAN AREAS

3.1 The need to overcome the concept of pedestrian island

When talking about pedestrian improvements in the city, people often exclusively think about the creation of streets closed to vehicle traffic and with pedestrian priority. For many years, this has been the general assumption, as administrations restricted their actions to the creation of pedestrian areas free from private motor traffic in some shopping or historical streets in the city and town centres. Pedestrian islands, also known as pedestrian refuges, have been for most people the best known reference of what means to improve pedestrian mobility in the cities.

However, at present, in the technical and, increasingly, in the political and social sphere, pedestrian mobility is addressed in a broader way. The ultimate goal is not only that pedestrians can stay and walk comfortably in a few streets in the city centre (which is also desirable), but to extend these improvements to all the streets that are part of the city network, without restricting all motor traffic.

If it is accepted that walking is not only an urban mode of transport around the city, but also the mode of transport that characterises citizens' relationships as well as the most used⁹, if we want to preserve the multiple functions that promote coexistence in the streets, it is essential that both traffic and pedestrian conditions will be as pleasant, as comfortable and as safe as possible.

⁹ All urban mobility surveys clearly confirm this statement

In this sense, it is necessary to think about the quality and the convenience of creating plenty of spaces for pedestrians, with different types of sidewalks and intersections where pedestrians can coexist with vehicles. The distribution of the different sections in the street, that is, sidewalks and carriageways with parking spaces, or the design and priority at intersections are key to create attractive and safe places for pedestrians and, therefore, for walking safely and freely around the city, beyond the pedestrian islands and central pedestrian streets.

The European Charter of Pedestrians' Rights, approved by the European Parliament on October 12, 1988, was adopted by a large number of town councils thereafter. It is aimed at broadening the concept of pedestrian island, establishing easy walking accesses to different urban spaces, which may be comfortable and attractive for pedestrians, at regaining the street as a place for socialising, and at limiting the car speed to ensure safe walking or cycling.

3.2 The concepts of pedestrian route and pedestrian network

Therefore, it is all about finding solutions — if there are any — complementing pedestrian areas. They need to be extensive, generalised, and with a high flexibility for improving pedestrian life and mobility.

Walking can only be comfortable and safe if you can do it in the whole city. This idea could not only need to be part of big urban projects, but can be the result of small actions of reduced scale, carried out over the years by local authorities, and transforming, in a short period, the towns and cities, in a silent but rapid way, almost imperceptible by the users themselves, who are gradually adapting to the changes.

This is how the concept of **pedestrian route emerges as a set of various types of roads, with varying degrees of safety and suitability for pedestrian. Moreover, they are connected with different mechanisms so that they can combine, coexist and link up with other urban modes of transport.**

A further step in the reflection takes us from the pedestrian route to the pedestrian network, that is, from the connection of activities in a single urban axis to generalised pedestrian accessibility in the whole city. The pedestrian network is the capacity that a territory has to be accessible to most citizens without limiting this access to a single mode of transport; on the contrary, by using different means of transport and from different locations¹⁰. It consists of a network of pedestrian routes and spaces, essentially citizens' spaces, which can be accessed on foot and link up the different neighbourhoods with the urban services.

We have to think of a road network (street network) that, in a similar way to the one that today provides the car access to all areas of the city with the minimum acceptable, or in some cases, excellent conditions, makes it possible for pedestrians to stay and move around under the minimum quality conditions, which, in general, should be the same as those enjoyed by car drivers. In addition, depending on the area, uses of the land, density of pedestrian traffic and type of vehicle, the quality levels should be different.

¹⁰ The most commonly known as "accessibility" is limited to more architectural aspects and consists of design measures that are adopted to allow all people (regardless of their physical or cognitive condition or their different mobility limitations) to access a place or a building. This concept of accessibility is included in this document, which goes even further.

This should apply to the citizens whose usual mode of transport is walking as well as to the users of public transport, cyclists and drivers when they park their vehicles.

A pedestrian route should run along different types of roads — only for pedestrians, with sidewalks separated from carriageways, with carriageways not separated from sidewalks. In all of them, the pedestrian space should be designed to achieve the maximum environmental quality to stay in and move around urban spaces.

In some cases, the creation of pedestrian routes will mean the appearance of new attractive routes for walking but, in other cases, it will be enough to regain the existing sidewalks and pathways, whose use by pedestrians has been limited.

In short, we can say that the ultimate goal will be to build a street network with suitable conditions for pedestrians that covers the entire city. Once again, it must be pointed out that this network will essentially use the existing roads, without excluding the different modes of transport — since, **as a general rule, the multi-functionality of the street space is more desirable than its specialisation. In addition, it will be necessary to establish some priorities on the use of the road network different from those currently prevailing in many cities and towns**, which give priority to cars over other modes of transport.

It is interesting to highlight the idea **that pedestrian routes are just a logical development of the street** and that they only sporadically exclude other means of transport — for example, when they pass through existing pedestrian zones or when they are created for urban, commercial or city planning purposes —. **In general, these routes develop the concept of coexistence of all modes of transport and of mutual respect among them.** They may present very varied designs, so as they can be adapted to the different streets and conditions of the road through which they run.

To sum up, we assume that these proposals are not only improvable, but they try to give the right answers to the relationship that citizens have with their public spaces, which, in most cases, are far from being ideal places where habitability and, collaterally, pedestrian traffic prevail.

If we want to improve both habitability and pedestrian traffic, we must not only **take action on sidewalks and crossroads, but also on carriageways, that is, on the whole street (from side to side), because it is necessary that car drivers are aware of the presence of pedestrians.**

3.3 Creating and promoting routes for pedestrians

As has been said, it is essential to think of a road network that makes it possible for pedestrians to move around and stay in the street under the appropriate quality conditions.

A basic and structuring element of this concept of road can be, as it has been already pointed out, the pedestrian route.

Going into detail, **a pedestrian route is nothing but a structured set of sidewalks and crossroads aimed at facilitating the need of walking and staying in the street, by widening sidewalks in those places, where possible, and in crowded areas, by placing a single platform between building facades, or by redesigning intersections to make crossroads safer and shorter. They are articulated complexes consisting of different types of roads**

for non-motor means of transport, which need to be attractive, safe and fast, and in which the intersections with other roads are solved by adopting criteria that favour pedestrians and cyclists. In a few cases, some sections of these routes are also shared with pedestrians. However, in most cases, they are improved, well-dimensioned sidewalks, with trees and the appropriate street furniture, and linked with other roads by means of convenient and safe crossings that facilitate walking without any risk or delay, and where people can stay in the street in pleasant and safe conditions.

It seems like an oil stain gradually spreading to cover most of the city surface, conceiving the public space as a place where people, can stay, enjoy and move around.

Once again, it is emphasised that the pedestrian network should not be confused with streets dedicated exclusively and necessarily to pedestrians.

“The foolish attempt to remove pedestrians from the streets and reserve them exclusively to cars — an attempt which took the form of the so-called urban highways — was followed by the logical and insensate attempt to remove the car from the streets. The pedestrian area is the opposite counterpart of the urban motorway and both are a threat against the traditional concept of the city they are generalised. For most streets, it is necessary to search for formulas of coexistence and integration of pedestrians and vehicles.”

“Originally, pedestrian areas can be compared to the 19th-century Indian reservations. First, Indians, or pedestrians, were cornered, then, their land was stolen and finally, to salve their conscience, the reservation, or the pedestrian street, was given back to them. Woe to the Indians or pedestrians who manage to leave their reservations! Inside them, they can do as they please, but if they cross their borders, they are at risk. That is why fences and very clear boundaries are placed in their areas.”

“If a pedestrian area is similar to an Indian reservation, it will be part of a reactive, regressive, defensive, shy and static approach, which is aimed at ensuring the survival of the Indian, or the pedestrian, in a restricted space. Nevertheless, it should be aimed at integrating them successfully in the society, in the street or road network, as individuals with rights.”

“In addition, the pedestrian zone, which has a limited extension, is conceived as the place through which car drivers or users of the public means of transport walk or go shopping. For the real movement: motor transport, either collective or private; for the almost non-existent, short-reach movement: going on foot. Nevertheless, walking is not a pseudo-movement, it is not a second-class mode of transport, it is not a short-reach movement that serves as a complement for the real movement. Contrary to what is often thought, pedestrians walk long distances. **Moreover, most urban journeys are accomplished on foot.**

“If it is unconceivable to study road traffic by limiting it to a specific road zone, it is also impossible to study and satisfy pedestrian traffic by limiting it to a single pedestrian zone. If we want to solve the problems that may arise, we need to study the networks, both the road networks and the pedestrian route **networks that coexist and overlap, networks designed in a non-exclusive manner**”¹¹.

¹¹ The texts between quotation marks were excerpted from the study “Reordenación de la Puerta del Sol de Madrid” for the Municipal Urban Planning Management Department by Arturo Soria and Fernando Nebot in 1984

Pedestrian zones, conceived as specialised areas, do not solve alone the problem of regaining the cities for the people, since they have served as mono-functional spaces in which urban and citizen qualities are not easily reproduced. Without renouncing to them, it is necessary to propose strategies based on the creation and development of pedestrian routes within the framework of a road network which supports urban mobility for all (people and vehicles). In particular, it is essential to turn streets into suitable places for people to stay in, enjoy and meet each other.

4. NEW PRIORITIES IN THE DESIGN AND USE OF STREETS AND PUBLIC ROADS

When we refer to a very partial use of the urban space, of streets and public roads by citizens, that is to say, if we focus on mobility, it is worth highlighting some interpretations and analyses made in the last years.

As has already been pointed out, walking around the streets is just one of the many activities that people do when using public and collective spaces, but it is not precisely the main one.

However, **cars have conditioned and shaped people's mobility**, as well as many other similar activities that take place in the citizens' space.

But much more than conditioning people's mobility, in an overwhelming and devastating way, cars have conditioned the use of urban space, of collective space and, therefore, of the city. They have displaced most of the uses related to mobility and have marginalised all their varieties, possibilities and quality.

They have forced pedestrians to be aware of the risks and dangers and live with discomfort.

- Danger: the possibility of causing harm or injury to a person or thing. Something that may harm you.
- Risk: the probability or eventuality of damage, inconvenience or mishap.
- Danger is a factual situation, which threatens the safety of people or things.
- Risk is a statistical concept, which indicates the probability that such a threat will occur in the form of harm to people or things.

Consequently:

- A boy running along the street is not dangerous.
- A cyclist riding on a road does not constitute a danger.
- An elderly person crossing the street very slowly, and, perhaps, distractedly, is not dangerous.
- They (children, cyclists, and elderly people) are not dangerous. They are at risk (of being knocked down).
- Motor vehicles are dangerous. Cars are dangerous. They are the ones that can cause damage.

Because of this prevailing cultural vision, the language has become so distorted that we have turned the victims of the accidents into dangerous elements.

Thus, people will avoid those itineraries where there is constant danger and elevated risk. Their decision will be conditioned and they will not take it for reasons strictly related with their needs, like meeting someone, walking or commuting. The feeling they may have of suffering a road accident while walking is one of the most important factors when choosing this means of transport and the route to be followed.

This is known as the risk compensation hypothesis, which applied to the private cars is reflected in that **“every «non-restrictive» safety measure, even though admirable in itself, is conceived by drivers as an opportunity for more speeding, so that the net amount of danger is increased”¹²**.

In conclusion, the behaviour of pedestrians, drivers of cars, motorcycles or bicycles is the result of **the perception and assumption of a certain level of risk that contrasts with the existing objective risk**. When, as a result of a road safety measure, road users perceive a decrease in risk, they tend to change their behaviour by taking more risky decisions and, consequently, increasing the probability of accidents¹³.

When people who are involved in road traffic perceive changes in the environment, they modify their behaviour in an attempt to compensate the variation in the level of risk¹⁴. As regards pedestrians, besides the inconvenience involved in the mobility itself, they need to be alert to potential dangers.

The subjective perception of risk by potential or actual road users influences their behaviour in each circumstance. This explains why, for example, if a street becomes more dangerous – due to an increase in traffic intensity or speed – it does not always result in an increase in the number of people hit by cars. **The pedestrian reaction to the perception of a greater danger in the street is avoiding diagonal crossings and adopting of additional preventive measures**, which results in a reduction in the risk of suffering a road accident. It is, therefore, a process dictated by fear of the car or of the traffic¹⁵.

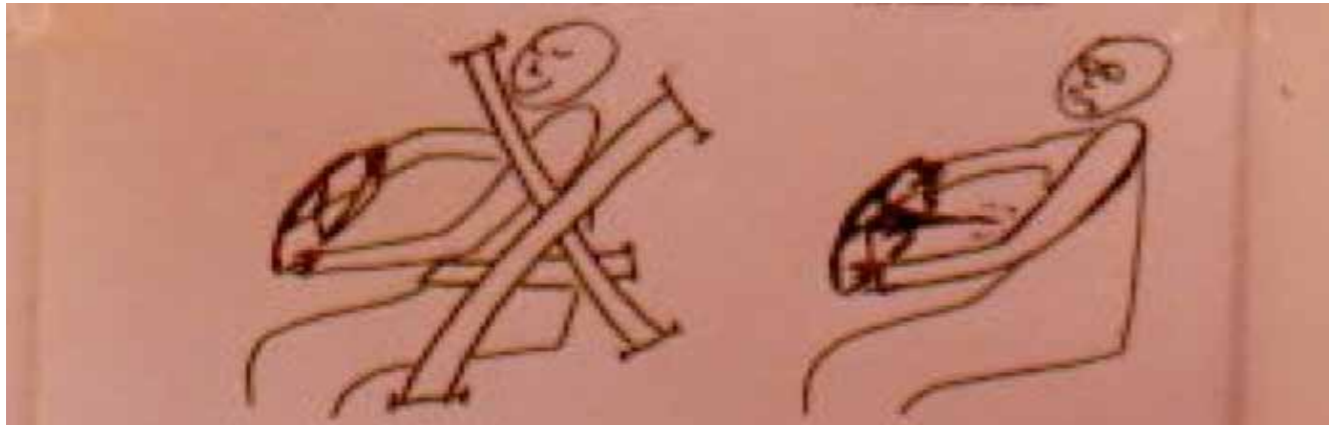
An association of pedestrians in London distributed a cartoon. It posed a question: what is safer for pedestrians in cities: the safety belt – which gives confidence and protects the driver – or a sharp stiletto coming out of the steering wheel – which reminds us that any minor over speeding, or any unforeseen event that forces us to brake, can have important effects on our health.

12 J. S. Dean, *Murder Most Foul*, Allen & Unwin, London, 1947. In the middle of the last century he stated that “more generally it will be seen that everything that is supposed to produce more danger in fact produces more safety and [...] everything that is supposed to produce more safety produces more danger. [...] Better roads, better sight lines, fewer bends and blind corners, less traffic, better lighting, better visibility, better weather conditions -all these that are supposed to make for greater safety, in fact, make for greater danger. Worse roads, worse surfaces, etc. [...] make for greater safety. [...] because every “non-restrictive” safety measure, however admirable in itself, is treated by the drivers as an opportunity for more speeding, so that, the net amount of danger is increased [...]”.

13 Alfonso Sanz Alduán. *Otra forma de pensar el transporte*. 1994. Archipiélago, numbers 18-19

14 Adams, J. (1985): *Risk and Freedom. The Record of Road Safety Regulation*. Transport Publishing Projects. United Kingdom

15 Alfonso Sanz Alduán. *Apuntes sobre el amor al automóvil y los accidentes de tráfico*. Revista sobre igualdad y calidad de vida, vol. 4, number 11, 1995



In any case, accidents should not be seen as the only indicator of how dangerous road traffic is, because even if there were no accidents on some streets, this would not mean that there wasn't any danger and that pedestrians would not perceive it. In fact, the risk of suffering an accident is a necessary, but not sufficient, indicator of the dangerousness of traffic for pedestrians, as they change their behaviour when facing the danger of being hit by a car. If they perceive danger on their routes, they tend to change their means of transport, route or attitude towards public space.

On his ninetieth anniversary, in relation to what has just been said, Rafael Sánchez Ferlosio stated: "As long as the gods do not change, nothing will change". Changing the gods, the god Automobile, is essential; changing priorities in the use of urban space is crucial to establish new policies of transport and traffic, but, above all, of urban space and city use.

Because taking action on vehicle mobility is much more than rationalising its traffic, it is much more than limiting the absolute power that private vehicles have had on the streets, the city and the area. It is taking the first step, a fundamental but not sufficient measure to regain the city and the area for the people.

"This principle, when applied with rigour and decision, is the best tool for reorganising the city so that citizens will be able to exercise the right to the city, the right to urban public spaces".

"From another point of view, if we want to take action in the urban public space and trying to integrate and taking into account all demands and needs related to mobility (bicycles, public transport, pedestrians, accessibility, traffic, road safety, green areas, street furniture, urban services, parking areas and loading areas, among others), considering all of them equally important, the results are going to be very complex, probably confusing, even impossible or contradictory. However, if we organise the proposals on the basis of a clear priority for pedestrians, the solutions will fit much better and the results will almost certainly be more accurate, transparent, legible and coherent".

"In short, we need to be minimally coherent and apply the already widespread scheme of 1st pedestrian; 2nd cyclist, 3rd public transport, 4th private vehicle. However, this is a limited scheme that is restricted to

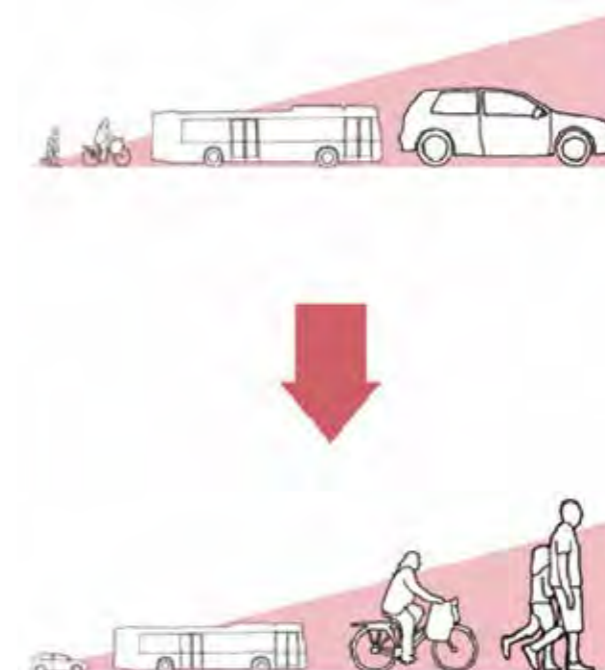
the mobility sphere and does not take into account other urban uses. But even so, and being this a serious matter, its greatest defect is not the one that has just been pointed out. The thing is that is almost never thoroughly applied, it is just an almost empty declaration of intention which is not based on any fact"¹⁶.

4.1 The increasing generalisation of new priorities

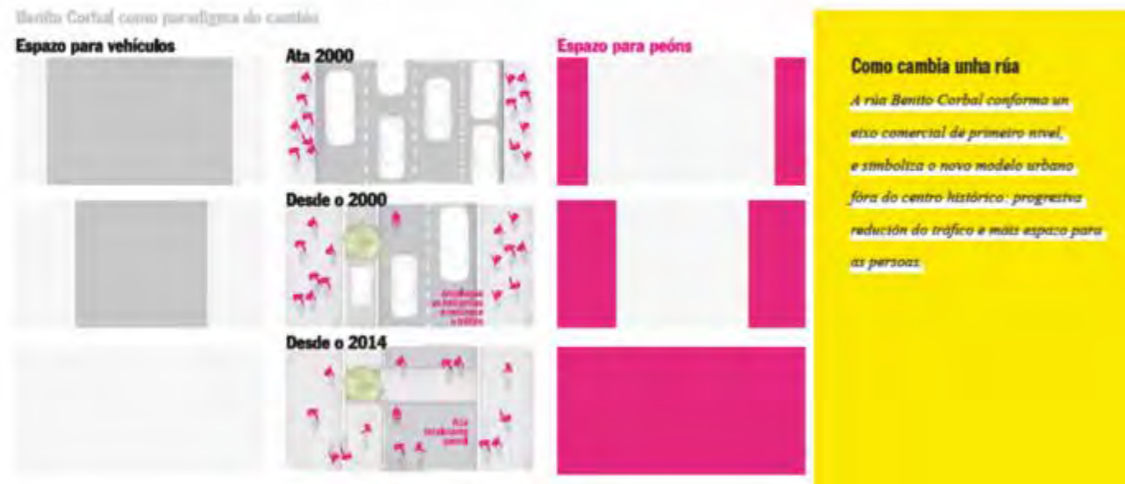
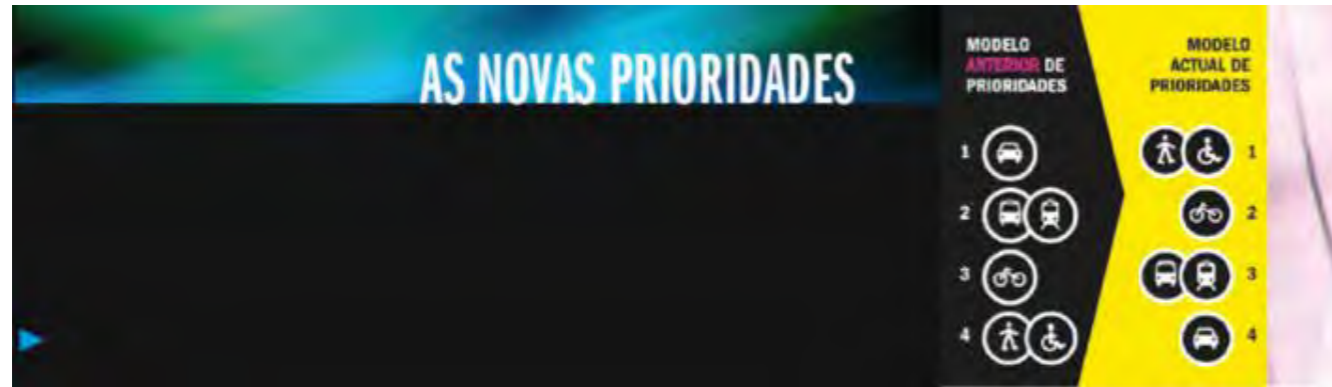
These proposals have gradually spread, at least theoretically, but there are many similar approaches from different points of view and parts of the world. All these visions, all of which, from the point of view of mobility, give priority to the use of the street, but are not aimed at excluding completely the private vehicle, but at reducing its speed and the level of motor traffic, and at encouraging and ensuring strict respect between the different means of transport. This is very different from the little respect that has prevailed for decades in the urban design of many cities, towns and territories, in the conception of the street and road, and in the organisation of traffic on the roads and in the use of all the above by the private vehicle for decades in many cities, towns and territories. We could say that it is an integrated vision of the use and enjoyment of public spaces as opposed to the still widespread vision of separated spaces.

As we will explain, today this approach is becoming generalised and almost nobody is totally opposed to it. Another aspect, as has been pointed out, is how to apply it. Although we do not want to be exhaustive, here are some references:

- Basque Country (*Guía para actuaciones de mejora peatonal y ciclista novedosas y de bajo coste*. Legazpiko Udala, Gobierno Vasco, Udalsarea 21. 2015)



- Pontevedra (*Pontevedra. Menos coches máis cidade. 2016* and *Pontevedra. Outra mobilidade. Outra cidade. 1999-2015*)



- Dirección General de Tráfico (*Plan tipo de seguridad vial urbana Guía de apoyo para la actuación local. DGT 2007*)

Peatones y personas con movilidad reducida	Máxima prioridad
Transporte público colectivo	↓
Ciclistas	↓
Vehículos de transporte de mercancías	↓
Vehículos de dos ruedas	↓
Automóviles privados	Mínima prioridad

El objetivo prioritario de las actuaciones en materia de movilidad urbana ya no es la fluidez del tráfico, sino la seguridad de todos los usuarios del espacio público de acuerdo con esta jerarquía de prioridades.

- *Decálogo de criterios de actuaciones en las vías provinciales* (Provincial Council of Pontevedra. Adopted in the Plenary Session of 29 January 2016)

These are some of the most significant parts of the document:

1.- The Provincial Council of Pontevedra will prioritize the needs of the most vulnerable sectors in all its road actions. The hierarchy to be followed will be: 1st pedestrian, 2nd cyclist, 3rd public transport and 4th private vehicle. A formula will be established for each project so as to guarantee the harmonious coexistence of the different mobility groups in a coherent manner.

4.- An effective speed reduction on provincial roads will result in a drastic reduction in the number of accidents, so the Provincial Council of Pontevedra will promote speed reduction measures through placing signage and implementing traffic calming measures. The proposed solutions will be, preferably, 30 km/h-zones, raised pedestrian crossings and speed breakers, among others.

- United States of America (*Global Street Design Guide*. Global Designing Cities Initiative, NACTO, Bloomberg Philanthropies. 2016)



Nevertheless, even the approaches seeking to give priority and primacy to pedestrians may lead to a non-sense.

Recently, a town council decided, arguing reasons related to crowd control, to restrict pedestrian access to certain streets from one of their ends, but not from the other, during specific periods of time.



Thus, pedestrians are treated and regulated in the same way as cars, with obligatory one-way streets. It is the antithesis of the use of the city by the people. Pedestrian movement is channelled; one of the peculiarities of walking is limited: to be able to retrace your steps.

Access is controlled by means of police surveillance and light signals to indicate the direction.

5. RECOMMENDATIONS FOR THE DESIGN OF ROADS AND PUBLIC SPACES AIMED AT PROMOTING FRIENDLY MOBILITY, ROAD SAFETY AND URBAN QUALITY

5.1 Streets and spaces with pedestrian priority

In line with the general approach of this text, streets or spaces with pedestrian priority can be defined as zones and areas that pedestrians can occupy freely without being afraid of motor traffic, which must be, if there is any, totally subordinated to pedestrian use.

As has already been pointed out, streets and spaces exclusively for pedestrians, in the strict sense of the term, are not recommended as a general rule, as they can deprive the area of the services it needs it to function properly, and they can also cause problems to the emergency and maintenance services.

Areas and streets with a clear pedestrian priority and strict limitations to motor traffic are preferred. Access to these areas by motor vehicles is only permitted to services and under very low speeds and, sometimes, at certain times of the day.

Streets spaces with pedestrian priority shall be continuous and compact, limiting the contact with motor and unrestricted traffic zones.

Creating routes for motor vehicles should be avoided within the areas with pedestrian priority and especially those that may be overloaded with traffic. In particular, these routes should never be crossed by motor-traffic streets without restrictions or limitations.

Streets and spaces with pedestrian priority should be at the same level and have a single platform, preferably without separate or segregated spaces for different types of mobility.

No high barriers or other elements that are difficult to remove should be placed to provide easier access for construction works, fire brigades, etc. The protective devices used should be kept to the minimum to be effective and, if this is not possible, removable or easily modified.

In the streets where motor vehicles and pedestrians coexist or in those with pedestrian priority, signposting of parking spaces and unlimited parking should not be allowed. It is not advisable to mark on the pavement any lane or space with motor vehicle priority.

Spaces with pedestrian priority should be protected from road traffic with dissuasive measures, such as changes of direction, non-continuous routes and similar measures to avoid through traffic. In addition, they must have a maximum speed of 20 km/h and a very low average daily traffic¹⁷.

The city of Pontevedra is a special case that could be broadly considered a uniform area at 30 km/h, in terms of motor vehicle speed.

¹⁷ In general, less than 75 vehicles at rush-hour or even less



Gutiérrez Mellado Street (Pontevedra)



Pontevedra



Before and after (Pontevedra)



Before and after (Pontevedra)



Before and after. 30 km/h-zones in the surroundings of the Compostela Square (Vigo)



Surroundings of the Compostela Square (Vigo). Before and after



Before and after (Vigo)

Finally, it should be noted that the **single platform**, which should not be confused with the pedestrian area, is at the **among the most recommended actions in terms of public space management**. It incorporates elements of design aimed at reducing the speed of motorised vehicles to a maximum of 20/30 km/h. **It also ensures mutual respect among the people (both pedestrians and drivers), within a pre-established order of priorities for the use of public spaces**, which is very different from the use of public spaces still prevailing today in large areas of cities and in the territory. **At the same time, it manages public spaces based on references that go far beyond mobility (whether on foot or by car), and rest on regaining the city as the space where everyone can live as a citizen**. In other words, as it was stated before, it redefines the place where people meet to build a collective life¹⁸.

Likewise, a single platform is much more than a single surface. The spatial distribution that segregates spaces, which in some cases becomes ridiculous, cannot be reproduced in a mimetic way:

18 As regards visually impaired people and single platforms, it is important to adopt measures to facilitate their movement.



Iberia Street (Barcelona). *La Vanguardia*. Pedestrians cramped on narrow sidewalks between the façade and some bollards. A person is half-hidden so that the car can pass (photo on the left). In the absence of motor traffic, pedestrians occupy all the carriageway (photo on the right), but the mere presence of the Google car forces them to line up (photo below on the left). There is no doubt that this section of the road is a single platform, but it often acts as a road for motor vehicles, in which pedestrians are permitted to pass with restrictions. If the Google camera is rotated, we can observe motorcycles, both parked and travelling on the road, and cars parked at an angle. This is the opposite of conceiving the street as a place to stay (photo below, on the right). It is considered a solution, possibly imposed by the traffic conditions in the area, but should be improved. It serves as another example that a single road level is not always a platform for living and staying, but a mere place of passage.



5.2 Streets separated from the carriageway

5.2.1 Conditions for building sidewalks

1) Except for small and isolated areas, sidewalks must have a minimum width of 2.50 m to guarantee the 1.80 m free space required to comply with the accessibility regulations. These figures must serve as a reference for installing sidewalks in new projects, and they constitute the minimum target to be achieved for improving existing sidewalks.



Pi y Margall Street (Vigo) (above)



Llorente Street (Vigo) (above)



Narrowed sidewalk in Basauri (Vizcaya)
Photos: J. Fariña's blog



Narrowed sidewalk in Getafe (Madrid)

The minimum width should be increased taking into account the urban furniture that will be placed on the sidewalk, the number of pedestrians, the presence of shop windows, bus stops, etc.¹⁹

2) Accessibility ramps shall not be installed when the width of the sidewalk and the ramp does not exceed 320 cm: 180 cm of free space outside the ramp (so two wheelchairs can pass) + 140 cm so that the ramp does not exceed the maximum 10 % slope, according to the accessibility regulations (calculations for a 14 cm-sidewalk height).



Masarrochos (Valencia)



Carlos Cañal Street (Sevilla)



Antillano Campos Street (Seville) (above)
The sign reads: "Absolute pedestrian priority"
Torrevieja (Alicante) (right)



Montevideo Street (Barcelona) (David Airol. *La Vanguardia*)



Más Durán Street (Barcelona) (*La Vanguardia*)

¹⁹ Some manuals advise taking 200 cm instead of 180 cm as a reference so that two wheelchairs can pass. *Recomanacions de mobilitat per al disseny urbà de Catalunya*. 2009



Madrid



Daroca Street (Zaragoza)

3) A minimum horizontal width of 90 cm²⁰ shall be left on the sidewalk when there are driveways. In these cases, two wheelchairs cannot pass if the horizontal width is under 180 cm. It should be noted that driveways and pedestrian crossings must never meet, it is obvious, otherwise cars leaving the garage would drive through the pedestrian crossing.

²⁰ Conceptually, driveways with the sign: "24-hour access is required" is another issue in which the logic of motor traffic and the automobile is becoming more and more important. In this case, the sidewalk is not respected when cars enter and leave the garages. In addition, the usual guidelines (also included in manuals and guides) indicate that pedestrians, especially children, should look and make sure that no car leaves or enters the garage. Road safety education, instead of claiming and promoting respect for pedestrians by drivers, shows once again a defensive approach and warns pedestrians to be permanently alert.

In cases where the three above conditions cannot be met in an urban area and, in any case, when the section of the street does not exceed 12 m, the preferred alternative option should be the single platform with pedestrian priority. This limitation can be reduced to 10 m in the case of one-way roads with just one lane²¹. In addition, the aforementioned measures should be accompanied by an adequate design and planning of the urban space and the necessary speed restrictions for motor vehicles.

Taking what has just been said as a reference, in projects carried out in rural and peri-urban areas the adoption of a single platform and its particular features should be analysed in detail.

Except for well-founded exceptions, pedestrian spaces should cover at least 50 % of the street space. The main exceptions may include streets with many cross-sections, but in this case they should guarantee a large space for pedestrians: i. e. 6 m on each side.

If streets are between 12 and 14 m wide, it is necessary to bear in mind the design and arrangement of the pavement, carriageway and parking lanes. As an example, in 13 m-wide streets the design of the sidewalk and the carriageway consists of 2 sidewalks of 2.5 m each, 2 motor traffic lanes of 5.75 m corresponding to the carriageway, and a 2.25 m parallel parking lane for vehicles providing services.

Except for streets with two or more motor traffic lanes in each way and provided with protective devices between the motor traffic lanes and the sidewalks, **the maximum speed must be 30 km/h.**

On urban roads, there should be spaces where vehicles can park for emergencies and for providing services in the area.

On the other hand, the sidewalk is not a secondary space of the street, although it often seems so. It is not only a basic element of the street, but it is, in theory, intended exclusively for pedestrians. In the same way, the carriageway intended for automobiles has its own design standards (no 1.75 m-wide lanes are allowed for motor traffic, since they would be narrower than a car). Below are several examples of a correct shape and arrangement of sidewalk spaces.



²¹ As can be inferred from this document, the decision to adopt the single platform is beyond the width that the street may have: incorporating essential decisions such as trying to build a city for everyone, reducing motor traffic..., regaining the function of the street as a place to stay, creating a street for children, etc. The guidelines outlined here may serve as a guide, but they should not be interpreted as immovable principles that state that the single platform cannot be installed unless the streets width reaches certain dimensions.

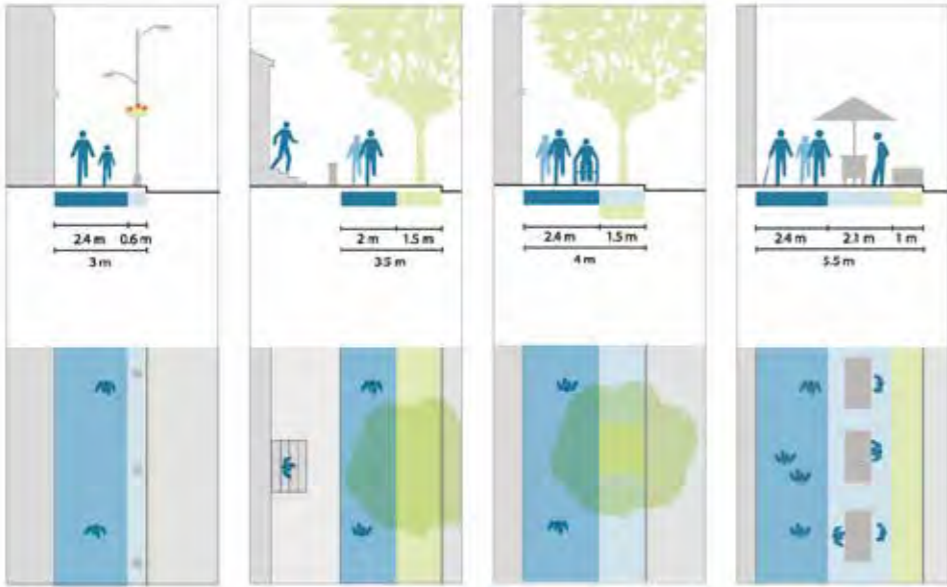


Los itinerarios peatonales accesibles se definen como aquellos que garantizan el uso no discriminatorio y la circulación de forma autónoma y continua de todas las personas.

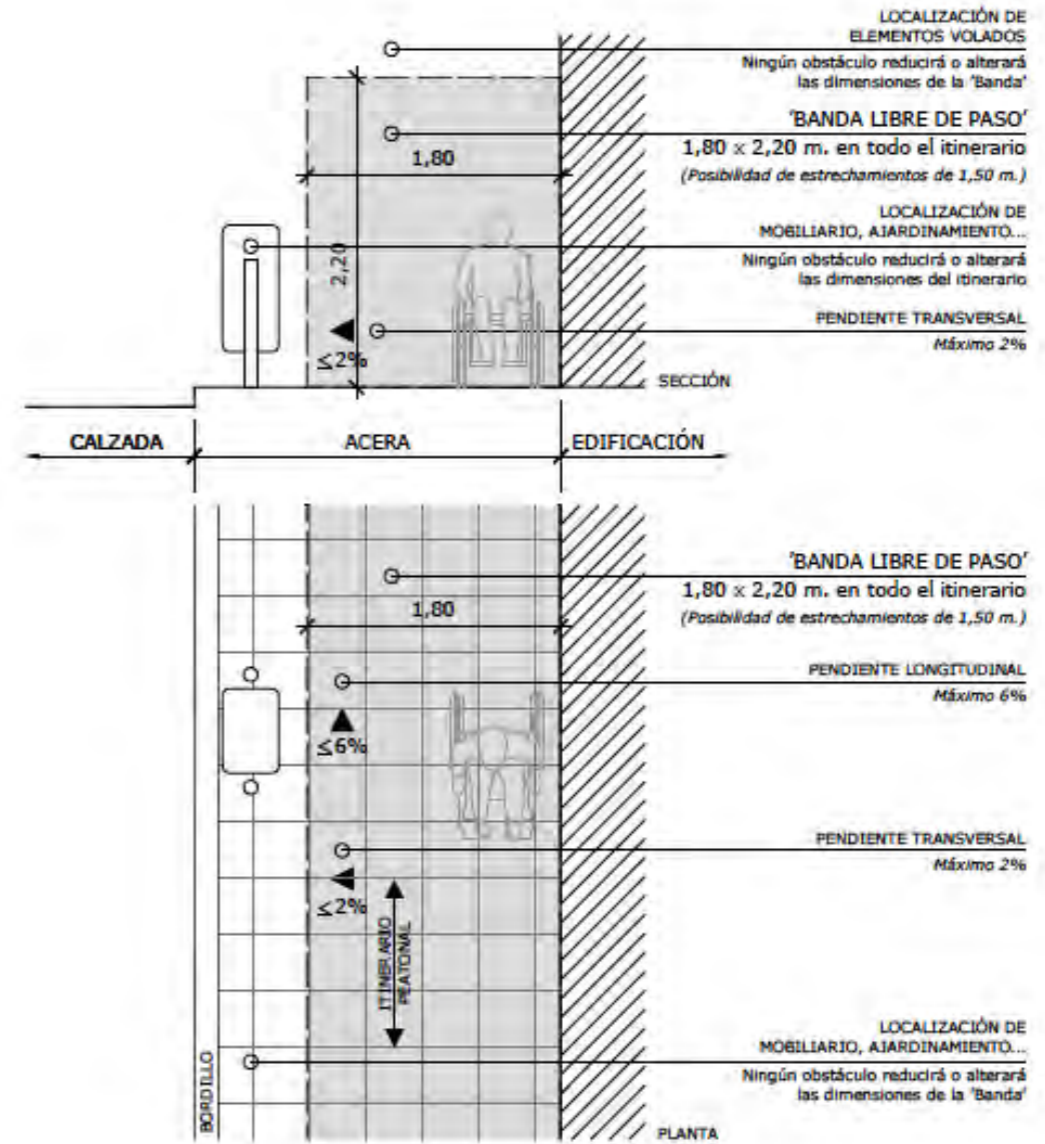
Especificaciones técnicas de diseño a considerar:

- Discurrirá siempre adyacente a la fachada o elemento similar que marque el límite edificatorio
- Banda de paso mínima libre de ancho 1,80m y 2,20m de altura*.
- Pendientes máximas del 6% longitudinal y 2% transversal
- No presentará escalones ni resaltes aislados o no señalizados
- Iluminación adecuada al entorno y uniforme, evitando el deslumbramiento
- Características del entorno e interacción con los demás elementos

*Excepcionalmente en zonas urbanas consolidadas se permitirán estrechamientos puntuales de 1,50m de ancho



22



23

Many technical texts are in line with what is set out in this document in terms of minimum width free of obstacles and use of sidewalk space. One of them is shown below, for the exclusive purpose of providing other references²⁴:

22 Global Street Design Guide. Global Designing Cities Initiative, NACTO, Bloomberg Philanthropies. 2016

23 Boston Complete Streets Guidelines. 2013. Boston Transportation Department. An excerpt from Manual de accesibilidad para espacios públicos urbanizados del Ayuntamiento de Madrid. 2016. The image perfectly shows the space intended for pedestrian movement and the urban furniture zone, but the mobility of usually impaired people can be affected by objects

24 An excerpt from Manual de accesibilidad para espacios públicos urbanizados del Ayuntamiento de Madrid. 2016



José Abascal Street (Madrid)



Modesto Lafuente Street (Madrid)



An additional obstacle for pedestrians



Escudillers Street (Barcelona)
(Xavier Cervera. *La Vanguardia*)



José Abascal Street (Madrid)

Having these general guidelines as a base, it will be necessary, for each case, to consider more specific aspects: street lamps must also illuminate sidewalks and not only carriageways, sidewalks are not the right place to put urban waste containers, etc.

Pavement is an essential element of **sidewalks** and **single platforms**. Without getting into technical aspects and recommendations, it is important to bear in mind that pavements cannot be slippery. On rainy days, apart from the uneasiness caused, they create a feeling of insecurity when walking and poses an evident risk of falls.

However, it is not only necessary to establish an appropriate design, but it is also very important that the budget includes items for the correct maintenance and repair of sidewalks and, logically, of single platforms. Therefore, administrations should plan and ensure the availability of means and also supervise the sidewalk repair companies so that they can work on them without causing any inconvenience to the people. They should be repaired adequately, without papering over the cracks, which is a common practice in many cities.



Cleanliness, a fundamental aspect



San Ignacio Street (Vitoria), 2017

5.2.2 Obstacles on sidewalks: proper management of the sidewalk space use

It is not just a matter of setting rules for designing and placing the elements on the sidewalk and for establishing a minimum width between them, as has just been said. It is essential to **manage the use of the sidewalk space** properly, which is the responsibility of local governments. It is about using the sidewalk properly.

Sidewalk spaces are unusually and inappropriately occupied for many reasons. In general, cases can be classified into two main groups:

- Vehicles

Motorcycles are undoubtedly the main obstacle that pedestrians encounter. Cars and other vehicles, such as delivery vans, parked on sidewalks may be a problem at certain times and in specific places. In many cities, motorcycle riders have considered sidewalks as a suitable, permitted and **ideal parking spaces**. This has often been the result of a lack of decision and initiative by local governments, which were not willing to turn parking spaces intended for cars into parking spaces for motorcycles. This situation gets worse when kerbside parking is regulated by private companies, since they disapprove the fact of losing parking spaces for cars.



Pontevedra



Motorcycle parking area in the carriageway



Buenos Aires (Alejo Santander. Infobae)



Arrasate Street (San Sebastián)



San Bartolomé Street (Donostia)

As has been pointed out, **parking motorcycles on the road is the right thing to do but, unfortunately, it is not the most usual practice**. Motorcycle riders' behaviour and local administrations' attitude are considered normal. In fact, an advertisement by a major insurance company proclaims: "Wherever a motorcyclist may go, he or she always parks at the door". It is obvious that at the door (of the house, the office, the restaurant, etc.) there will probably not be a free legal parking space for either motorcycles or cars. However, many riders would not mind parking their motorcycles at the door and on sidewalks.



Cea Bermúdez Street and Abascal Street (Madrid)



Balmes Street (Barcelona)

Both photos by *La Vanguardia*²⁵



Martínez de la Rosa Street (Barcelona)

Car drivers interfere with pedestrian mobility, particularly by infringing traffic regulations: parking on sidewalks and at street corners and crossings.



Elduayen Street (Vigo)



Cánovas del Castillo Street (Vigo)



Abascal Street (Madrid)



Vía Augusta Avenue (Barcelona) (*La Vanguardia*)

An often-incorrect design of sidewalks and junctions, as well as a permissiveness when it comes to surveilling and fining motorcyclists and car drivers who park in these areas contribute to obstruct pedestrian movement.

- Bicycles

Bicycles are also a problem on sidewalks, both when riding and parking.

Bicycles cannot be compared to pedestrians. Bicycles are, after all, vehicles, certainly much less aggressive than cars, and not pollutant, but vehicles after all.

Its average speed is between two and four times that of the pedestrian²⁶. This is a very high speed, which, on the one hand, **causes inconveniences and generates instinctive attitudes** in pedestrians and, on the other hand, can lead to bicycle-pedestrian collisions, sometimes with serious consequences²⁷. Moreover, cyclists usually wear helmets, which increases their sense of safety and makes them to take more risks, thus becoming more dangerous for pedestrians.

“Although the bicycle has features that can be associated with pedestrian mobility, especially in terms of sustainable mobility, it must be borne in mind that it is a vehicle able to reach high speeds. Thus, bicycles are potentially dangerous elements for pedestrians, especially when sharing the same space and as long as the bicycle does not have its place on the road with the rest of vehicles”²⁸.

²⁵ In February 2018, the City Council of Barcelona launched a warning campaign for motorcyclists with the slogan “Sidewalks are for pedestrians”. A notice was hung on motorcycle handlebars indicating that they were incorrectly parked and that in a few days this type of parking will be illegal, and that they could be taken away by a tow truck.

²⁶ Average speed is about 12 km/h. Christian Kisters and Marcos Montes. *Peatones y vehículos, una coexistencia necesaria. Accesibilidad y modalidades de coexistencia de peatones y vehículos*. 2011

²⁷ For example, in Barcelona, between 2016 and 2017, two women were killed and another one was seriously injured by a bicycle

²⁸ Christian Kisters and Marcos. Montes *Peatones y vehículos, una coexistencia necesaria. Accesibilidad y modalidades de coexistencia de peatones y vehículos*. 2011

Due to their characteristics, bicycles are more often associated with pedestrians than with motor vehicles, and there is a widespread misconception that bicycle traffic is the same as pedestrian traffic.

Most manuals state that a bicycle lane known as a “bicycle sidewalk” (a bicycle lane that runs along the sidewalk without any physical separation from the pedestrian lane) should only be exceptionally used since it can contribute to promoting cycling in pedestrian spaces²⁹.

Likewise, if a bicycle lane is placed on the sidewalk the space reserved for pedestrians is reduced. “A bicycle lane on a sidewalk reduces pedestrian space regardless of the former use of that space [that is, regardless of whether it was built on the pre-existing sidewalk or as an extension of the carriageway]. Pedestrians need to cross the bicycle sidewalk lanes to get to their cars, to go to litter bins, to cross the street, to get to the bus stop, to go to the newsagent. Bicycle lanes on sidewalks force pedestrians to change their normal behaviour, impose new standards of behaviour and pose a danger to their physical integrity”³⁰.

The difference in the speeds described above makes it difficult to reconcile the two modes of transport without having to separate spaces. In this regard, there is a considerable agreement – at least among technicians and social groups aimed at protecting pedestrians and cyclists – on the consideration of the bicycle as a vehicle and the carriageway as its natural space³¹. Thus, nowadays some examples of mobility ordinances dealing with this subject are being issued.

To sum up, the use of sidewalks by cyclists is controversial, especially when there is a lack of a mobility culture based on the coexistence and mutual respect between pedestrians and cyclists. In these cases, it is essential to clearly regulate the use of these spaces by cyclists to guarantee, as a matter of priority, adequate conditions for pedestrian mobility and to prevent cyclists from riding there at more than 4 km/h, which is equivalent to the pedestrian speed. However, this is difficult to measure and it is much better to ban bicycles on sidewalks, stating that they must ride on roads.



A bicycle well tied to the bench, with the handlebars at the height of the head of the person who may sit on it and enjoy the beautiful view of the motorcycle!

29 A. Sanz. *La bicicleta en la ciudad. Manual de políticas de diseño para favorecer el uso de la bicicleta como medio de transporte.* Ministry of Development. 1999

30 Javier Arias González. 2010

31 Conclusions of the II Seminario Técnico de Infraestructura Ciclista, “La convivencia peatón-bicicletas en las vías urbanas”

Experience shows that bicycle lanes built on the sidewalk “increase the confrontations between cyclists and pedestrians and, instead of facilitating the movement of both, they make it more difficult”³².



Alcalá de Henares (Madrid). The town council has invited its residents not to use the bicycle lanes on the sidewalks and to ride on roads, alongside motor vehicles, to put pedestrians at risk. (*El País*, June 2016)



Conflictive bicycle lane on the sidewalk



Bicycle lane overlapping a pedestrian crossing. Both photos were taken in Valencia by Raquel Andrés Durà (*La Vanguardia*)

32 Pablo Barco, *Ciudades que caminan.* “Ciclistas, peatones y conductores frente al carril bici”. *El País* 13-03-17



Seville (Flickr/González-Alba) (*La Vanguardia*, February 2018)



Seville (Ignacio Díaz Pérez, October 2010)



As can be seen, pedestrians are forced to use a two-way bicycle lane (more difficult for them to foresee where the bicycle is coming from) or the remaining space of the sidewalk next to parked vehicles (this space should be used for street furniture or for the opening of car doors safely). The fact that the bicycle lane has not been created on the parking lane is particularly striking.

Photo: Javier Arias González, 2013



Serrano Street (Madrid). Conflictive pedestrian crossing (Google)



The increasing invasion of bicycles on sidewalks may be a consequence of:

- The unreflected establishment of priorities on the use of public space (previously commented). Sometimes public authorities tolerate or turn a blind eye to this issue, either because of their lack of decision to impose limitations on private vehicles, or because of its unwillingness to create a space for bicycles on the carriageway and to establish a maximum speed limit of 30 km/h on the carriageway for both vehicles.
- The fact that cyclists do not ride on the road because they are afraid of road traffic or they do not know the traffic and safety regulations well due to the aggressiveness and dangerousness of private vehicle drivers or to the lack of willingness of public authorities...

On the other hand, the city councils of some cities, such as Zaragoza or Madrid, have launched campaigns aimed at preventing cyclists from riding on sidewalks, regardless of its width.

Santander. Bicycle sidewalk behind the bus stop shelter. The use of the bicycle sidewalk by pedestrians poses an obvious risk³³

33 Photo and comment included in the *Manual de accesibilidad para espacios públicos urbanizados*, City Council of Madrid. 2016



Campaign in Madrid "I can see you. Can you see me?"



With regard to pedestrian zones, when it comes to develop a comprehensive planning for non-motor transport poses the question of whether it is better to share the same space or to create visually or physically separate traffic lanes and zones for pedestrians and bicycles.



Traffic sign in Zaragoza



Zaragoza (photo: Fariña's blog)

In theory, the shared use of space results in a more flexible and rational occupation of it, but it can reduce the perception of safety by the most vulnerable users (pedestrians). In addition, separating traffic lanes increases not only the use of space but also the construction and maintenance costs. **A purely visual separation of both spaces is even more dangerous, as cyclists ride at a higher speed.** In addition, horizontal signage by means of a solid white line on the road is insufficient, as it does not protect visually impaired people.



It can be concluded that:

- When promoting the use of bicycles, pedestrians must be borne in mind.
- As a general rule, cyclists must ride on the carriageway in cities and urban areas. There, spaces shared by pedestrians and cyclists should be an exception³⁴.
- In cities and urban centres in which traffic calming measures are widely applied, the maximum vehicle speed should be 30 km/h on the carriageway of streets with sidewalks.
- In general, in the remaining streets of the cities and towns applying traffic calming measures and in other cities, all streets where cyclists are allowed to ride at a maximum speed of 50 km/h should have at least one lane with its maximum speed limited to 30 km/h (this has been done for some years in Madrid)³⁵.

- Other motor modes of transport

The use of pedestrian-priority zones or areas (both sidewalks and open spaces) by people using motor vehicles jeopardises pedestrian safety and comfort on sidewalks, squares or other areas. Some examples are electric scooters, hoverboards, monowheels, electric monowheels, etc.

Their speed ranges from 5 to 40 km/h and their weight from 2 to 50 kg. Due to their speed and weight, they pose a risk for pedestrians and other users of sidewalks and shared areas.



This is not consistent with the road safety regulations, which stipulate that sidewalks should be only for pedestrians.



Due to the progressive spread of these motor vehicles and bicycles, combined with the barriers that have been just mentioned and an inappropriate urban design that hinders pedestrian mobility, people are unable to enjoy the city. What would be the point of non-return, which has already been reached in some cities?

The shared use of public space by everyone, often advocated by the defenders of these motor vehicles, whether naively or artfully, that is to say, consisting of tolerance between sidewalk users of the shared space, is a fallacy: tolerance and coexistence only exist for one side. Pedestrians are forced to respect the users of these motor vehicles and devices (some of them large, heavy and fast), but it does not happen the other way around. Normally, there is no respect for pedestrians, and if pedestrians do not move away from where they are, and the vehicle cannot pass, it is evident that there will be an argument. In all cases, it is the pedestrian who must step aside.

³⁴ Marche et vélo. Prise de position commune. Mobilité piétonne et pro velo. Suisse. 2014

³⁵ It should be made clear that either if there is a separate bicycle lane or a 30 km/h lane on the carriageway (this lane is often referred to as bicycle boulevard), cyclists can use any of the traffic lanes on the carriageway. From the safety point of view, it is recommended that they ride on the centre of the lanes, so that if a motor vehicle overtakes them, they must use another lane

The use of sidewalks by this type of vehicles is a bad practice and it should be an exception to the rule³⁶.



Both photographs: Vigo



- Urban furniture

Urban furniture is a key element in urban planning that creates areas to be enjoyed and used by all citizens. However, all elements of urban furniture, including those designed for pedestrians, can often be barriers. Urban furniture is sometimes installed in wrong places because of local authorities' negligence of local authorities or of models adapted to the characteristics of each space. However, in other cases, is the result of a wrong choice, which does not take pedestrians into account; otherwise, it favours the occupation of pedestrian space by motor vehicles for parking or moving around.



Ercilla Street (Barcelona)

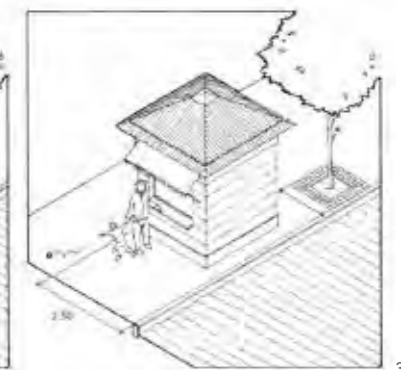
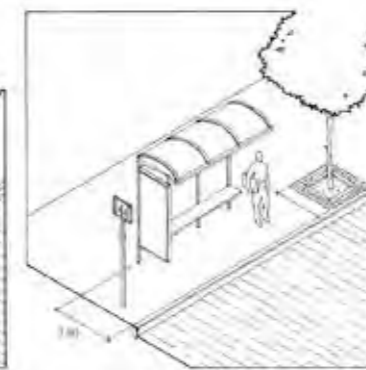
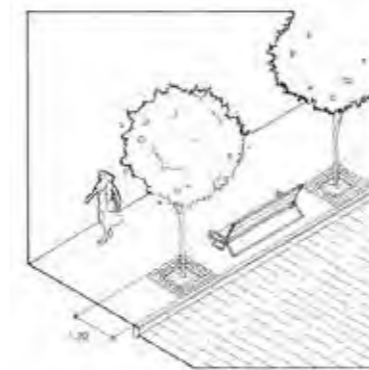
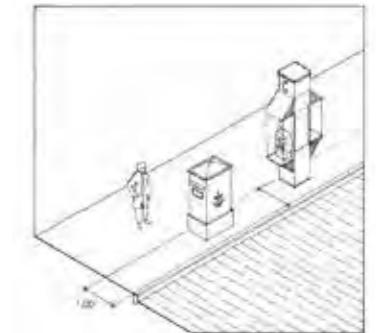
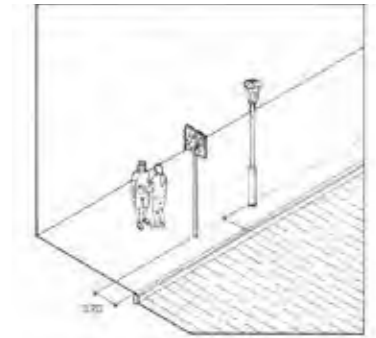
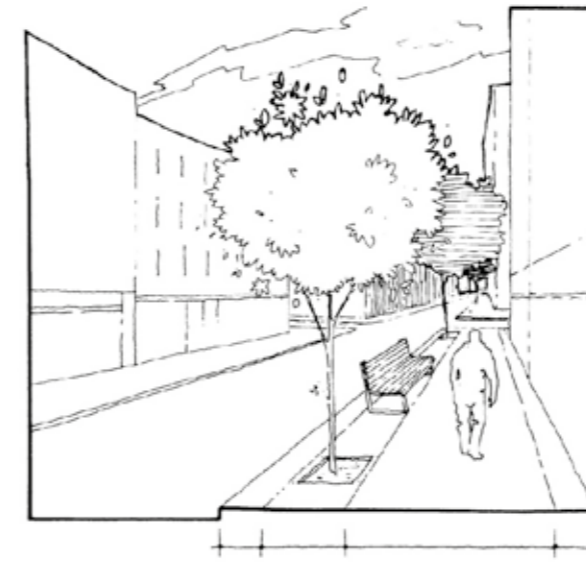


Artesanía Street (Barcelona)

36 Position au sujet des engins motorisés: trottinettes électriques, hoverboards et monowheels. Mobilité piétonne, Suisse. 2017

The following obstructing pieces of furniture and other elements are not listed in order of frequency or significance, although the terraces of cafés and bars deserve a special mention:

1. Newsstands (press, food, lottery)
2. Traffic signs
3. Machines (parking metres, games, vending machines)
4. Information and advertising (panels, banners and signposts)
5. Traffic lights (traffic light posts, control cabinets)
6. Street lamps
7. Sidewalk and carriageway protective devices (steel and stone bollards, U-bollards, fences)
8. Benches
9. Terraces (chairs, tables, awnings, closings)
10. Urban decoration (fountains, monuments, flower beds)
11. Drinking fountains
12. Mailboxes
13. Posts (telephones, electricity)
14. Weatherproof elements (bus stops, gargoyles, awnings)
15. Waste bins (litter, domestic, glass and construction bins)



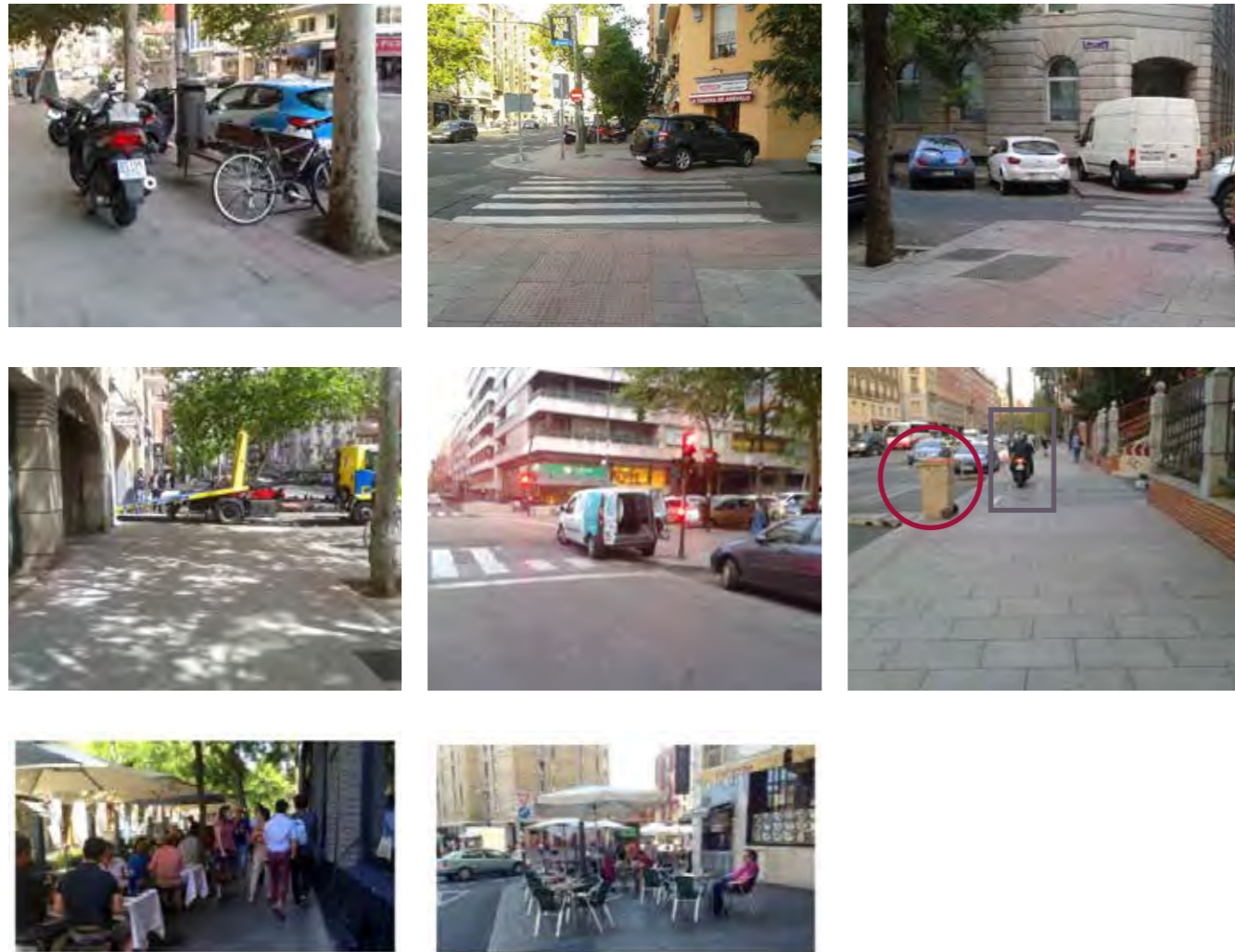
37

As already stated in section 5.2.1, it is very important to conveniently arrange of all these elements on the sidewalk. The following are recommendations on how these elements must be placed:



Pontevedra

Our intention is not to make an exhaustive list of examples and images of these types of barriers, but to try to make people aware of how important is to keep sidewalks free from obstructions so that they can be used by pedestrians.



Information panel obstructing pedestrian pathway



Use of urban furniture for private purposes



Inadequate location of the terrace next to the building façade



Furniture stacked on the street



Obstruction of the pedestrian crossing



Terraces placed by the kerb and adjacent to the building façade

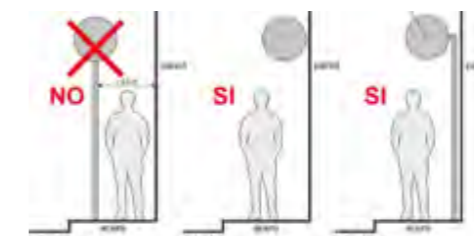


38

On narrow sidewalks that cannot be widened enough to comply with the minimum unobstructed widths (clear zones) indicated in the previous section, vertical signage could also become an additional obstacle. In these cases, the use of traffic signs with arms or attached to the walls should be avoided. If used, they need to be high enough, always taking into account the visual impact they may cause. However, they shall be regarded as exceptional.



Accesitec Blog



www.trafcoservicios.com



A Estrada ("Chapuzas galegas", *La Voz de Galicia*)



Barcelona



Camilo José Cela Ring Road (A Coruña)



In addition, a curb extension was installed by taking up space from the parking space. *Ideal Gallego*



"Chapuzas gallegas", *La Voz de Galicia*. Is it really a *chapuza* (shoddy work)? though, alternatively, can it serve as a reference of what should be done: placing many pieces of urban furniture on sidewalks, especially on narrow sidewalks? Probably, a good solution would be to extend the curb in the foreground. The control cabinet is placed in the middle of the sidewalk.

Several cities have decided to turn the bus shelters placed on narrow sidewalks, so that bus shelter poles do not obstruct pedestrian traffic on the sidewalk. However, if bus shelters are turned, it is important to ensure that the bus shelter side panel does not become an obstacle and that space is really gained.



Zubieta Street (Donostia)



San Bartolomé Street (Donostia)

Some city councils have authorised installing terraces on parking lanes, while prohibiting them on sidewalks in order to leave them unobstructed. The first photographs were taken in Verín and the second ones in Barcelona.



In the case of Barcelona, each platform can have a maximum of 3 tables and 12 chairs. Platforms are 6.6 m long and 1.6 m wide — including the surrounding flower beds —leaving a usable area of 6.60 m² for placing tables and chairs. In addition, they are 40 cm apart from the traffic lane and have protective devices. They are preferably placed between parking spaces and separated about 30 cm from the sidewalk — which will be covered with a strip so that users can pass without obstacles — to allow a correct water drainage. In addition, the system allows cleaning the road under the platforms. The owners of the establishments are responsible for the maintenance of these platforms.



On the other hand, there are successful urban actions that improve accessibility for people with reduced mobility:

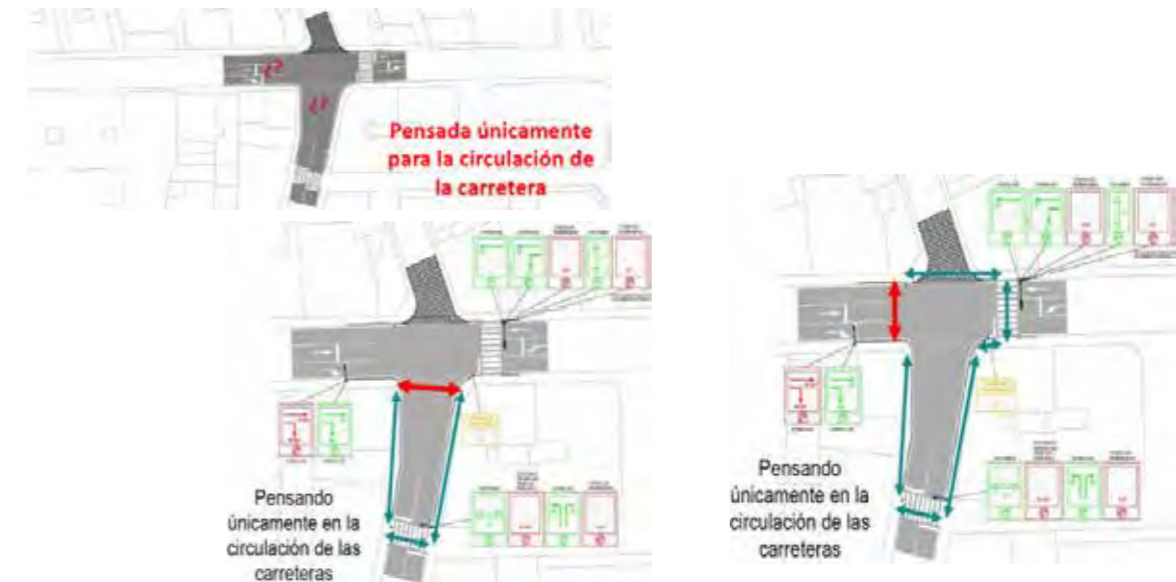


Aligned street furniture. The space between benches allows wheelchair users, people with baby carriages, etc. to stay, pass and move around between them.

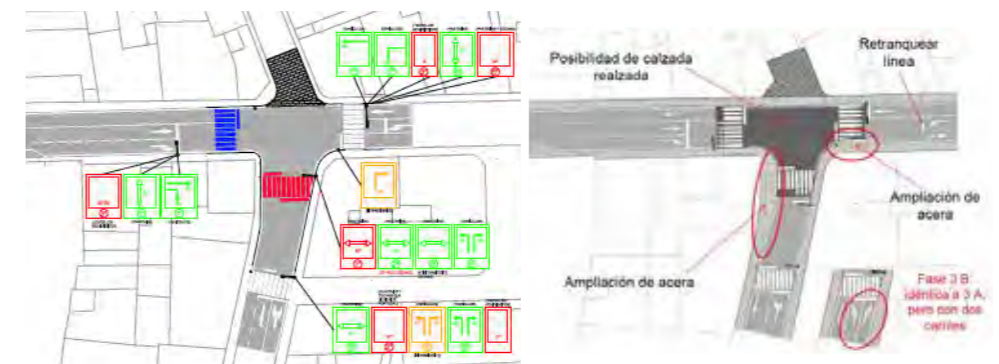
5.2.3 Crossings

Crossings should also be designed for all users and not only for motor vehicles:

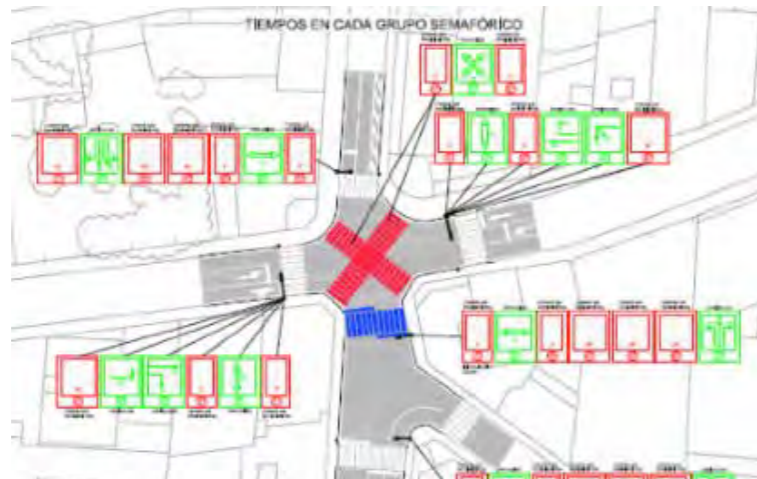
¿El centro urbano? No, esto es el encuentro de dos carreteras. No es ciudad



Rediseño pensando en los principales usuarios de la calle: los viandantes



Other examples:



Designs for the town of Verín



Tokio.
Recogido en el Plan de movilidad do Concello de Vigo

Shibuya. Cruce de calles: Scramble Kousaten



When considering the actions focused on the pedestrian mobility and stay, one must be aware that it is not only enough to focus on critical spots (which, in general, are usually crossings), but it is necessary to create appropriate, pleasant and safe traffic conditions on streets and sidewalks. The frequent bad conditions that pedestrians encounter in the streets increase their tension and discomfort. They tend to see the crossings as an obstacle that must be overcome quickly so as to escape from the bad situation as soon as possible. By improving the general traffic conditions for pedestrians, crossings, critical zones and spots, will be integrated in the improved route that is being designed. Thus, pedestrians will act more prudently and will consider these spaces much less problematic.

5.2.3.1 The barrier effect

This issue has already been mentioned in section 2.2 when addressing the lack of interaction between residents and/or passers-by on both sides of a street or road.

Essentially, the barrier effect is directly related to the speed and the motor traffic rate on streets and roads. The common practice has been to favour motor traffic and not to consider other options, such as diversifying it, reducing it, diverting these vehicles through other routes, imposing fines when taking certain routes, etc. As a result, pedestrians who have to cross the road are barely taken into account and their movements are obstructed.

This means that there are very few crossroads. Therefore, pedestrians have to make a detour to cross, and in crossings with traffic lights the time set for pedestrians to cross is short and cars do not remain stopped for a long time. Pedestrians have to wait long to cross the street or the road; sometimes in a hurry, those who can, or take risks trying to cross through unauthorised spaces.

These are some examples of large cities that can be used as a reference and that allow us to draw conclusions that can be replicated in other areas.

The barrier effect of the Paseo de la Castellana Avenue (Madrid)⁴⁰

Pedestrians take long to cross the Paseo de la Castellana Avenue.

⁴⁰ The following is an excerpt from the analysis conducted on this subject in the work *Plan de mejora de la circulación de los viandantes y ciclistas en Madrid*. F. Nebot, A. Sanz, P. Iturrioz, M. Llop. Mobility and Transport Department of the City Council of Madrid. 1991

	Tiempo estricto (min./seg.)	¿Puede cruzarse en una sola fase?	Tiempo inclu. espera media (min./seg.)	Observaciones
PLAZA DE CASTILLA (Pasarela)	1/45	NO	2/10	
RAIMUNDO FDEZ VILLAYERDE (Norte-RENFE)	1/40	NO	2/05	
RAIMUNDO FDEZ VILLAYERDE (Sur-Nuevos Ministerios)	1/40	NO	2/05	
PLAZA SAN JUAN DE LA CRUZ	2/20 - 2/40	NO	2/20 - 2/40	Más 55 seg. si quiere efectuar el cruce legalmente en la C/ Zurbano.
JOSE ABASCAL (Norte)	2/20 - 2/50	NO	2/45 - 3/15	Más de 20 seg. para alcanzar la calle María de Molina.
JOSE ABASCAL (Sur)	2/40 - 2/55	NO	3/05 - 3/20	
ALCALA (Cibeles-Norte)	1/40	NO	2/05	
ALCALA (Sur-Correos)	2/50	--	2/50	Más 30 seg. para alcanzar nuevamente la calle Alcalá.
ATOCHA (Norte)	1/35	NO	2/00	

41

As can be seen in the table above, the crossing time is over two minutes in almost all cases, and it sometimes reaches three minutes, and even more if pedestrians continue on the same side of the street from which they started. In a straight line the distance is about 100 m.

These conditions to cross the street are not certainly attractive for pedestrians.

One of these crossings, which was regarded as particularly critical in the aforementioned study, is shown below. Today, more than twenty years later, the situation is the same. This is the crossing of the Paseo de la Castellana at the San Juan de la Cruz Square.



Route to cross the Paseo de la Castellana from the area of Vitrubio Street, Museum of Natural Sciences and School of Industrial Engineers (right) to the San Juan de la Cruz Square, Zurbano Street and the Nuevos Ministerios Area (left)

41 The average waiting time on the sidewalk to cross was estimated at half the duration of the green phase for vehicles



An example in Valencia

An example of the long distance that a pedestrian has to walk (between the two red circles)



Pedestrian route from the European University of Valencia to the Jardines de Viveros Park (La Vanguardia)

5.2.4 Carriageway sections

Carriageway sections and parking spaces must be designed to avoid double parking and other types of parking violation, because, besides causing all kinds of problems, they also interfere with pedestrian routes.

In order to achieve this goal and as a traffic calming measure, it is advisable to reduce the carriageway section to the minimum width that allows the passage of a fire truck. Around 3 m⁴² for a speed of about 30 km/h.

It should be pointed out that the narrower the lane, the lower the speed of motor vehicles on the road.

On this issue, the Swiss standard VSS SN 640 201 *Profil géométrique type. Dimensions de base et gabarit (Recherche et normalisation en matière de route et de transports)* lists a series of widths that can be taken as a reference, since they were verified⁴³.

They are listed below:

These are the widths of reference:

	Pedestrian	Bicycle	Car	Truck
Width	From 0.60 to 0.80 m	0.60 m	1.80 m	2.50 m

The dimensions should be also accompanied, in this case, by a safety margin taking into account the inevitable variations in the vehicle's straight or regular trajectory and depending, logically, on its speed.

Safety margin	Pedestrian	Bicycle	Car	Truck
Vprox= 20 km/h	0.10 m	0.10 m	0.00 m*	0.00 m
Vprox= 30 km/h			0.10 m	0.10 m
Vprox= 50 km/h			0.20 m	0.20 m

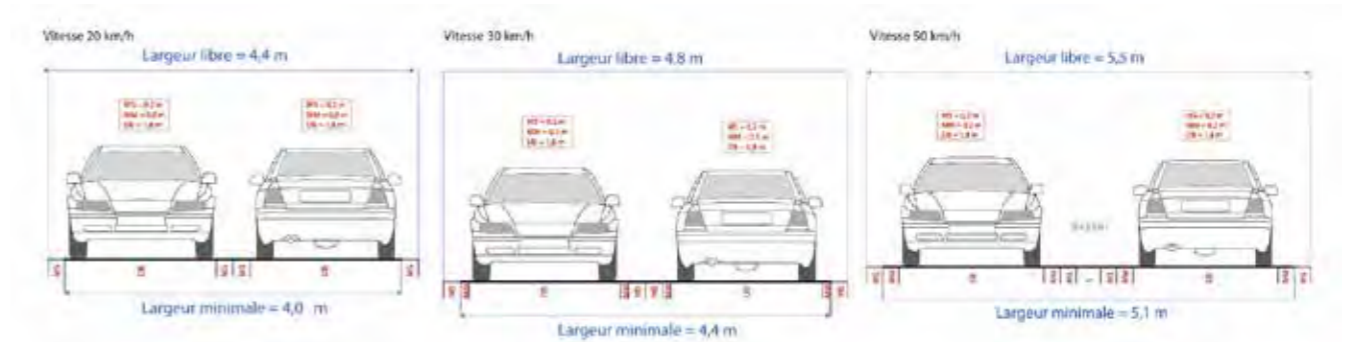
* 44

42 Small widenings can be considered in reduced radius curves, but only for traffic speeds of 50 km/h or above. Below these speeds some studies, such as *Recomanacions de mobilitat per al disseny urbà de Catalunya* (Territorial Policy and Public Works Department. 2009), consider that it is not necessary to increase the curve width

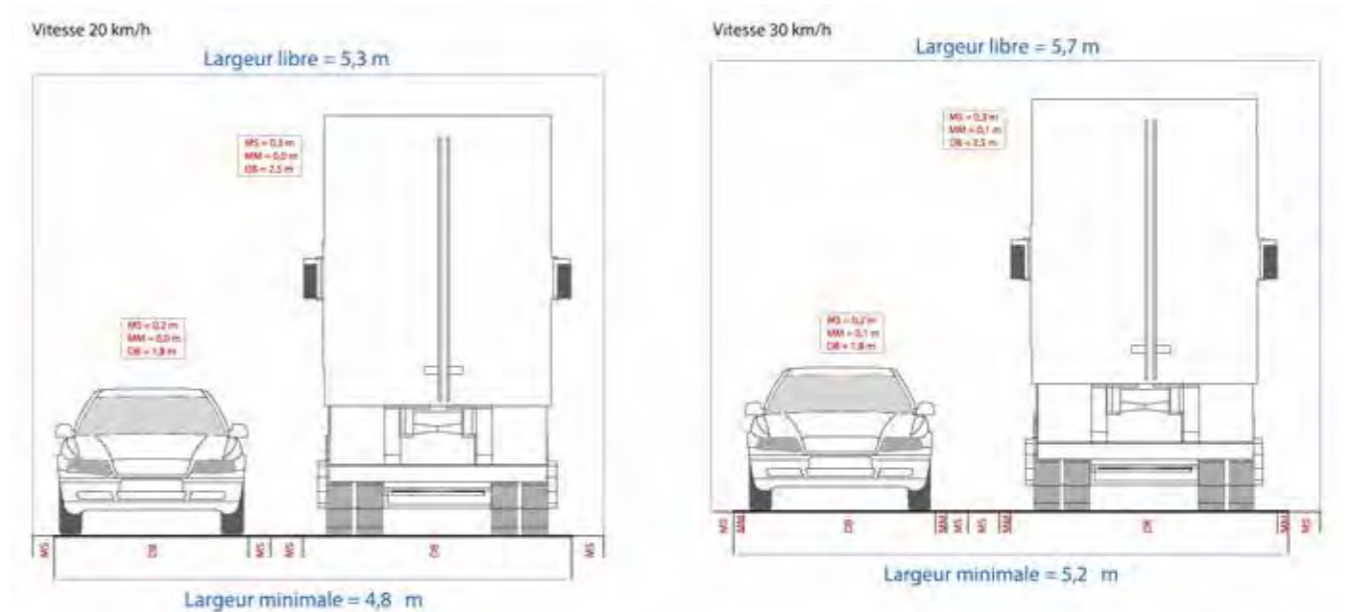
43 The German standard *Empfehlungen für die Anlage von Erschliessungsstrassen*. EAE 85/95. *Forschungsgesellschaft für Strassen und Verkehrswesen*. Arbeitsgruppe Strassenentwurf provides similar figures

44 In some documents the margin of movement for low speeds such as 20 km/h is considered, insignificant for cars and trucks, because this speed is estimated as just preceding the stop. However, this margin can be assimilated to that of 30 km/h. In fact, as can be seen in a subsequent graph (*Manual de movilidad peatonal*), speeds under 40 km/h are included in the same group

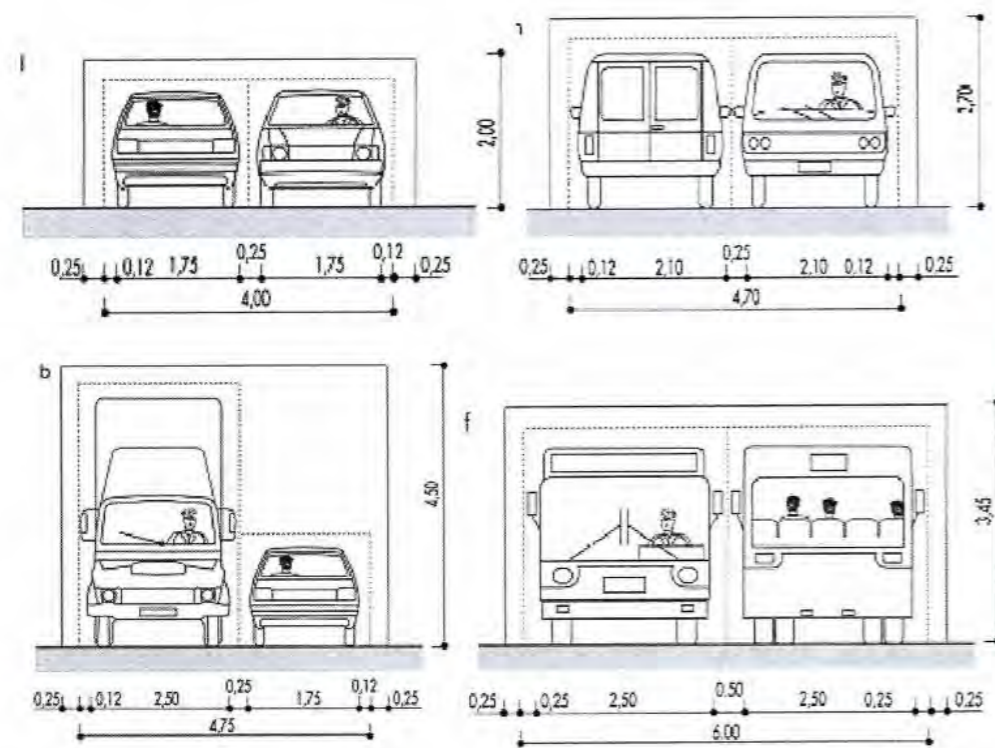
This is the width that the carriageway needs to have for two traffic lanes in the city, according to the document referred and incorporating the safety margin and taking into account the bidirectional traffic:



It underlines the importance to establish maximum traffic speed and, contrary to what is assumed, that wide traffic lanes are not necessary in cities, even when heavy vehicles are allowed on the road.

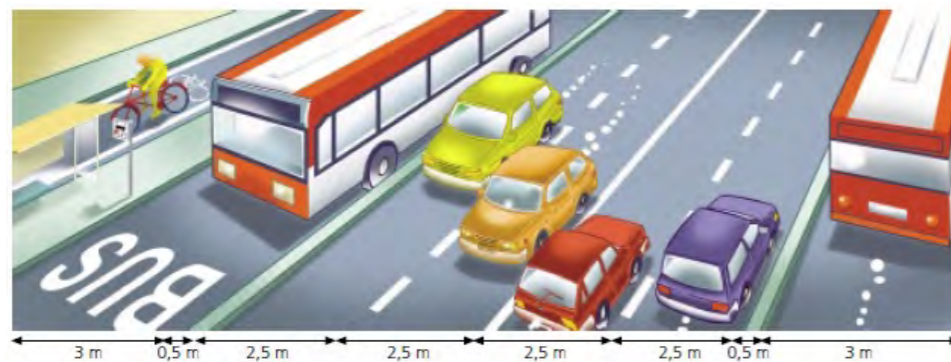


In other studies and documents, similar widths for traffic lanes and carriageways are established:



Necesidades de espacio en el cruce de automóviles, furgonetas, un automóvil con un camión y autobuses. Velocidades inferiores a 40 km/h.

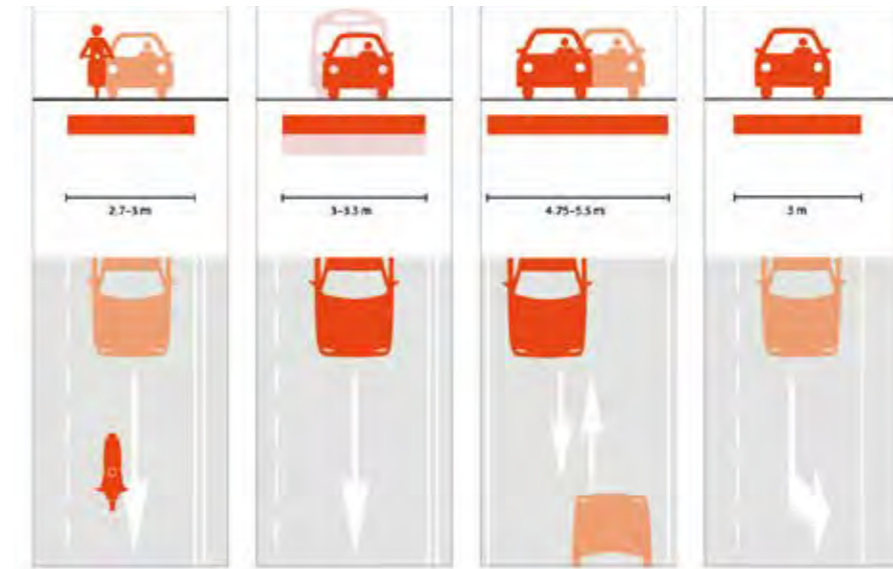
45



Urban area with an exclusive lane for public transport⁴⁶

45 An excerpt from *Manual de movilidad peatonal. Caminar en la ciudad*. A. Sanz. Association of Highway, Canal and Port Engineers. 2016. It makes reference to the German standard quoted in the previous footnote

46 *Criterios de movilidad en zonas urbanas*. RACC



47

5.2.5 Some parking considerations

In general, parallel parking is recommended, as it allows to have more space in streets than angle parking. However, it does not mean that the carriageway space has to be larger.

Spaces for parallel parking should have a width of about 2.20 m, +/- 10 cm. Those for angle parking shall be about 5 m x 2.50 m⁴⁸ and be designed in such a way that the vehicle exits in the traffic way (known as back-in angle parking). In any case, nose-in angle and back-in angle parking spaces should be only used in areas with a maximum speed of 50 km/h or below, and never at intersections.

Back-in angle parking spaces is being a widespread practice. Here are some examples:



Pla local de seguretat viària. Annex Bones pràctiques (Tarragona)

47 *Global Street Design Guide*. Global designing cities initiative and National Association of City Transportation Officials. Bloomberg Philanthropies. 2016

48 As regards marks on the road surface for parking spaces, it is recommended to place a central line of 2.30 m and two outer lines, enclosing the previous ones, delimiting the 2.50 m zone. This helps drivers to park their vehicles better (vehicles tend to be parked in the centre of the parking space) and is easier to park in adjacent parking spaces



Monturiol Street (Rubí, Barcelona)



Street in Gasteiz



Bizenta Mogel Street (Gasteiz)



Fernando Conde Street (Vigo)



Ribeira (A Coruña)

However, there are also cases of traditional nose-in angle parking even in roundabouts and street crossings (in this case, they are crossings with chamfered street corners). Some examples are shown below, but this type of solutions are not recommended.

These cases are frequent in the expansion district Ensanche of Barcelona:



Casanova/Diputació Street



Muntaner Street

On the other hand, it is worth paying attention to the chamfered street corners of the expansion district Ensanche designed by Cerdà. The following example shows how the intersection between two important roads with a high-traffic rate was improved, gaining space for pedestrians:

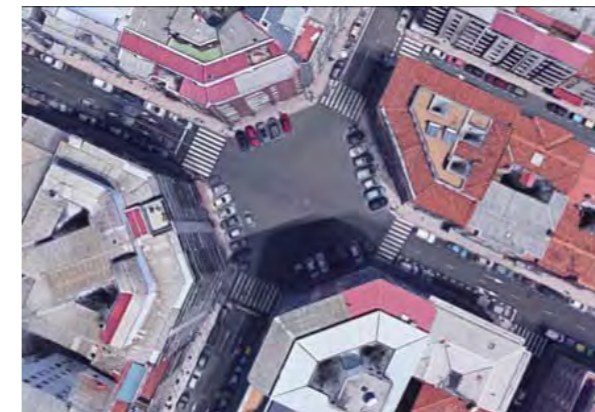


Muntaner Street/Gran Vía de las Cortes Catalanas Street

The following examples, corresponding to the city of León, are certainly not recommended:



República Argentina Avenue (León)



República Argentina Avenue (León)



Bernardo del Carpio Street (León)

As can be seen in the roundabout on the right, green spaces were created on chamfered street corners. Although there is no space for pedestrians, it is a more friendly design. However, crossroads (in the centre of the photograph) were not changed.

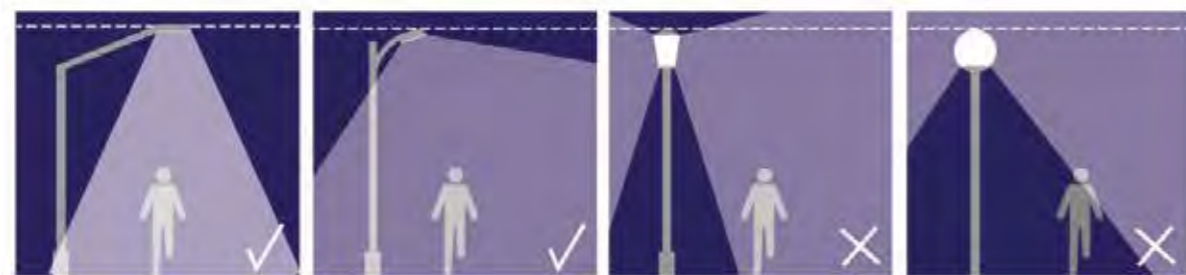
In the following example, the large asphalt surface intended for cars can be seen:



Lancia Avenue (León)

5.2.6 Some lighting considerations

Lighting must be designed and aimed for **pedestrian routes**, in particular for **crossroads and pedestrian crossings**. Dark areas should not be left on sidewalks, and the lighting should not disturb or dazzle pedestrians or drivers.



The approximate transverse distance between the posts of the street lamps should be between 2.5 and 3 times the height of the light source. On narrow roads, a single row of street lamps may be sufficient to illuminate the road⁴⁹.



49 Global Street Design Guide. Global designing cities initiative and National Association of City Transportation Officials. Bloomberg Philanthropies. 2016

Lighting of pedestrian crossings, which are sometimes zebra crossings, that is to say, crossings without traffic lights) is very important; especially in rural and peri-urban areas. When the road passes through a rural populated area, where the number of people crossing the road at night is often low, pedestrian crossings must be properly illuminated so as drivers can see them.



Town of Sabarís (Baiona)



Álvaro López Núñez Avenue (León)

Venecia Avenue (Cartagena)

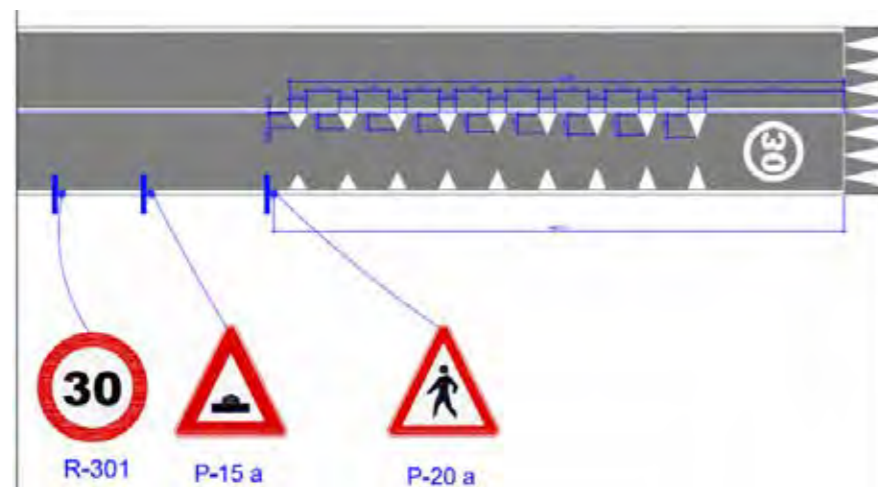
In rural areas, pedestrian crossings (often at road level) are hardly ever used. In these cases, permanent illumination at night can be uncomfortable for drivers. So, a good option may be placing lighting systems activated when there is a pedestrian, either by the person who wants to cross or by sensors that detect the pedestrian movement on one side of the road and are connected to the other side of the road by different systems activating the street lights on both sides.

As a complement to lighting (or in the event of its failure), it may be interesting to add horizontal signs known as dragon's teeth⁵⁰ or speed humps to indicate pedestrian crossings. These actions shall be motivated in the project.

50 They can also be used, if considered in the project, to reinforce or complement the measures presented in this document on speed reduction on rural roads and crossings



Example of dragon's teeth



Dragon's teeth. Design by the Provincial Council of Pontevedra

As has been said, it is very important to clearly illuminate pedestrian crossings so that they can be easily identified. If the illumination of the carriageway is homogeneous, the pedestrian crossing will not be detected.

If the light is directed towards the surface of the pedestrian crossing, pedestrians will be left in the dark. Likewise, when the access to the pedestrian crossing is not properly illuminated, it may seem that the pedestrian is suddenly emerging from the shadows.

Minimum illumination levels in both the vertical and horizontal planes must be set, avoiding pedestrians remaining in the dark and lights dazzling drivers.

The pedestrian silhouette and volume should be made clearly visible and 3D image must be seen as best as possible.

In this sense, when referring to the additional lighting of pedestrian crossings, the *Guía de eficiencia energética en instalaciones de alumbrado exterior*⁵¹ indicates that "the minimum recommended illumination levels in the vertical plane shall be 40 lux, with a limitation on glare intensity (G2) in the vehicle traffic direction and glare intensity (G3) in the pedestrian direction". It is recommended to follow these guidelines.

51 Technical application guide: GUÍA-EA-02 Eficiencia energética en instalaciones de alumbrado exterior. Instrucción técnica complementaria EA-02 Niveles de iluminación. Ministry of Industry, Energy and Tourism. May 2013

Adequate illumination of road margins and pedestrian crossings is especially important in roads passing through villages and towns. Adequate and well-studied illumination systems enable, logically, drivers to have a better view of both road margins and pedestrian crossings, thus increasing safety. In addition, the lighting can serve as a gate to the centre of the village or town and informs drivers that they are about to drive along a non-conventional road section.

5.2.7 Some information on traffic lights

In many areas referred to in this document, pedestrian flows are dense, therefore the number of traffic lights must be reduced. A high number of traffic lights makes pedestrian mobility difficult, since they are usually installed to make vehicle traffic flow smoother. Therefore, it is necessary to place the number of traffic lights that enable an adequate traffic flow of motor vehicles, which should always be subordinated to the type of pedestrian priority established for each area. In the framework of friendly mobility, road safety and urban quality referred to in this document, the general rule should be placing a zebra crossing, not a pedestrian crossing with traffic lights. Obviously, in areas and streets with pedestrian priority and in areas with a single platform, pedestrian crossings should be avoided. Nevertheless, it all depends on the desired purpose: for different purposes, different alternatives; in other words, we must consider in each case whether we want to give preference to pedestrians or to motor traffic.

At an intersection with pedestrian crossings controlled by traffic lights, there are usually three aspects that may obstruct pedestrian mobility:

- **The waiting time is too long:** as a general rule, in urban areas, pedestrians should not wait more than 30 seconds, with a maximum of 40 seconds. If the waiting time is longer, it will mean that the mobility needs of pedestrians are not adequately met or that they are placed behind those of motor vehicles⁵².
- **The green phase for pedestrians is too short.**
- **Conflicts with vehicles that turn:** this happens when the traffic light for vehicles is green or flashing at the same time as pedestrians have theirs in green.

In pedestrian crossings controlled by traffic lights, it is very important to set a sufficient crossing time for pedestrians in accordance with the mean walking pace. It should also be considered the different types of people, their age and mobility conditions, including children, people pushing a trolley, pregnant women, teenagers and young people, adults, people with reduced mobility (people in wheelchairs and visually impaired people go at different speeds), elderly people, etc. All of them must be able to cross the street without going in a hurry. The period of time that passes when the traffic light is flashing green for vehicles and changes to red for pedestrians deserves a special mention: the time elapsed between the pedestrian starts to cross (which coincides with the end of the flashing) and the traffic light for cars changes from red to green must be such to allow the pedestrian to reach the opposite sidewalk under mean walking pace (this is called "clearance interval"). When the traffic lights for cars turn red, those for pedestrians do not turn green until some time later, which is the time taken by a vehicle at normal traffic speed to reach the intersection exit. However, this is not normally applied for pedestrians.

52 If the crossing is very complex, with many streets and junctions, the complete traffic light cycle lasts a long time, and pedestrians and motor vehicle drivers have to wait longer than recommended

In the case of roads passing through villages and towns, the green phase time for pedestrians wishing to cross is essential and the clearance interval is particularly important.

For all users, but especially elderly people (they are used to crossing the road slowly) and children, who quite identify this road section as their street, it is important to set adequate and sufficient phase times. We must bear in mind that if for regular users they are crossing the street of their village or town, for drivers, in spite of the new design measures installed, it is the road they are driving on and, additionally, they encounter obstacle of the traffic light.

In these roads, it is also highly recommended to set a red phase time for everyone (people and vehicles) in which the traffic light turns red for cars and green for pedestrians, to allow the passage of those vehicles that drive through the amber traffic light in the last minute. This may not prevent drivers, who are aware of such a situation, from rushing through the amber light, without being aware that with a fixed amber light they must stop⁵³.

Finally, it is advised that pedestrian crossings in roads passing through villages and those, which, exceptionally, are installed in other roads, are visible, **if possible, by speed humps advance warnings placed prior to the crossing.**

5.2.8 Corner design. Curb extensions

As already noted, pedestrian crossings should be as short as possible, and, in order to achieve this, curb extensions are the appropriate and recommendable elements.

Pedestrian crossings must be separated from parking spaces, if necessary, by physical measures, such as bollards, flower pots, tree grills or **sidewalk extensions if there are parking spaces**, etc. All these elements are recommended for this purpose.

Likewise, this separation should not be limited only to the pedestrian crossing, but extended to both sides of the road to avoid vehicle parking obstructing the driver's view of the pedestrian and the pedestrian's view of the cars. It is usually a good solution extending the sidewalk in the pedestrian crossing on both sides.

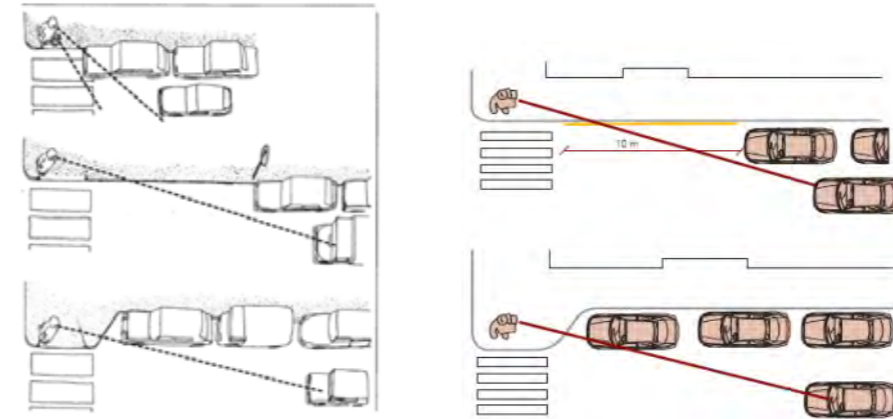
⁵³ This is stated in the General road traffic regulation, in its Article 146(3): "A non-flashing amber light means that vehicles must stop (as if it was a fixed red light), unless, the car is so close to the traffic lights that it cannot stop in safe conditions".

As it is also stated, there is one exception: when we are very close to the traffic light. That is to say, so close that we cannot stop the vehicle in safe conditions, without the risk of being hit from behind, or just before the traffic light line, even though we press the brake pedal hard. If we drive properly, anticipating the potential situations, we will be able to see the amber light and have time to brake. And, in the same way, if we keep the correct safety distance from the vehicle in front of us, even if it brakes suddenly, we will also be able to do so without danger of colliding. This situation included in the regulation is, obviously, exceptional.

However, what we see every day in the cities of our country, where, too often, we go in a hurry, is far from what should be. Unfortunately, many drivers understand the amber traffic light as a "step on the gas", even when they see the light at a certain distance and with time to brake without any problem. This usually means that they end up passing through the red traffic light, or when it is about to turn red. This is dangerous, because there are many road users with their respective routes that can intersect with the route of the vehicle that, instead of braking, accelerates and passes through in amber (text excerpted from the blog *Circula seguro. Tu publicación sobre seguridad vial*. Fundación Mapfre y Michelin Fundación).

However, if a driver wonders if he or she can be fined for passing through a fixed amber traffic light, the answer below explains the usual driver behaviour. Quite often, the driver accelerates, instead of braking, when the traffic light turns amber for cars: "No, they can only fine you if the traffic light turns red. If it is amber, they can only do it when it is obvious that you have not stopped but had the possibility of doing so. But you cannot be fined by a red light camera, only by a cop who has seen the dirty trick" (from the website www.todoautoescuela.net)

The sidewalk extension to protect pedestrian crossings is recommended to be at least 5 m (one parking space) and preferably 10 m, especially in areas where traffic speed is above 30 km/h. It is also possible to adopt measures to prevent parking, such as those mentioned above: bollards, flowerpots, etc., although they do not help to increase space for pedestrians.



Five street corners (Juncal, Libertad and Quintana) in Buenos Aires. Before and after

These recommendations are equally valid both for the centre of cities and towns and for roads passing through villages and towns.

What is known as curb extensions, which are sidewalk extensions at corners or intersections, are probably the best solution to address these problems.

They have many advantages for pedestrians without affecting road capacity:

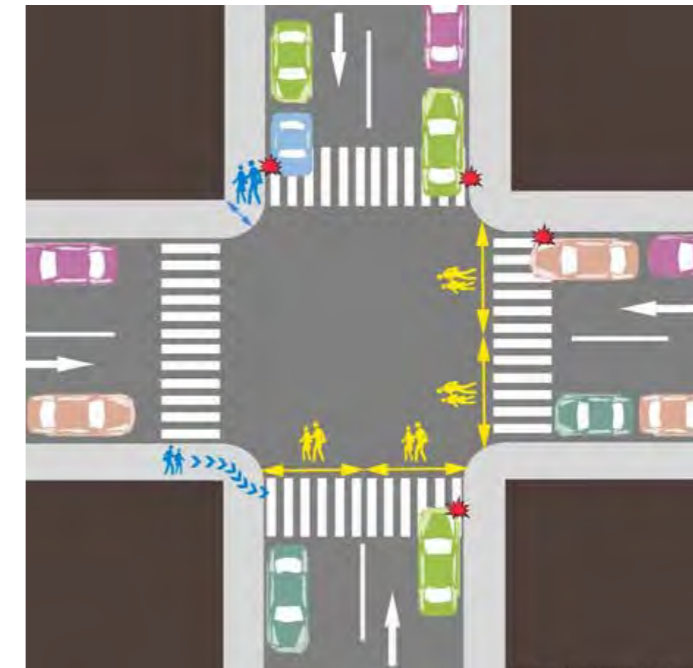
1. To facilitate pedestrian crossing by reducing the distance they have to walk on the carriageway.
2. To allow pedestrians to better look at both ways before crossing.
3. To prevent illegal parking on pedestrian crossings and zebra crossings.
4. To prevent illegal parking at street corners, which are the most disturbing places for all types of pedestrians, wheelchair users and baby buggies.
5. To better redistribute the logical directions of pedestrians.
6. To improve the marking possibilities on different pavements.
7. To be used to place part of the urban furniture that obstructs pedestrian movement in other places.
8. To extend the pedestrian area to be used for new purposes.
9. To contribute to reduce vehicle speed because they seem to narrow the street and reduce the carriageway width and the turning radius for vehicles.

In consolidated urban areas, to establish the size of curb extensions, a turning radius of 4-6 m for light vehicles and of 10 m for buses and other heavy vehicles can be taken as a reference. At road intersections with more than a single traffic lane, the turning radius may be lower (4 m), which forces larger vehicles to occupy more than one lane when manoeuvring. However, before establishing the minimum and maximum radii, it is important to analyse each case when drafting the project⁵⁴.

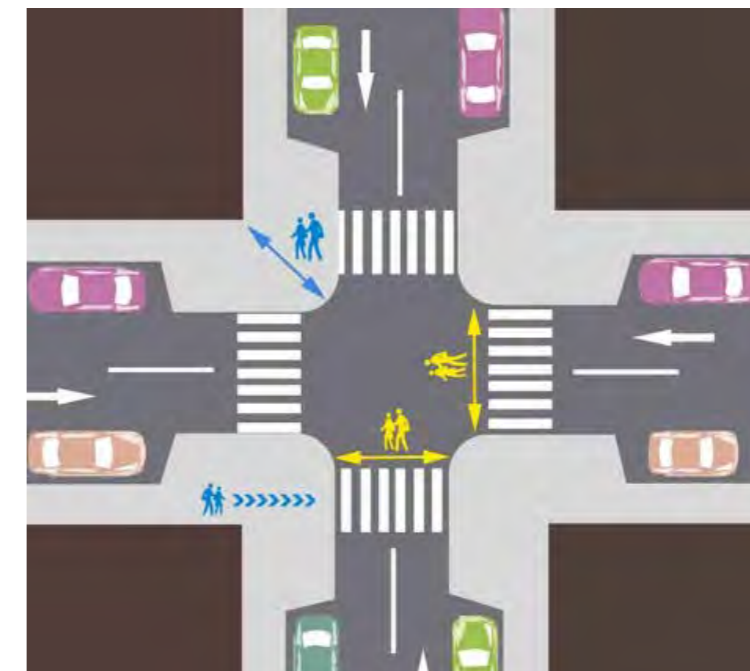
If the curb extension radius is excessive, it may lead to illegal parking, but if it is too small, manoeuvring larger vehicles (garbage trucks, fire trucks, buses, trucks for loading and unloading) can be difficult. It is therefore essential to adjust the size of curb extensions.

An example of the results of using curb extensions in a standard crossing can be seen below:

- Without curb extensions:



- With curb extensions:



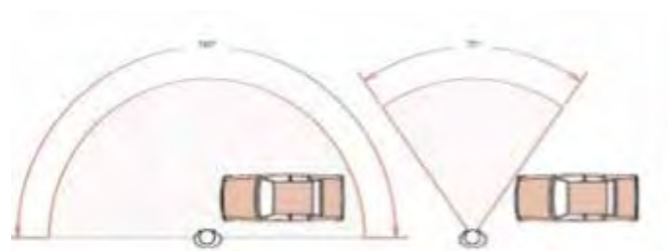
⁵⁴ These figures are based on a basic premise. Not all types of vehicles can drive through these urban areas. Crossings and turns cannot be adapted for any type of bus, whether it is 12 or 15 m long, or any type of truck, either rigid or articulated. Large vehicles, on the other hand, had a different turning radius and cover a different area depending on the speed at which they turn. In consolidated urban environments, turning speeds must necessarily be extremely low and the lower the speed the smaller the turning radius and the area covered.



5.2.9 Visibility and reciprocal visibility

The control of badly parked cars becomes especially important when it comes to children. If there are badly parked cars, drivers may not see the kids or not notice them early enough, due to their low height, and kids may not see approaching vehicles.

We should bear in mind the great difference between the narrow visual field of a kid (70°) and that of an adult (180°):



Children are shorter than adults and parked cars obstruct their view of the street. In the following image, the photo on the right corresponds to the vision of a kid, and the one on the left to that of an adult, which is able to see beyond the parked car.



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In addition, children have a visual contrast perception, making it difficult for them, for example, to distinguish a black car on the road in a dark background. They also have difficulty in establishing the vehicle size and distance, so they quite often do not differentiate correctly between a parked car and a car in motion.

Moreover, the field of vision is reduced as the car's speed increases. At lower speeds, drivers can pay more attention to what is happening on the roadside, and they are more likely to slow down or brake, which does not happen when driving at higher speeds.

At higher speeds, drivers are less able to see pedestrians, especially children, and even less able to stop so as not to hit them:



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55 Excerpted from *Recomanacions de mobilitat per al disseny urbà de Catalunya*. Regional Government of Catalonia. 2009

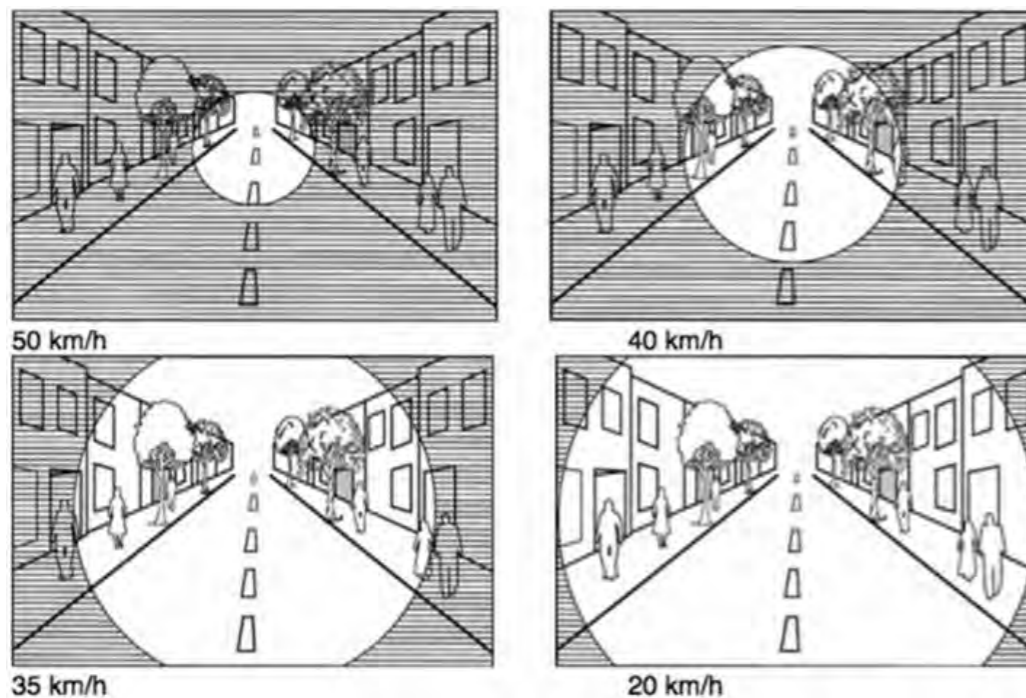
56 Rue de l'Avenir 2016

57 *Maîtrise de la vitesse*. Ministry of Ecology, Energy, Sustainable Development and Territorial Development. 2010

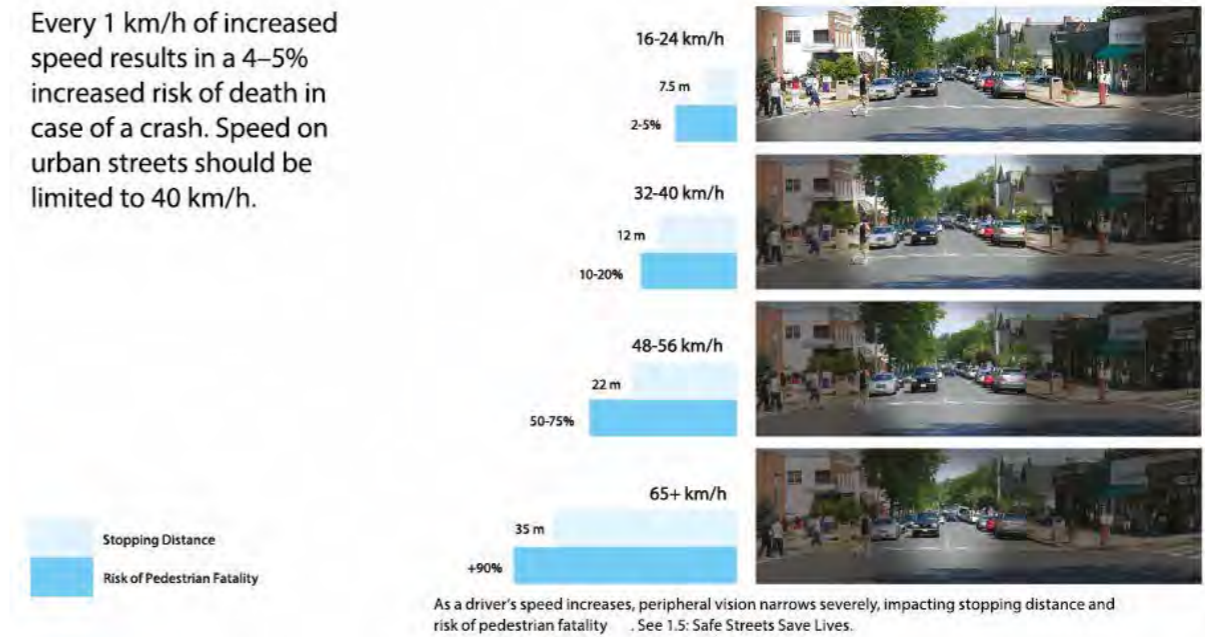
The peripheral vision that is required for driving in urban environments is greatly reduced as speed increases:



The faster you drive, the more you focus your gaze and attention farther away and the more your field of vision is reduced. The perception of the surrounding area is lower as speed increases.



Every 1 km/h of increased speed results in a 4–5% increased risk of death in case of a crash. Speed on urban streets should be limited to 40 km/h.



5.3 Pedestrian priority measures in rural and peri-urban areas

The relationship between people and public spaces is similar in urban and rural areas. However, the importance that people have had in space design has been different, but in both cases it has been reduced and, sometimes, considerably (for example, in peri-urban areas the road, with the increase in motor traffic, has made their residents feel imprisoned in their homes).

The measures to address this situation may differ between urban and rural areas, as well as their implementation, but they have common elements and essential references that should guide actions in both cases.

The defining action guidelines set in this document should be followed and applied in both rural and peri-urban areas:

- The need to create ample and wide spaces for residents, both to stay in and move around comfortably and safely.
- Spaces free of obstacles and protected against the invasion of external elements, especially if, as is often the case in rural and peri-urban areas, pedestrian traffic flows are not high or maintained throughout the day, so there are periods when these spaces may be easily occupied.
- Road sections for motor traffic that are designed in such a way that they do not encourage higher speeds due to their excessive width.
- Motor vehicles speed limits, preferably physical ones, like placing more safety signs.

- Crossroads designed bearing pedestrians in mind, without making their routes longer. Installation of traffic lights with adequate timings for pedestrian crossing.
- Pedestrian crossings as short as possible, well protected, preferably with raised devices, with parking prohibitions (which should be implemented through physical actions that prevent parking) on their edges, and pedestrian crossings where the visibility of pedestrians and vehicles is guaranteed.
- Well-illuminated pedestrian crossings.

As a rule, it is especially important to bear in mind that pedestrians and cars should never compete. If this happens, pedestrians will be the ones to lose.

For this reason, on streets and roads with separate spaces for pedestrians and motor traffic, it is necessary to keep a physical separation between them, in such a way that it is not easy for cars to surpass or invade the pedestrian space. This recommendation is applicable and extensible to streets and lanes that are connected and merged with a road passing through a town, village or parish. In these cases, the installation of H-75 beacons, bumps, ditches, rubber road separators or other similar devices can be good barrier solutions.

On the other hand, in the roads passing through towns and villages, the verge or passable ditch, which is commonly used by pedestrians, need to be suitably protected (with the measures previously indicated or other types of devices). Without these measures, even though the roads are well designed with the required lighting and right speed limit, people who walk along the passable ditch or verge feel unsafe or afraid and do not trust drivers. As a result, these pedestrians apply the aforementioned principle of risk compensation and do not use these roads. Consequently, there is a generalised and habitual absence of pedestrians on the verge of roads passing through towns and villages, and, as a result, cars increase their speed. Therefore, it is essential to implement effective traffic calming measures.

Sidewalks in rural and peri-urban areas deserve a special mention. The mimesis with the city identifies the sidewalk as a step forward, one more step that needs to be considered by public authorities. Unfortunately, that is the only demand made on many occasions by rural communities. "Our streets have already been sidewalked!". This seems to fulfil their aspirations. However, these sidewalks, which are often narrowed because of the lack of space between facades or adjoining walls, only provide a space in which pedestrians feel more secure. In other words, pedestrians sense less danger, but in no way it contributes to regain the street space for the everyday use of its inhabitants, as a place to meet and enjoy, and reduce the barrier effect that motor traffic and its speed have exerted on both sides of the road. In rural areas, it is necessary to overcome the idea that sidewalks are the maximum goal to be achieved, and instead people should claim streets and spaces as their own.

However, sidewalks are expensive and require careful maintenance to avoid deterioration. It is necessary to move from conceiving the sidewalk as the doormat of the house. Instead, the street (although in rural areas it can be regarded as a road) should be conceived as the authentic carpet and hall of the house, the one that is projected outwards, and not as a hostile space avoided by pedestrians, who prefer to stay inside the house.

Apart from sidewalks, other solutions, sometimes cheaper, should be considered. But, undoubtedly, it is necessary to make the inhabitants of these rural areas aware that there are other options, which are not second-rate solutions and can be applied to a greater length of the road and therefore benefit more houses (for example, 2.5 m wide-pedestrian walkways on one side of the road), which can be built in a less amount of time and included in the municipal budget without so many obstacles (due to the expense limit). These solutions are equally valid if they are complemented by other actions that contribute to regain the space that has been only for motor vehicles. The sidewalk alone does not address or solve the underlying problem: regaining public space for the people, regaining the street the motor traffic has turned into a motor road, the enjoyment of the village road that has separated the neighbours living on both sides, the possibility to walk along the roadside safely, etc.

This is common in rural and peri-urban roads, where the aim is to provide a space where people can walk around a population centre or to some nearby facilities outside the residential area itself (church, beach, market, etc.).



Jeanne Picard. NGO STOP Accidentes (Pontevedra. November 2016)

A proposal could include, for example, a painted pedestrian walkway (with coloured or concrete pavement) on one side of the platform, at a single level and a recommended width with a 2.5 m threshold. In all cases, the type of separation or protection from motor traffic lanes must be analysed and defined in the project, as well as the **need to implement a speed limit** (50 or 30 km/h, depending on the case) and the means to achieve it, so that **traffic calming measures can effectively be applied**.



Action of the Provincial Council of Pontevedra (in an area different from the one shown in the previous photo)

The solution of the single platform should be considered for rural areas and villages, and not be exclusive for towns and cities. In places and parishes of the municipality of Pontevedra it has been installed in many places, mainly due to the limited space available; but actions in rural areas shall be also aimed at achieving the main objective: regaining public space for everyone, to live in, to meet and also to move around.

Especially on rural secondary roads, horizontal signage is important. It does not mean that the most commonly used road signs are the most appropriate and the best at improving safety. Without going deeply into this last issue, we should decide whether this assumption is true, since the signs designed for cars give safety to drivers, who will be more likely to increase their speed or not to reduce it, and so the use of these signs will only provide greater safety for motor vehicles.

Is it always advisable to mark the two lanes of the road well? Is it better to mark the axis of the platform at all times but not the outermost sides? Is it sometimes recommended not to place horizontal signs? How can pedestrians walking on the road be better protected? How can motor vehicles speed be reduced more effectively?

These are no definitive answers to these questions, and the different situations will have to be dealt with in different ways. However, apparently similar situations need to be solved with different actions, depending on the desired objectives and the location and surroundings of each road section and its characteristics. In conclusion, there is not a single universal solution for all cases.

Certainly, it is not easy to address this issue. Each case will need the appropriate solutions that shall be incorporated into the corresponding design and safety project⁶⁰.



Ribeira (A Coruña). Two-way road section with horizontal signs only on the sides



Note the different treatment for sidewalks on road sides. Is it adequate or inadequate?
This type of decisions must be justified in the project

⁶⁰ Reference is made to section 5.4.4 “Continuity of pedestrian routes”, in particular to section 5.4.4.2 “Sparsely populated urban environment and rural centre” for additional information

5.4 Traffic calming

All that has been said covers and gives content to what is known as traffic calming, which serves as a conceptual framework for developing and implementing specific measures focused on motor vehicle traffic.

Traffic calming as an important but occasional measure contributes greatly to reduce vehicle speed and gives people the chance of enjoying public spaces safely. Thanks to traffic calming measures pedestrians can develop their activities and take their decisions according to their wishes and needs, and not in a way mediated by the presence of car drivers and their demands.

5.4.1 Common and general recommendations

It is not recommended to place any device that is not part of the traffic calming measures. These elements must be included in a project or study of a whole road section, a street or a wide area, so that the action will be coherent ⁶¹.

When possible, and only in justified cases, changes in alignment, chicanes, islands and other elements of horizontal planning that turn these areas into complex, strange and incoherent spaces are not recommended, and they usually have very limited effects on traffic calming. In addition, the road section needs to allow the passage of fire trucks and other service vehicles, such as moving vans or construction vehicles, so they have proved to be quite ineffective for automobiles and no effective for motorcycles.

In general, and especially in urban areas, prefabricated devices are strongly not recommended since they are not hard enough, have a low durability, are noisy and difficult to read. Transverse warning speed humps based on vibration are not recommended in urban environments because they are noisy.

Except in cases where a street or area is surrounded by other streets with traffic calming measures, there should always be an entrance to the area, for which the preferred options are roundabouts and also speed humps.

In these cases, if speed breakers are used, accompanied by other designs and actions contributing to reinforce the entrance (i. e., **they do not constitute the entrance themselves but a complement**), the slope of speed humps could be somewhat smaller than when used alone. In other words, in this case speed humps could be gentler than the previous ones, preventing them from being confused with pedestrian crossings. An example of this would be a design with roundabout serving as the entrance, preceded by speed humps to warn of its presence.

⁶¹ Only in exceptional cases it may be necessary to install these devices alone, but these actions must be justified and in no way generalised; since, as has been said, it is an undesirable practice

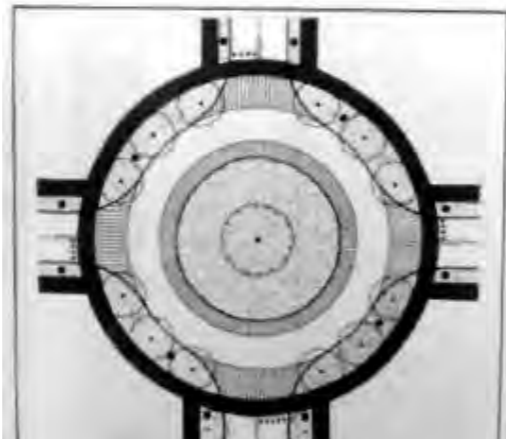
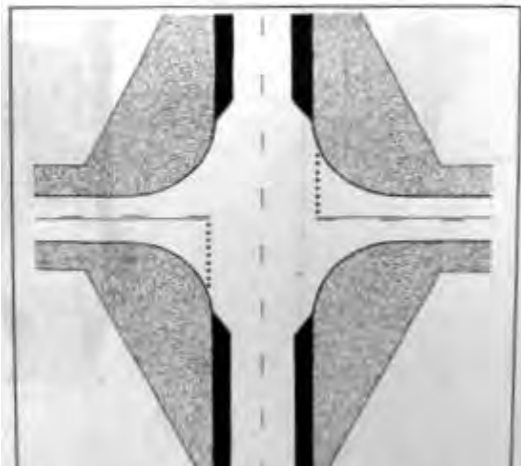
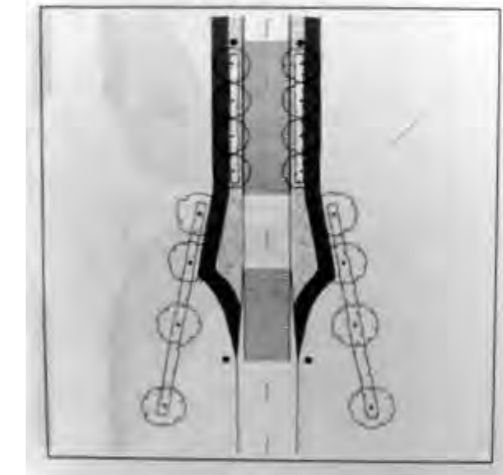
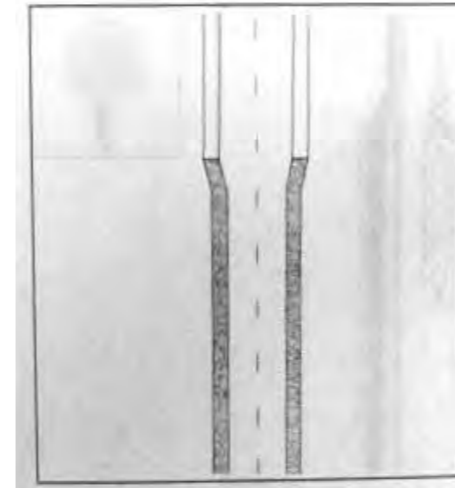
5.4.2 The entrance to the city and population centres

The doors define the threshold from which one leaves the staircase, for example, and enters home. When you cross that door the setting changes. In the same way, the road could become a street, where a motor traffic zone with few restrictions becomes a place where different modes of transport coexist.

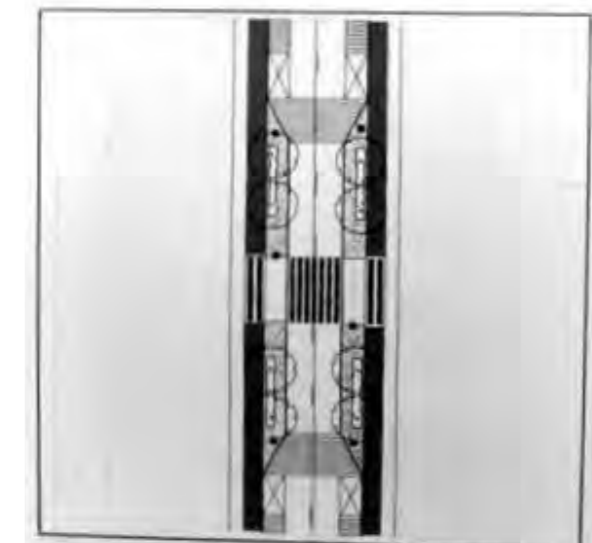
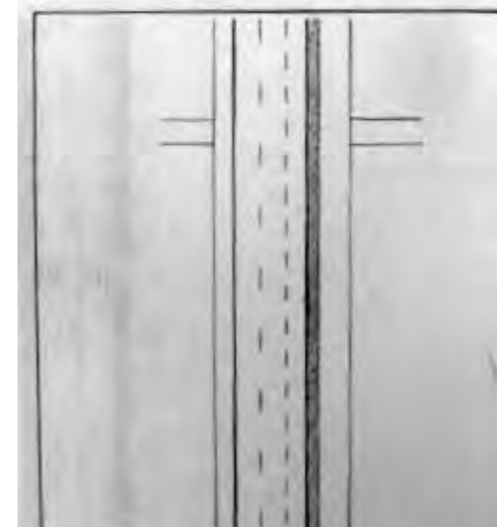
Drivers must perceive that they are no longer on a conventional road but on one with frequent pedestrian presence and with a danger of causing a road accident if they are driving at an inadequate speed.

On the other hand, the road design must make it easier to foresee the presence and crossing of pedestrians.

The following images show some examples on how the design and the perspective of the road changes when entering in the populated area.



When the above measures aimed at designing the entrance cannot be applied, the option is to reinforce signage, narrow carriageways, create visual cones with trees and other feasible similar measures.



What has just been commented, referred to the entrance to populated areas and to alternative solutions, is especially important in roads passing through villages and towns as well as in the road access to cities. In addition, in all these cases, special attention should be paid to areas with low visibility, such as curves, changes in road level, etc.

A specific treatment of the road surface at the entrance to populated areas or towns or cities is another measure that can be taken to reinforce the concept of city entrance. In the same way, speed humps can be installed in the road section preceding the urban area. In this case, and contrary to what has been indicated above for a more compact urban environment, the slopes of speed humps may be somewhat steeper than those recommended below, especially if they are the only element that is part of the entrance to the road passing through the village or town. That is to say, the fact that the speed reducer is the only element that fulfils the function of being an entrance to a population centre, somewhat steeper slopes may be advisable. Therefore, speed humps could be used alone, or as part of a design including tree planting on the sides of the road, which causes a visual effect of road narrowing.

Elements of urbanisation and street and road design, such as green areas, lighting, signs, dragon's teeth, urban furniture... are also very important and contribute to traffic calming and reinforce other actions towards the same goal.

5.4.3 Vertical devices

The vertical elements aimed at changing the gradient levels of the carriageway to make pedestrian priority effective and to improve accessibility or traffic calming must have the following characteristics:

- * To raise the road level.
- * To be continuous and homogeneous, and to cover the entire width of the carriageway or platform in certain areas (especially in rural areas) which are not bordered by sidewalks.
- * To have a sufficient slope to guarantee expected speed reduction.
- * To allow low-floor buses to pass through.
- * To have an average access slope of no more than 10% and than 15% on any zone.
- * To be correctly signalled and, in the case of raised pedestrian crossings, illuminated.
- * To be provided with the corresponding drainage systems if necessary.

This does not include a wide variety of devices, such as speed bumps, bottle dots, European or Berlin cushions, road lowering...

The case of the Berlin cushion can serve as an example of the need that speed reducers occupy the whole width of the carriageway. Motorcycles often dodge them on both sides (which is risky even for pedestrians if they do so on the sidewalk side) and cars invade the wrong road side on two-way streets, with a serious risk of

collision (front or side collision) and sometimes vehicles approaching from the opposite side have to perform a dangerous manoeuvre.

All edges and defining lines of vertical devices (line or starting edge of ramps, top line in the case of speed humps or defining lines of elevated platforms) must be fairly straight and perpendicular to the longitudinal road axis. In sidewalks with a level different from the carriageway, the project must adopt the most appropriate solution to achieve this objective and, as a general rule, they should not be placed obliquely to the carriageway.

There are very few pedestrian crossings having speed humps that are successfully solved by installing them obliquely to the carriageway. An example might be the one shown in the following photos, which illustrate a peculiar situation, with reduced traffic, at very low speed and in a very busy sidewalk. In any case, in the image the road surface needs to be treated because the paving stone has been removed or is embedded in the base. As has been said, this is an exceptional situation which cannot be generalised.



Curved raised pedestrian crossing placed obliquely to the carriageway, crossing the wide sidewalk of Fuencarral Street (Madrid)

Special attention should be paid to pedestrian crossings near curves or changes in road level. These pedestrian crossings, which should be raised if there are sidewalks, must be suitably signposted and provided with

traffic speed breakers. This is important because cars need to be able to manoeuvre when reaching these pedestrian crossings and people feel confident when they cross a pedestrian crossing, and, as a result, are less able to react to unforeseen events.



Not a very good solution in Zucaina (Castellón)



Improvable solution

There are two main types of vertical devices fulfilling the above conditions. They can be grouped according to their main function:

* **Continuation of pedestrian routes:** aimed at improving pedestrian traffic, pedestrian priority and accessibility. The most important are **pedestrian crossings at the same as sidewalks** and **raised intersections** or speed tables.

* **Speed breakers:** their main function is to reduce or maintain motor vehicle speed. The most important are those known as speed humps, although it is better to refer to them as speed breakers (they can be curved, triangle and trapezoidal).

5.4.4 Continuity of pedestrian routes

The **continuity of pedestrian routes** is planned both at **ground level** and on the **grading line**.

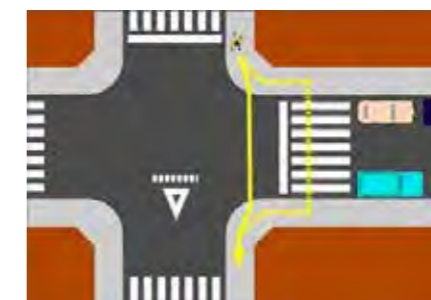
Pedestrian priority in urban areas should be reflected in the **continuity of pedestrian routes in the same level, by seeking the shortest route, especially at street intersections**. This should be a general rule, as it results in:

- A shorter crossing distance
- Pedestrians are less likely to be hit and, consequently, they are safer

In addition, pedestrian priority must be clearly reflected in **keeping the same street level** of these pedestrian routes, both on sidewalks (avoiding broken and uneven sidewalks) and pedestrian crossings, where pedestrian routes must predominate over the gradient and height of the carriageway for motor traffic.

5.4.4.1 Compact urban area

When pedestrian routes meet street crossings, there is once again a conflict of interests that has traditionally been solved using criteria intended exclusively for motor vehicles. The pedestrian route along the sidewalk is lengthened and the pedestrian crossing is moved away from the intersection. This creates a crowded space in which cars that are about to turn need to stop in order to give way to pedestrians, causing a small congestion. If these cars did not have this space, the passage of other motor vehicles would be obstructed. In other words, the car is given priority in a particularly critical area such as the intersection. This situation forces pedestrians to walk greater distances and take longer to cross the street.



Road safety plan (Tarragona)

62



63

Pedestrian crossing placed outside the regular route



64

Pedestrian crossing located in the extension of two sidewalks

The preferred devices in urban environments must be raised or level pedestrian crossings and elevated intersections that extend the sidewalk level and the route followed on these sidewalks, as indicated previously. In other words, as a general rule pedestrian crossings, both zebra crossings or pedestrian crossings with traffic lights, should be at the same level of the sidewalk, as if they were an extension of them.

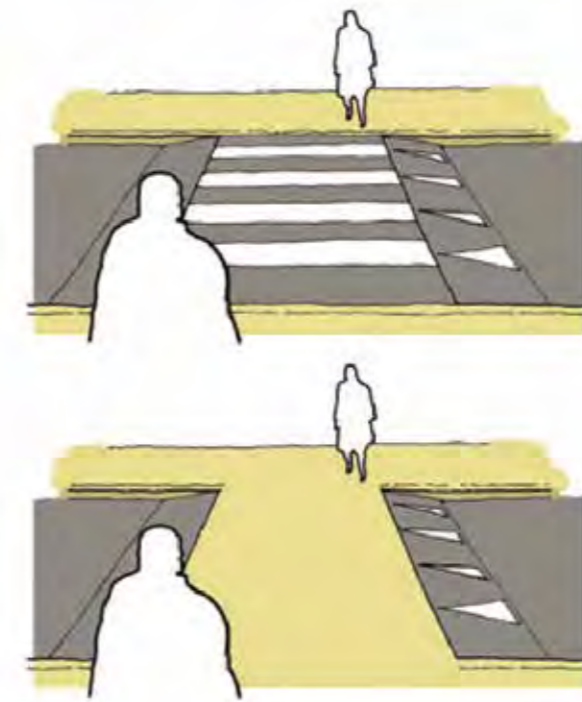
The level continuity in pedestrian routes is achieved in the intersection points with the carriageway by raised pedestrian crossings. This is better than the usual practice of lowering the sidewalk to the carriage level and then place the pedestrian crossing. This document describes a large number of cases in which this measure is commonly used.

With this type of action, pedestrians do not descend from the level on which they are walking and drivers need to change the level on which they are driving, causing a speed reduction and increasing the driver's attention.

However, it is advisable to consider and create new designs of raised pedestrian crossings with a pavement similar to that of the sidewalk and not to that of the carriageway, as is usually the case. The material used needs to be resistant to motor traffic and, where appropriate, placing the corresponding horizontal signage

whenever required by law or considered advisable.

The last stage is very significant and, conceptually, very important. Pedestrians keep on walking at the same level and along the sidewalk (which constitutes an important improvement) and car drivers need to change the regular level of the carriageway and drive through the sidewalk, the pedestrians space, which they clearly perceive as a space different from their own. We can say that drivers pass through a "car crossing".



65



66

Physical and perceptive continuity of the sidewalk at an intersection

63 Camins escolars. Mobility Department of Catalonia. 2016. Technical report 27

64 Urban Street Design Guide. NACTO

65 Guía para actuaciones de mejora peatonal y ciclista novedosas y de bajo coste. City Council of Legazpi. Basque Government, Udalsarea 21. 2015

66 Camins escolars. Mobility Department of Catalonia. 2016. Technical report 27. Photograph by A. Sanz

Apart from exceptional situations, the elevated part of raised crossings must be more than 4 m wide, with a recommended width of 5 m.

The distance between consecutive raised pedestrian crossings must meet two criteria: to effectively keep the speed required for cars (long distances cause a speed increase) and, in pedestrian crossings, to be functional and not force pedestrians to take unnecessary detours. In addition, other factors should be taken into account, such as school facilities and areas full of pedestrians nearby.

These modifications can be performed in a range between 25/35 and 100 m.

Speed breakers shall only be used in compact urban environments to protect pedestrian crossings on streets with sidewalks at the same level as carriageways.

With regard to the distance between these speed breakers, the following figures can be taken as reference values:

Velocitat objectiu	Distància recomanable entre elements reductors de velocitat	Distància màxima d'eficiència entre elements reductors de velocitat
50 km/h	150 m	250 m
40 km/h	100 m	150 m
30 km/h	75 m	75 m
10-20 km/h	20 m	50 m

67

The table above shows the maximum distance between speed breakers. As has been said when describing the sequencing of pedestrian crossings, large distances decrease the speed reducing effect.

5.4.4.1.1 Colour of the zebra crossing stripes

The standard colour of zebra crossings has been subject to constant debate and discussion, since many consider that other colours different from white could be applied to make them more visible and catch pedestrians' attention. In fact, there are many cities in Spain that use or have used other colours for zebra crossings.



Ontinyent (Alicante)



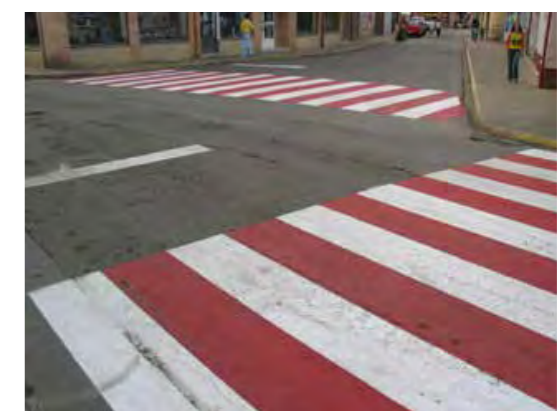
Barakaldo (Vizcaya) (Tráfico magazine. January-February 2000)



Cornellá (school zone). Local Government website



Madrid⁶⁸



Santa María del Páramo (León)

There are examples of many other cities outside Spain. In some areas of Buenos Aires, the colours white and yellow and a 3D effect have been used to attract attention.



Buenos Aires

Pedestrian crossings of the photos above are placed in **school routes**, so as to **make them safer** near schools⁶⁹.



Isola della Scala (Italia), 2010

With regard to the actions previously mentioned and carried out in Spain and in other cities, they do not comply with what is stipulated in the current Spanish General Traffic Regulations, which establish that pedestrian crossing stripes must be white on the carriageway (or street, as the case may be), and that no other colours may be used alternating with white stripes⁷⁰. It should be noted that the previous General Traffic Regulations did not prohibit the use of other colours⁷¹.

⁶⁹ Alejo Santander. 2 July 2017 (asantander@infobae.com)

⁷⁰ Article 168 of the Spanish General Traffic Regulations approved by Royal Decree 1428/2003, of 21 November (consolidated text of 18 July 2015): "c) Pedestrian crossing mark. A series of lines of great width, marked on the carriage pavement and parallel to its axis, indicates a pedestrian crossing at which drivers of motor and animal-drawn vehicles must stop to allow people to cross. **Other coloured lines alternating with white lines shall not be used**"

⁷¹ Royal Decree 13/1992, of 17 January, approving the Spanish General Traffic Regulations, in its article 168 "white transverse lines" indicates: "a series of lines of great width, marked on the carriage pavement and parallel to its axis, indicates a pedestrian crossing at which drivers of motor and animal-drawn vehicles must stop to allow people to cross". As can be seen, no reference is made to the colour of the asphalt stripes between the white markings

It is worth highlighting two aspects:

- In a relatively short period of time the coloured strips need to be repainted, otherwise they will deteriorate and, in this case, the best solution is to keep the grey of the asphalt.
- The General Traffic Regulations do not mention the colour of the carriageway, which is not always the grey of the asphalt (many roads sometimes have varying degrees of darkness and different bitumen mixes). In cities, streets are paved with different materials, shades and textures that often vary. This allows a certain flexibility on both pedestrian and zebra crossings. The surface, texture or shade of pedestrian crossings can be changed to create a contrast.



Rondilla de Santa Teresa Street in Valladolid



Granada

In the two images above the poor state of road conservation can be appreciated. The one on the right also shows how contrast between colours has been lost. It is important to ensure that all pedestrian crossings are correctly maintained and that the appropriate paint is used to prevent pedestrians from slipping or from skidding in the case of motorcycles and bicycles.

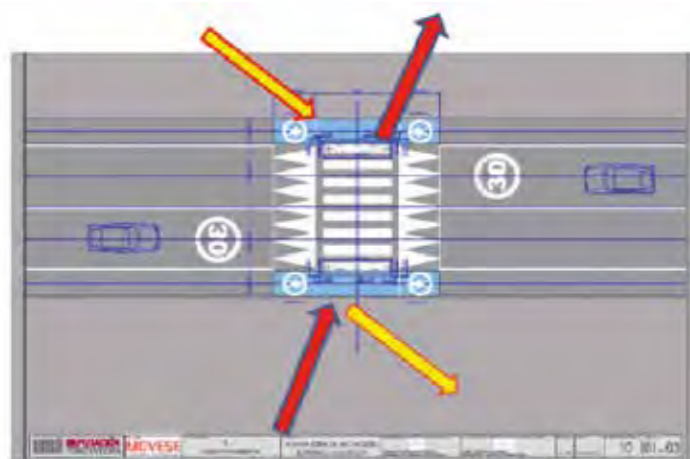
5.4.4.2 Sparsely populated urban areas and rural areas

When there are well-defined sidewalks or pedestrian routes and pedestrian crossings, the same criteria as for the compact urban area must apply, with the exception of the distance between devices placed consecutively. In this latter case, the distance between them may be greater than the one established for compact urban environments, and may reach 300 m depending on the requirements of the area, although it is not advisable to exceed 150 m.

Excessive distances, which require large detours and do not consider pedestrian needs and existing facilities, may result in false pedestrian crossings, which may pose a risk for pedestrians. On the right side of the photo (María de Molina Street, in Madrid) the Instituto Empresa can be seen and on the left side the cafes where students (between 23 and 30 years old, as they are all postgraduates) go for a coffee. It serves as a good example.



When there are no sidewalks (or any other type of pedestrian route) or it is not feasible to place them, pedestrian crossings partly lose their functionality⁷². In this case, speed breakers can be used. If it is necessary to place a pedestrian crossing, in the start and end zone of the carriageway a sidewalk or another element with similar characteristics will be placed outside the carriageway. In addition, it is essential to connect these areas with the services that motivated the pedestrian crossing construction (pedestrians cannot be left in no man's land when reaching the other side of the road, or need to pass through a minefield to manage to get to their destination. In this sense, the new pedestrian crossings must have itineraries for pedestrians on both sides of the road, with adequate lighting and parking restrictions that guarantee mutual visibility between pedestrians and drivers, traffic calming measures that increase safety and warn that there is a crossing (physical speed bumps, adequate road signs, prohibition of overtaking nearby, etc.). In no case, may the application of these exceptional measures justify the lack of sidewalks or routes for pedestrians, which must be placed when necessary and if possible. As an example, a proposal included in the project Plan Móvese for safe mobility and speed of the Provincial Council of Pontevedra is provided:



In any case, overtaking shall be prohibited on roads passing through villages and towns in order to improve safety and significantly reduce motor vehicle speed.

⁷² In article 5 of the current Road Safety Ordinance of the Provincial Council of Pontevedra it is stated that "in general, apart from any exceptions duly justified in accordance with the provisions of the second point, on provincial roads, except on urban roads and on roads passing through villages, pedestrian crossings must be avoided"

On rural roads and, in general, on roads with low traffic and narrow lanes where it is not possible to establish separate areas for vehicles and pedestrians, maximum speed must be very low and using speed bumps is recommended. In these cases, in populated rural areas it is preferable to place circular or triangular speed breakers, avoiding, if possible, trapezoidal ones, as they can be confused with raised pedestrian crossings. In rural populated centres and on roads passing through villages and towns, raised pedestrian crossings can reduce vehicle speed. Trapezoidal breakers are more advisable outside populated centres. It is necessary to carry out an analysis when drafting the project in order to choose the best measures.

In roads where many people walk along the border, placing warning signs and speed breakers in curves with little or no visibility is particularly important⁷³.



Santiago de Compostela (top)



Verín (Ourense)



Ribeira (A Coruña)

⁷³ Refer also to section 5.3 "Pedestrian priority measures in rural and peri-urban areas"



NGO STOP Accidentes

6. TECHNICAL FEATURES OF SPEED HUMPS AND SPEED BUMPS

6.1 Options for reducing speed

Besides their slope, height and type, vertical devices have different geometric shapes, which can be used in different contexts and situations; thus, the entrance ramps can be flat, circular, parabolic, sinusoidal, having different significant effects on their mechanisms and speed reducing capacity. Having the same slope, height and width, the results obtained may be quite divergent. This may be due to a variety of reasons, but the most common are the differences observed in speed breakers design:

A) To reduce the shock as much as possible, as a consequence of abrupt changes in road level, and speed effect only on the vertical acceleration produced (shock free speed hump), vertical units must be defined. In the same way as changes in ground level are usually adopted in road projects, the parabolic meetings of ramps with the carriageway and with the speed table could be used to solve these concave and convex vertical meeting points (K_v in these cases take values as low as 4 or 5).

A practical alternative for these meeting points are sinusoidal ramps which have practically identical effects.

When eliminating the shock the duration of the speed hump reduction is increased, precisely in one of the weakest zones, where they meet the road, which are problematic. It has the disadvantage of mitigating the reducing effect, which should be compensated with somewhat higher average slopes.

B) The use of flat surfaces without solving vertical meeting points by combining as reducing effects both the shock when changing the ground level and vertical acceleration are more aggressive, but can be accomplished with less steep slopes. For example, according to the Order FOM/3053/2008 for flat surfaces, a 10% slope is excessive for 30 km/h, and, in practice, not even the Ministry itself tends to use them. Flat surfaces, of any slope, can cause problems for buses due to the excessive incidence of the reducing effect.

In both cases, it is necessary to make sure that devices strictly meet the design requirements so as to avoid having effects different from those desired.

Obviously, solutions such as circular or parabolic devices increase the shocking effect more than the flat ones and, so, they are not recommended.



Pontevedra



Pontevedra

6.2 Raised pedestrian crossings and speed tables: speeds, slopes, widths, heights

The tables below refer to cases of horizontal changes in road level, and cover the range between 6 and 14 cm in height. Below 6 cm, even with ramps with steep slopes (greater than those indicated in the following tables), there is not much evidence to state that the desired speed-reducing effect is actually achieved using these devices.

As regards its minimum width, it should not be less than 4 m (zebra crossing) with a recommended width of 5 m.

The following figures can be taken as a reference for towns and cities and population centres and especially for roads passing through villages and towns. The adoption of these options or the proposal of others must be justified, explaining the reasons to choose one or another considering the urban, rural or peri-urban context in which the actions are to be carried out.

A) Raised pedestrian crossing/flat-topped speed table

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	9%	8.5%	8%	7.5%
30	8%	7%	6.5%	6%
40	6.5%	6%	5%	4.5%
50	5.5%	5%	4%	3.5%

For the purposes of on-site execution⁷⁴, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	65 cm	90 cm	125 cm	185 cm
30	75 cm	110 cm	150 cm	230 cm
40	90 cm	130 cm	200 cm	310 cm
50	110 cm	160 cm	250 cm	400 cm

B) Raised pedestrian crossing/speed table with a sinusoidal ramp

These raised pedestrian crossings are less used than those with a flat top.

⁷⁴ It is important that the data that the contractor has to respect are easily reproducible (and, therefore, easily controlled). However, some designers prefer to reproduce the slopes rather than the dimensions of the base on site

In practice, when executing these traffic calming devices with hot bituminous mixes, its compactness provides a logical smoothing effect in the meeting points of sinusoidal elements. This decreases its speed reduction effect, and then it will be necessary to comply with the following designs.

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	10%	9.5%	9%	8.5%
30	9%	8%	7.5%	7%
40	7.5%	7%	6%	5.5%
50	6.5%	6%	5%	4.5%

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	60 cm	80 cm	110 cm	160 cm
30	65 cm	100 cm	130 cm	200 cm
40	80 cm	115 cm	165 cm	250 cm
50	90 cm	130 cm	200 cm	310 cm

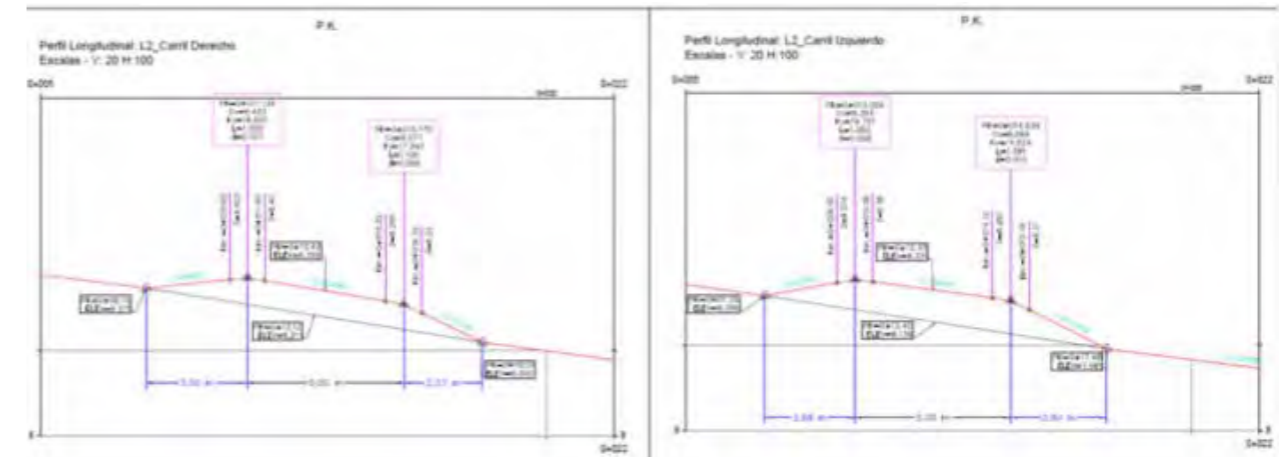
In both cases A) and B), when the pedestrian crossing is very high (greater than 14 cm), besides adjusting the entrance slopes; two mechanisms of compensation can be additionally used:

- * Extending the speed table. This adjustment can be made by multiplying, as a minimum length, the average height of the device in centimetres by 0.45 and the result in metres. This would give the dimensions of the speed table, unless other factors, such as the passage of articulated buses, recommend a greater length.
- * Determining and establishing a maximum height. If the sidewalk is very high, the raised pedestrian crossing may not reach the sidewalk level, so in these cases it is advisable to establish a maximum height (e.g.: 14 cm), and raise the carriageway the required centimetres a few metres before and after the crossing. In this way, the level of both the sidewalk and the crossing are maintained and, if necessary, a staggered double reducer effect can be achieved, as the raised carriageway should run parallel to the original carriageway in the raised pedestrian crossing connections.

6.2.1 Specific cases: streets and roads with steep slopes

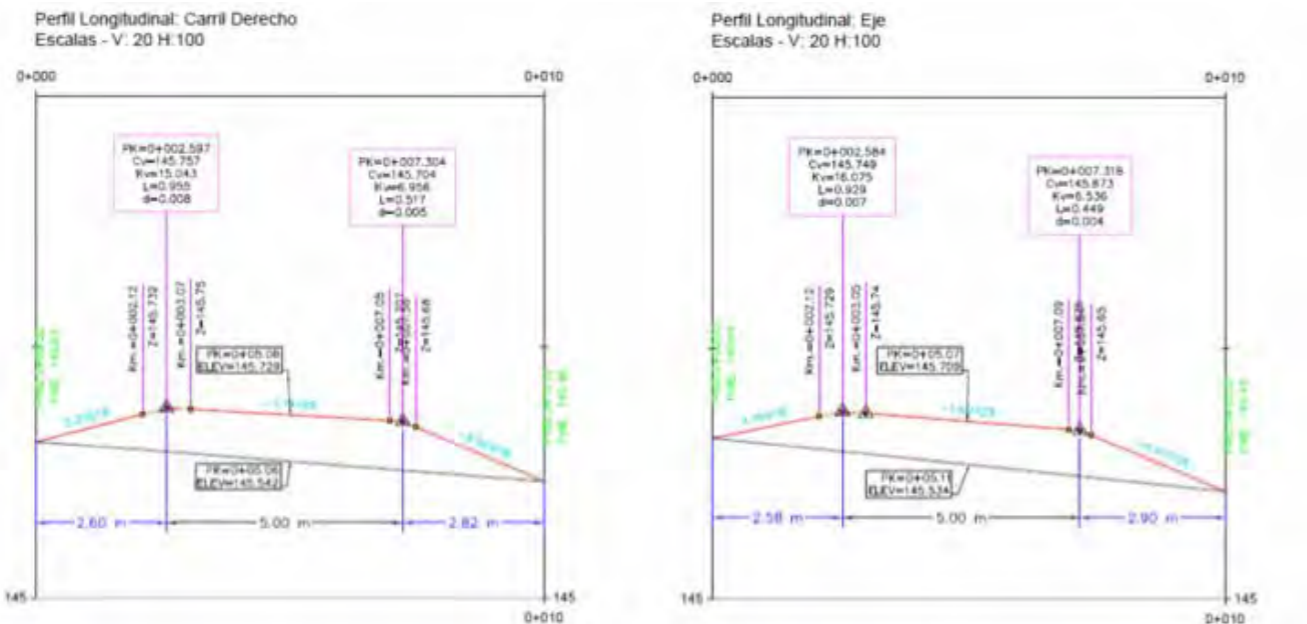
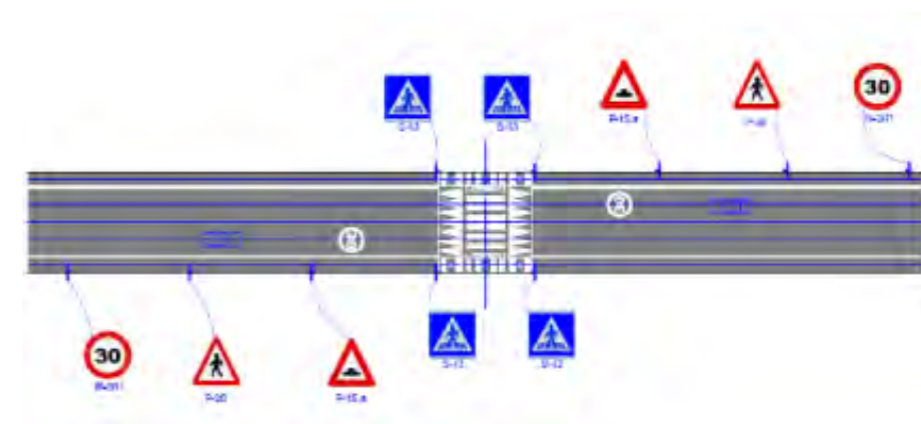
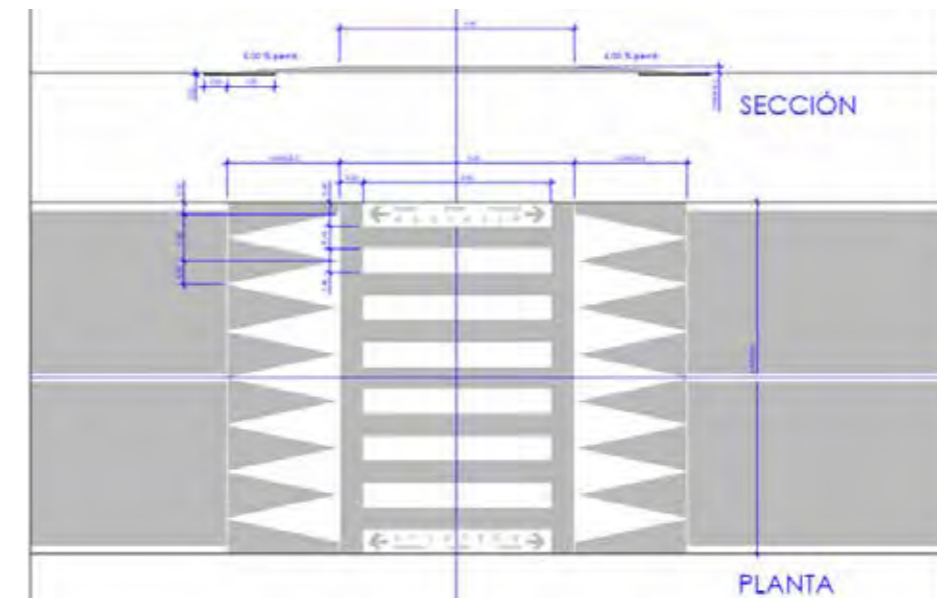
Streets and roads are not always fully horizontal and with gentle slopes. In many cases, slopes are steep. In these cases, the design of the speed breaker or raised pedestrian crossing must be justified when drafting the road safety project accompanying the construction project.

As an example, three projects for roads with steep slopes, designed by the technical services of the Provincial Council of Pontevedra, are presented below. From the point of view of this document, they have been correctly solved. They correspond to a 30 km/h speed limit.

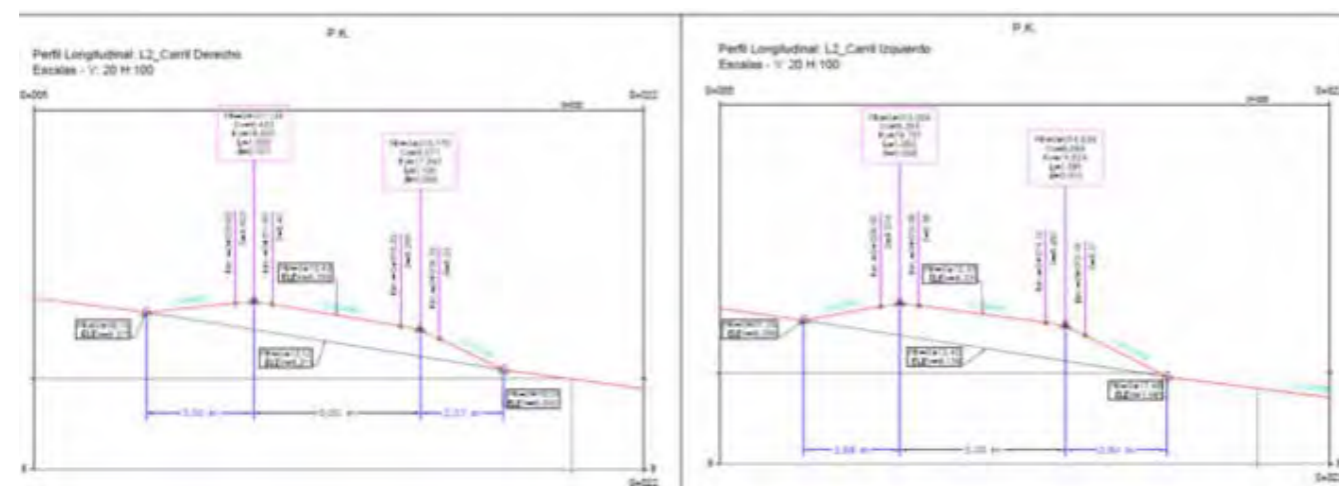


Road Cesantes-O Viso-Alxán (Redondela)

Below a detailed example and its corresponding signage is shown⁷⁵:



Road Redondela-Cepeda



Road Noalla-A Lanzada Beach (Sanxenxo)

6.3 Circular, triangular and trapezoidal speed breakers: speeds, slopes, widths, heights

It is recommended to use speed breakers of 6 and 8 cm in height; the former are the most commonly used.

6.3.1 Circular speed breakers

For circular speed breakers:

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT		
Speed (km/h)	Height (cm)	
	6	8
30	6%	6%
40	4%	4%
50	3%	3%

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT		
Speed (km/h)	Height (cm)	
	6	8
30	100 cm	130 cm
40	150 cm	200 cm
50	200 cm	265 cm

6.3.2 Triangular speed breakers

For flat-topped speed breakers:

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT			
Speed (km/h)	Height (cm)		
	6	8	8*
30	7%	6.5%	7%
40	5%	4.5%	5%
50	4%	3.5%	4%

* When they are used to protect a non-raised pedestrian crossing, i. e., at road level.

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT			
Speed (km/h)	Height (cm)		
	6	8	8*
30	85 cm	120 cm	110 cm
40	120 cm	175 cm	160 cm
50	150 cm	225 cm	200 cm

* When they are used to protect a non-raised pedestrian crossing, i. e., at road level.

6.3.3 Trapezoidal speed breakers

Flat-top trapezoidal speed breakers without pedestrian crossing have two basic characteristics:

Height: 12 cm

Speed table width: 3 m

SLOPE AND LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT		
	Slope (%)	Length ramp base (cm)
30	6%	200 cm
40	5%	240 cm
50	4%	300 cm

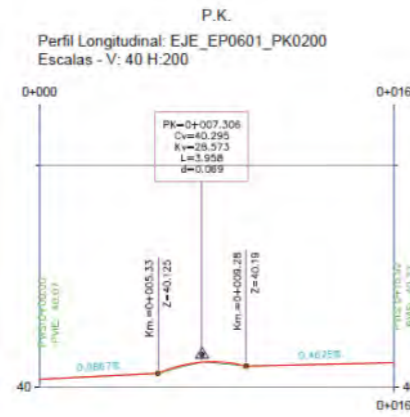
6.3.4 Some examples

The following are some actions designed and developed by the technical services of the Mobility Department of the Provincial Council of Pontevedra.

They were carried out in rural areas on roads with different slopes ranging from almost horizontal levels up to 9% slopes.

The speed limit established in the project was 50 km/h in all cases, although the speed of the vertical signs placed on most road was 30 km/h.

- Road Portosanto-Campelo-C550

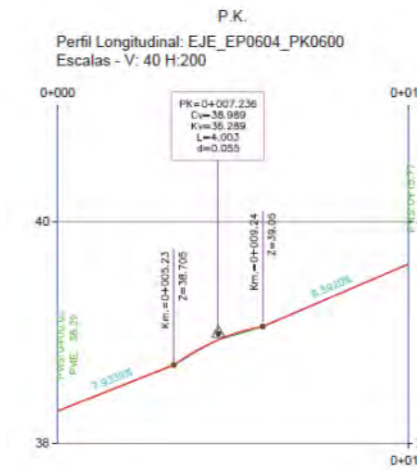


Before the access to two roads

- Road Casalvito-Pereiro

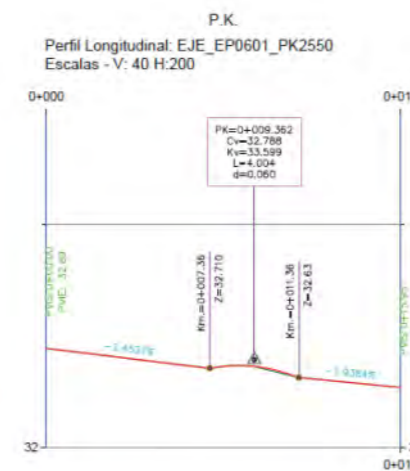


Protecting the pedestrian crossing and the access to another road

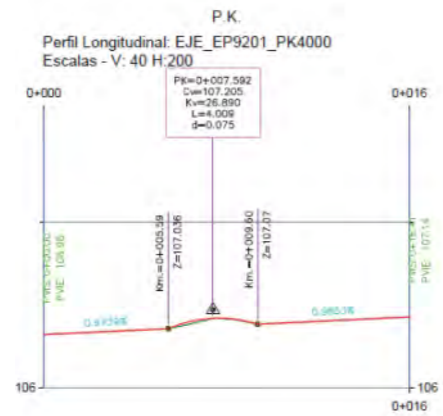


Step slope

- Road Portosanto-Campelo-C550



- Road Sanxenxo-Bordóns

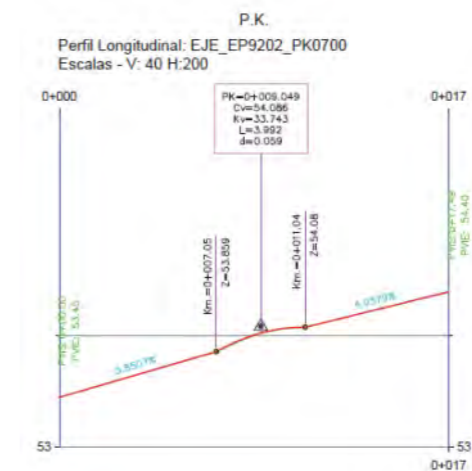


Near a fork in the road

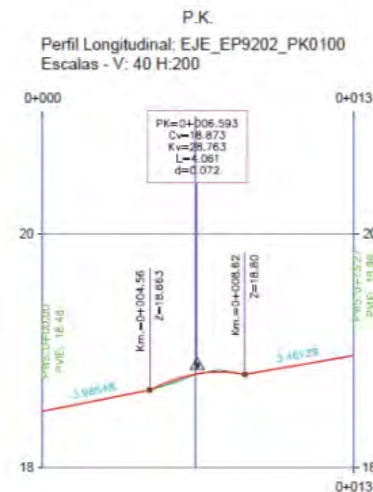
- Road Nanín-Church of Bordóns



In this area with two road accesses, the action taken covers the whole surface

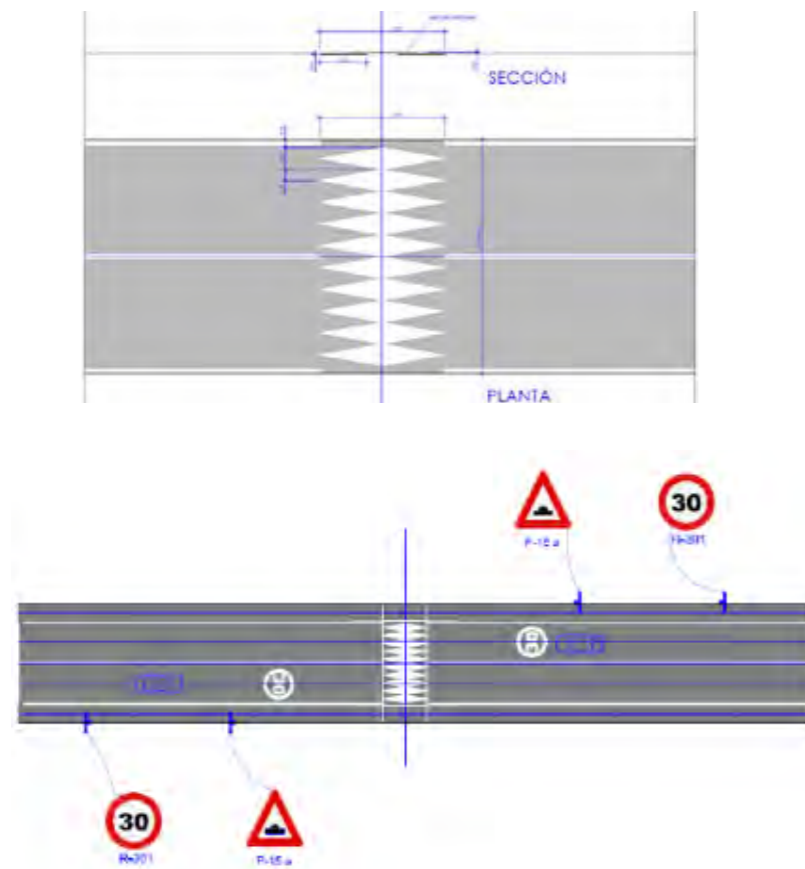


- Road Nanín-Church of Bordóns



Entrance to a residential area with a curve in the background

Below is a detailed example with its corresponding signage⁷⁶:



6.4 Implementation

Both in this and next sections, only some brief comments are made and there are a couple of examples from the experience of cities where the use of speed reducers is widespread, such as Pontevedra. In this sense, this document is not an implementation guide.

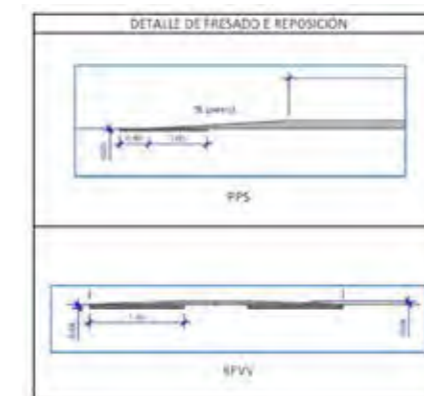
As mentioned above, the implementation process is very important, especially to avoid that an inadequate implementation will minimise or increase the speed reduction effect sought when installing these devices.

In the case of raised pedestrian crossings, besides the correct slope construction and curves adjustment, it is important to perform an adequate cut in the meeting and starting point of the ramp with the carriageway, which is the area with the highest maintenance requirements. It is crucial to make the necessary cut to be filled in at a distance prior to the start of the ramp. This will be sufficient to avoid creating a weak point at the place where the greatest tractive force is being exerted. The milling machine dimensions will often influence the overall size of this milling operation. In general, unless otherwise justified, a cut of about 0.75/1 m is recommended both before and after the meeting point of the ramp with the carriageway, with a minimum of 0.50/0.50 metres.

However, this recommendation does not apply to speed breakers. In such cases, it can be noted:

- For a 6 cm-high speed breaker (very common), it is recommended to perform the cut strictly in the ramp area, so that the speed reduction is not diminished due to the small height. If the cut is made before the meeting point with the carriageway, this effect disappears due to the roller curvature. It is very important to supervise the construction work on site with low height speed breakers (between 6 and 8 cm).
- For heights of about 8 cm, the project must state whether the cut should be performed before the ramp, under the appropriate on-site supervision.
- For heights of about 10 cm, the cut can be also performed before the meeting point of the road with the speed breaker.

An example of milling and replacement is shown below:



During the construction works, appropriate signposting must be made placed. As regards horizontal signs, it is advisable to install them in two stages: first, when the execution work starts, and then, one or two weeks later, depending on the condition of the markings, these signs should be repainted.

6.5 Drainage

Drainage of raised pedestrian crossings and speed tables is best achieved by means of inter-connected drains and underground manholes rather than using pipes embedded in the pedestrian crossing at road level and along the sidewalk because these pipes are often obstructed.

Prefabricated surface water drains are also good solutions. However, they may be obstacles for wheelchair users or people carrying baby buggies because wheels can be stuck in the grating, which must be placed obliquely to the front of the sidewalk.

7. AFTERWORD

“We all have our home, which is the private home; and the city, which is the public home.”

Tierno Galván

Cities, towns and villages are the places where people live and many commercial exchanges and a variety of productive, industrial and commercial activities take place. Above all, there, their inhabitants find their homes and dwellings and all kinds of facilities are built. They are also the places where roads and outdoor spaces are located, thus rounding out urban and humanised space.

In a region like Galicia, cities, towns and villages are an urban continuum structured along the roads in which a connected urbanisation is formed, sometimes along several kilometres. Very often, it is a long road passing through several connected villages, with houses, schools, facilities, discos and industries scattered along the whole way... This symbiosis between both the rural and urban environments, which occurs in a large part of Galicia — having a geographically dispersed population — results in roads that have become streets and streets that have been absorbed by non-local motor traffic and turned into roads. Daily life is organised along these roads as one of the most important public spaces of these villages, towns and cities.

Undoubtedly, they can be considered as “the meeting place for building collective life”.

For this reason, in this work we have tried to rethink the public and collective space from the citizens' point of view, and also to consider them as the main protagonists of the cities and towns that they themselves have built.

As already stated in 1999 in Pontevedra: “The city or the town must be the place par excellence for socialising and social cohesion. All urban public spaces must be in good condition to be used by its citizens for diverse activities, regardless of their abilities, age or socioeconomic status”.

For decades, the street area and the shared space have been specialised, and have progressively lost their multifunctionality. As a result, carriageways have been widened and sidewalks narrowed, trees have been removed from the side of the road, carriageways have been also widened on roads passing through villages and towns... In short, cars have been given priority and citizens' life in the city has been left out, as well as the movement on foot and the use of other means of transport except private vehicles.

In view of this scenario, besides using the street as a communication channel, it is necessary to regain it as a place where pedestrians can stay in and meet each other.

“Every man, every woman, every old man and child on the street is deciding not only on the quality of their lives but also on the quality of the spaces where they live. They are saying that they do not believe in isolation or individualism. They are choosing a world with shared spaces”.

This document is aimed at providing an overview and at assessing the technical aspects of the measures that can be taken to encourage a more friendly and respectful traffic on streets and roads. An attempt has been also made to establish a series of criteria so as to regain these public spaces, which are part of the collective heritage, for everyone and to establish the necessary conditions to build them together.

The measures and proposals outlined in this work can be used as a reference for developing actions to implement traffic calming measures. At the same time, they were verified and have proved to be effective.

These measures might seem unachievable a few decades ago, but today they are hardly questionable and dealt with from very different contexts and approaches.

However, there are still unresolved and partially solved problems, some of which need to be addressed in a different way:

- Cases in which even though the solution is clear, it cannot be applied (due to legal or cultural issues).
- The solution has not yet been found.
- Others that need to be reconsidered, as they are ambivalent, such as those related to transport and public spaces. In some cases, it has not been possible to provide a suitable solution.

A few examples of the latter case are worth mentioning:

- In driveways, it is a common practice to place bollards on the sidewalk on both sides of it to keep the area clear. This has proven to be a mistake, since it is an obstruction for pedestrians and, moreover, it does not prevent motorcycles from passing.
- The same applies to pedestrian crossings at road level or raised pedestrian crossings: the sidewalk is protected with bollards in the meeting point with the road. If bollards are placed, pedestrian traffic is interrupted and/or made difficult, and if they are not placed, cars may occupy the sidewalks.
- The regulatory constraints for redesigning zebra crossings or for creating continuous sidewalks on the driveway.

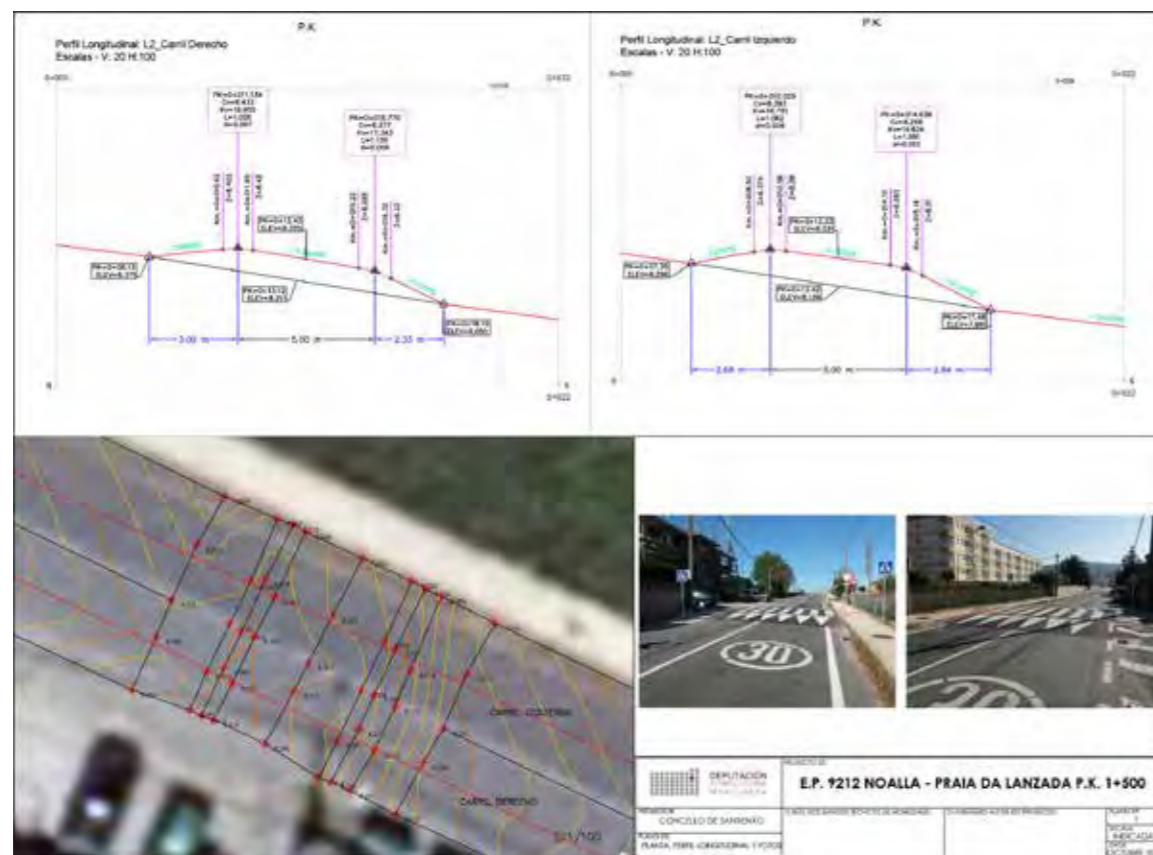
The wide experience on traffic calming measures of the Provincial Council of Pontevedra and of some towns and cities of the province has allowed to provide solvent, prudent and verified solutions. Many of them have been trial-and-error initiatives, as is the case of all pioneering ones.

We hope that this work will serve as a subject of debate, which will undoubtedly be enriching and make it possible to share experiences and propose improvements and other solutions or approaches.

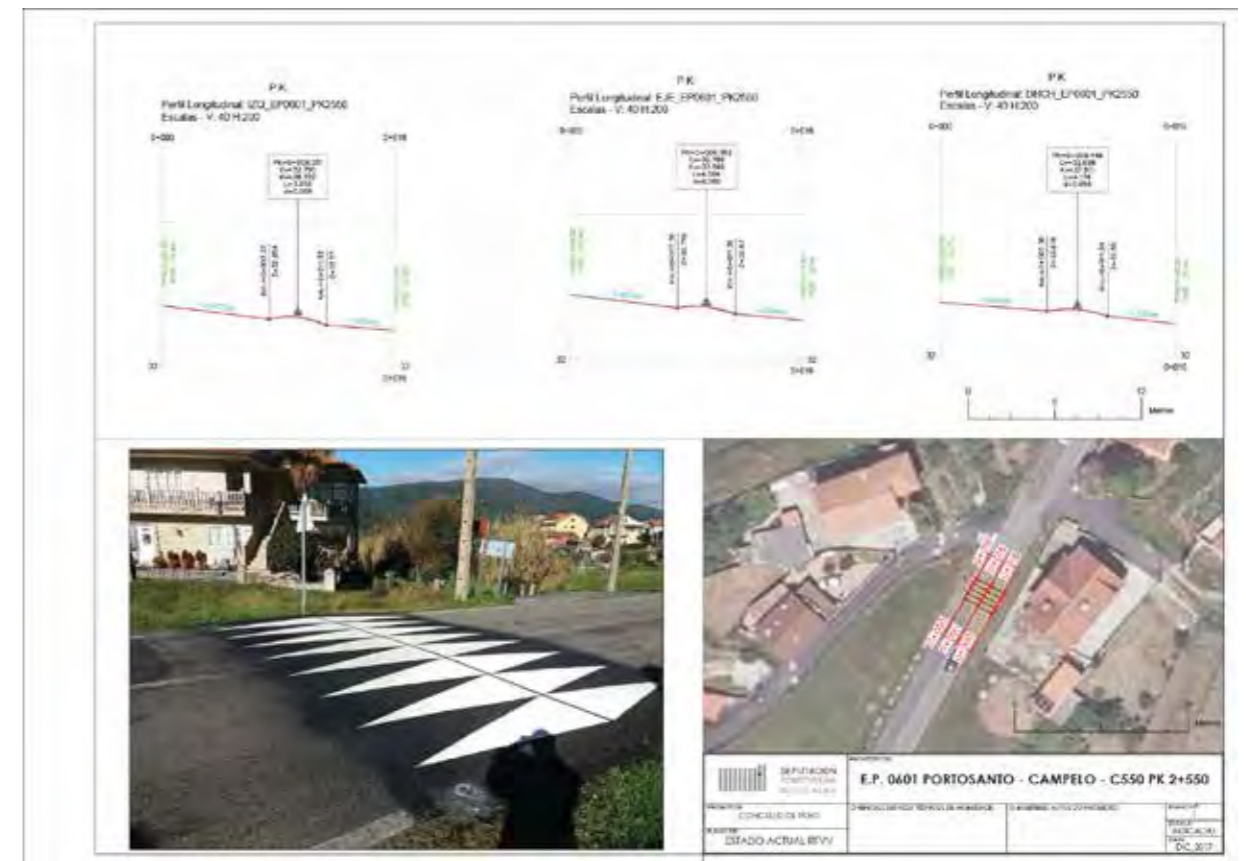
ANNEXES

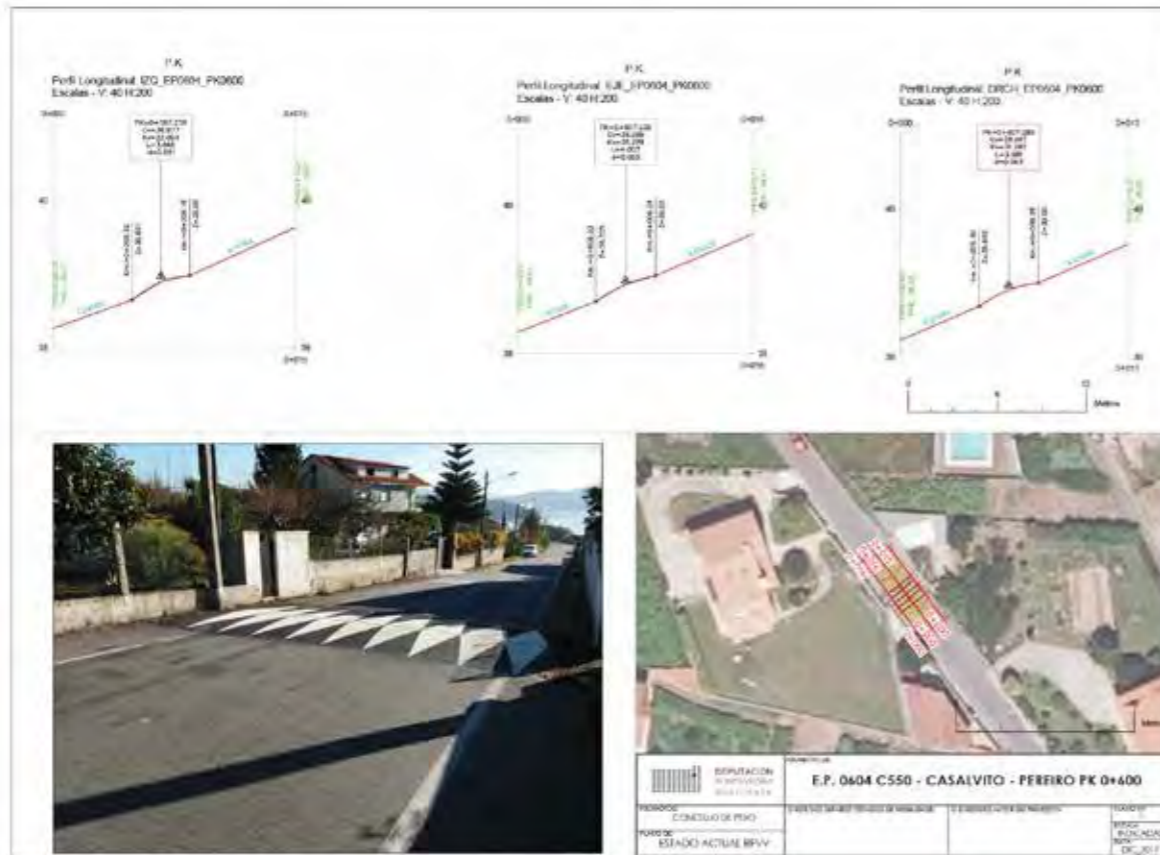
1. RAISED PEDESTRIAN CROSSINGS AND SPEED TABLES. SPECIFIC CASES: STREETS AND ROADS WITH STEEP SLOPES





2. CIRCULAR SPEED BREAKERS. SOME DEVICES DEVELOPED BY THE PROVINCIAL COUNCIL OF PONTEVEDRA





3. PROPOSAL OF THE PROVINCIAL COUNCIL OF PONTEVEDRA FOR DESIGNING SAFETY DEVICES

RAISED PEDESTRIAN CROSSINGS AND SPEED TABLES: SPEEDS, SLOPES, WIDTHS, HEIGHTS

The tables below refer to cases of horizontal changes in road level, and cover the range between 6 and 14 cm in height. Below 6 cm, even with ramps with steep slopes (greater than those indicated in the tables), there is not enough evidence or experience to state that the desired speed-reducing effect is actually achieved with these devices.

As regards its minimum width, it should not be less than 4 m wide (zebra crossing), with a recommended width of 5 m.

The following figures can be taken as a reference for towns and population centres and especially for roads passing through villages and towns. The adoption of these options or the proposal of others must be justified, explaining the reasons to choose one or another, considering the urban, rural or peri-urban context in which the actions are to be carried to out.

A deviation of 30% from the figures included in the tables is accepted, as established in the Ordinance for Road Safety.

In general, and unless justified, the cut should be 0.50 m both before and after the meeting point of the ramp with the carriageway.

A) Raised pedestrian crossing/flat top speed table

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	9%	8.5%	8%	7.5%
30	8%	7%	6.5%	6%
40	6.5%	6%	5%	4.5%
50	5.5%	5%	4%	3.5%

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default. However, some designers prefer to reproduce the slopes rather than the dimensions of the base on site:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	65 cm	90 cm	125 cm	185 cm
30	75 cm	110 cm	150 cm	230 cm
40	90 cm	130 cm	200 cm	310 cm
50	110 cm	160 cm	250 cm	400 cm

B) Raised pedestrian crossing/speed table with a sinusoidal ramp

These raised pedestrian crossings are less used than those with a flat top.

In practice, when executing these traffic calming devices with hot bituminous mixes, its compactness provides a logical smoothing effect in the meeting points of sinusoidal elements. This decreases its speed reduction effect, and then it will be necessary to comply with the following designs:

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	10%	9.5%	9%	8.5%
30	9%	8%	7.5%	7%
40	7.5%	7%	6%	5.5%
50	6.5%	6%	5%	4.5%

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT				
Speed (km/h)	Height (cm)			
	6	8	10	14
20	60 cm	80 cm	110 cm	160 cm
30	65 cm	100 cm	130 cm	200 cm
40	80 cm	115 cm	165 cm	250 cm
50	90 cm	130 cm	200 cm	310 cm

In both cases A) and B), when the pedestrian crossing is very high (greater than 14 cm), besides adjusting the entrance slopes; two mechanisms of compensation can be additionally used:

- * Extending the speed table. This adjustment can be made by multiplying, as a minimum length, the average height of the device in centimetres by 0.45 and the result in metres. This would give the dimensions of the speed table, unless other factors, such as the passage of articulated buses, recommend a greater length.
- * Determining and establishing a maximum height. If the sidewalk is very high, the raised pedestrian crossing may not reach the sidewalk level, so in these cases it is advisable to establish a maximum height (e.g.: 14 cm), and raise the carriageway the required centimetres a few metres before and after the crossing. In this way, the level of both the sidewalk and the crossing are maintained and, if necessary, a staggered double reducer effect can be achieved, as the raised carriageway should run parallel to the original carriageway in the raised pedestrian crossing connections.

Specific cases: streets and roads with significant slopes

Streets and roads are not always fully horizontal and with gentle slopes. In many cases, slopes are steep. In these cases, the design of the speed breaker or raised pedestrian crossing must be justified when drafting the road safety project accompanying the construction project.

CIRCULAR, TRIANGULAR AND TRAPEZOIDAL SPEED BREAKERS: SPEEDS, SLOPES, WIDTHS, HEIGHTS

It is recommended to use height reducers of 6 and 8 cm; the former are the most commonly used.

Circular speed breakers

For circular speed breakers:

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT		
Speed (km/h)	Height (cm)	
	6	8
30	6%	6%
40	4%	4%
50	3%	3%

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT		
Speed (km/h)	Height (cm)	
	6	8
30	100 cm	130 cm
40	150 cm	200 cm
50	200 cm	265 cm

Triangular speed breakers

For flat top speed breakers:

SLOPE OF ENTRANCE AND EXIT RAMPS DEPENDING ON SPEED AND HEIGHT			
Speed (km/h)	Height (cm)		
	6	8	8 *
30	7%	6.5%	7%
40	5%	4.5%	5%
50	4%	3.5%	4%

* When they are used to protect a non-elevated pedestrian crossing, i.e., at road level

For the purposes of on-site execution, the following table indicates the length of the ramp base, rounded by default:

LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT			
Speed (km/h)	Height (cm)		
	6	8	8 *
30	85 cm	120 cm	110 cm
40	120 cm	175 cm	160 cm
50	150 cm	225 cm	200 cm

* When they are used to protect a non-elevated pedestrian crossing, i.e., at road level.

Trapezoidal speed breakers

Flat top trapezoidal type speed breakers without a pedestrian crossing have two basic characteristics:

Height: 12 cm

Speed table width: 3 m

SLOPE AND LENGTH OF THE ENTRANCE AND EXIT RAMPS BASE DEPENDING ON SPEED AND HEIGHT		
	Slope (%)	Length ramp base (cm)
30	6%	200 cm
40	5%	240 cm
50	4%	300 cm

4. PROPOSAL OF THE PROVINCIAL COUNCIL OF PONTEVEDRA TO DEVELOP A PROTOCOL OF ACTION FOR ROAD SAFETY

Extending and adapting well-established roads is often a process requiring large investments and having serious effects on property, heritage and territory. Likewise, over the last years, there has been an increasing concern for sustainability and environmental protection in all developed countries. Moreover, new trends have been focused on the so-called friendly mobility.

Therefore, not surprisingly, infrastructure policy, having a strong impact on the territory, has been substantially affected by incorporating environmental issues. In addition, it is important to consider the services provided by each road and the actual and potential demands, emphasizing the importance of protecting the most vulnerable groups: pedestrians, cyclists and people with reduced mobility.

As for provincial roads, the variability of types and the fact they are scattered around the province makes it difficult to establish specific standards for them and only allow us to make general recommendations. Below is a set of minimum criteria to be included in the design of new projects. In exceptional cases, the solutions that do not include these minimums must be comprehensively justified.

1. AIM

This work is aimed at establishing some basic criteria to define new and improvement actions, which, although they are not conservation and maintenance actions, they can be carried out on provincial roads. These should allow safe traffic, ensure the protection of most vulnerable groups, and promote a change of use towards a friendlier everyday mobility.

The need to comply with current Road Regulations (Decree 66/2016, of 26 May, approving the General Road Regulations of Galicia), as long as they do not contravene the Ordinance for Road Safety of the Provincial Council of Pontevedra and the provisions of this protocol.

2. PRIORITIES FOR USE

The needs of the most vulnerable groups will be priority in all road actions. The order will be 1st pedestrian, 2nd cyclist, 3rd public transport users, 4th private vehicle users. Each project shall coherently establish and justify the best method to guarantee the harmonious coexistence of the different types of mobility.

3. SEGREGATION OF PEDESTRIAN SPACES

In urbanisation and reurbanisation projects, sidewalks, if there are any, and except specific justified cases, shall be continuous, be at least 2.50 metres wide and comply with the universal accessibility criteria. The different elements of urban furniture shall be arranged as best as possible to create a continuous safe pedestrian space free from obstacles.

If this solution is unadvisable or unfeasible, the best alternative will be placing a single platform at the same level, which includes the necessary traffic reduction and traffic calming measures to protect the most vulnerable groups.

In this way, as a general criteria, depending on the characteristics of the surrounding area:

- Outside population centres, sidewalks should be avoided and, if necessary, footways separated from the carriageway may be created.
- Inside population centres (in peri-urban areas) segregated pedestrian itineraries will comprise paths with a minimum width of 2.50 m, at the same level, which may be physically separated by H-75 beacons, bumps, cat's eyes, ditches, rubber road separators or similar devices, and with asphalt or coloured concrete or granite sand compacted with cement.
- In urban areas, sidewalks shall be at least 2.5 m wide. If possible, using cement tiles shall be avoided.

If the platform is wide enough, the space used must be separated. In general, it will depend on the space available on the platform:

- In platforms with widths above 12 m the uses can be separated.
- In platforms with widths below 12 m, spaces must be redistributed to create a pedestrian route with a minimum width of 2.5 m. If this is not possible, the solution will be the single platform.

In new roads or in those subjected to road safety improvements, where is not possible to separate the different spaces, a maximum speed of 30 km/h and additional traffic calming measures must be established.

In single platforms of peri-urban areas, lifelines may be indicated by means of lighting devices, different types of pavement, signage or beaconing, which serve as guides for pedestrians. However, these must, in any case, be surpassable and leave a minimum width of 2.5 m for pedestrians.

4. STREETS AND SPACES WITH PEDESTRIAN PRIORITY

- Streets and areas with pedestrian priority should be continuous and compact.
- Routes for motor vehicles should be avoided within the areas with pedestrian priority and especially in the areas that may be overloaded with traffic.
- The areas with pedestrian priority shall be at the same level and be provided with a ground-level platform.
- No high barriers or other elements that are difficult to remove shall be placed in order to be adapted to people with reduced mobility and to provide easier access for construction works, services, fire brigades, etc.
- Parking spaces should not be created or marked in pedestrian priority areas.
- In new projects carried out in peri-urban areas, having very limited space, pedestrian zones should be created instead of lateral parking lanes.

5. USE BY BICYCLES

In areas where the use of bicycles for everyday mobility is encouraged:

- In urban areas, there will be no bicycle lanes on sidewalks and bicycles will share space with motor vehicles. For this purpose, traffic speed will be reduced by means of traffic calming devices.
- On roads connecting towns where the average daily traffic (ADT) is greater than 8,000 veh/d and/or with speeds above 70 km/h, it will be necessary to separate the spaces for motor vehicles and bicycles using an independent lane or by means of a physical separation.
- In peri-urban areas:
 - If platforms are wide enough and have a low density of pedestrian and bicycle traffic, it will be possible to create a side lane for pedestrians and bicycles, with signs indicating pedestrian priority. The lane width (between 2.5 and 4 m) will depend on the expected density of pedestrians and cyclists and the road speed limit.
 - If platforms are not wide enough, it will be necessary to create shared zones in the whole road width. In these zones, the pavement will be different from that of the rest of the road, there will be traffic calming elements at the entrance to the shared zone and the corresponding pedestrian priority signage must be placed.

6. ACCESSIBILITY

The areas with pedestrian priority will be continuous and provided with a ground-level platform. In any case:

- Accessibility ramps shall not be installed when the sidewalk width plus the ramp do not exceed 320 cm: 180 cm of free space outside the ramp plus 140 cm so that the ramp does not exceed the maximum 10% slope (calculations for a 14-cm high sidewalk).
- In accesses to buildings and driveways, there must be a minimum horizontal width of 90 cm on the sidewalk free of barriers.
- Under no circumstances, pedestrian route zones can be considered as the residual space of the street. Thus, in urban areas, pedestrian spaces should, in general, comprise at least 50 % of the total street space, and, in any case, they should be at least 2.5 m.
- Street furniture shall be an obstacle on pedestrian routes. If furniture is placed, a 1.80 wide-free area shall be left on the sidewalk.

7. CROSSINGS

- As a general rule, in urban areas, pedestrian crossings shall be placed on all streets and roads converging at an intersection.
- Traffic lights shall be avoided. If a crossing with traffic lights is necessary, the period of time of the different traffic light phases must be specified. Pedestrians must have enough time to cross and an adequate clearance interval must be set to allow them to leave the road without being in a hurry.
- Pedestrian crossings shall be straight and an extension of the sidewalk or of the pedestrians route and be as short as possible.
- Pedestrian crossings will be raised and at the same level as the sidewalk.
- The maximum distance between pedestrian crossings must be specified.

8. PEDESTRIAN CROSSINGS OUTSIDE INTERSECTIONS

- They should be as short as possible, justifying the design, especially on roads, and roads passing through villages and towns.
- They must be properly illuminated, indicating the kind of lighting and signage system solution proposed.
- They must be protected and raised. In addition, vehicle crossing speed shall be justified, especially on roads, if applicable, and on roads passing through villages and towns.
- In general, apart from any exceptions duly justified, on provincial roads, except on urban roads and on roads passing through villages and towns, pedestrian crossings shall not be installed. If it is necessary to place a pedestrian crossing, the starting and ending zone of the crossing outside the carriageway will have the characteristics of the sidewalk or of the pedestrian route. In addition, it is essential to connect these areas with the services that motivated the construction of the pedestrian crossing. The new pedestrian crossings must have pedestrian itineraries on both sides. They must be correctly illuminated and/or signposted and be provided with the corresponding parking restrictions so as to guarantee mutual visibility between pedestrians and drivers. Moreover, traffic calming measures that increase safety and warn that there is a crossing (such as physical speed breakers) as well as adequate signposting should be installed. Overtaking must also be prohibited nearby (if they are located on the part of the road passing through a village or town overtaking must be prohibited) and speed limits shall be equal to or less than 50 km/h.

9. CROSS-SECTION

9.1. Pedestrian space

Cross-sections will be defined depending on the availability of space and the area of action, as set out in articles from 3 to 6.

In general, the minimum size of the elements to be considered will be:

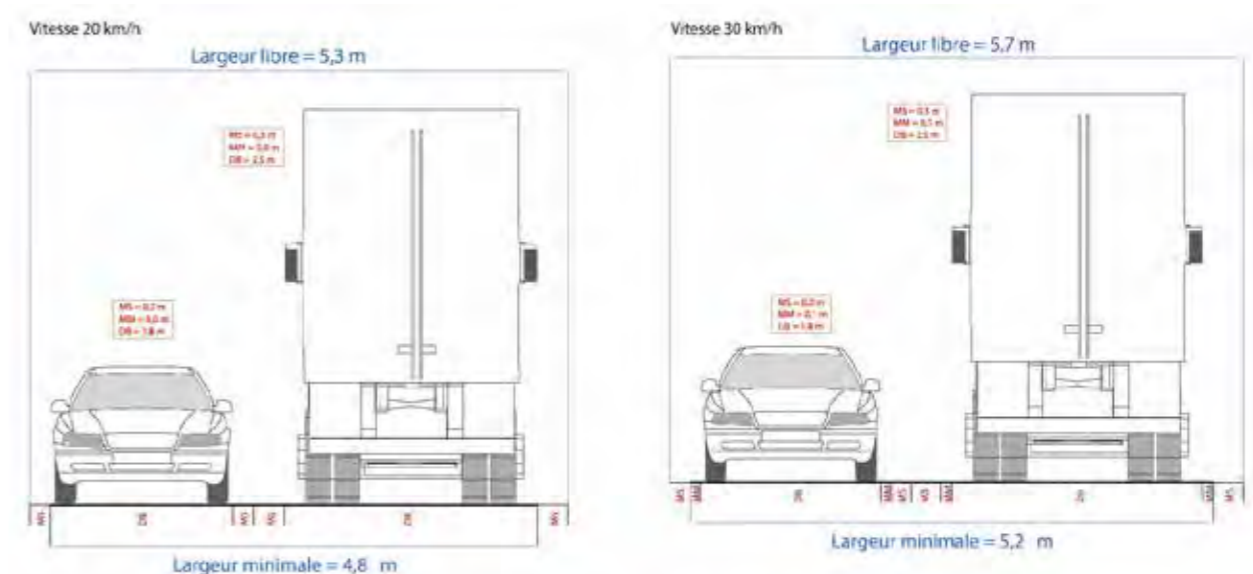
- Minimum space for pedestrians: 2.5 m.
- Physical separation of uses by means of green areas or separation bands: from 0.20 to 0.50 m.
- Minimum hard shoulder width: 0.50 m.

If the space available is not enough, the following measures shall be taken:

- Installation of concrete ditches with a minimum width of 1 m.
- Canalization of the cross-section drainage system of the road to increase space on surface.
- Traffic calming measures and promotion of coexistence of different uses.
- Occupation of areas close to the road.

9.2. Lane width

The narrower the lane, the lower the speed of the vehicles. Thus, as a traffic-calming measure, it is convenient to reduce the section of the road to allow the passage of a fire truck.



10. PARKING SPACES

When the need for parking spaces is justified, they should preferably be parallel to the road. Angle parking means a greater invasion of the space that, if it is available, should be intended for pedestrians.

- Spaces for parallel parking should have a width of about 2.20 m +/- 10 cm.
- In case angle parking is justified, it shall be about 5 m x 2.50 m and be designed in such a way that the vehicle exits in the traffic way (known as back-in angle parking). Under no circumstances, angle parking spaces should be placed in areas with speeds greater than 50 km/h, and near intersections.

11. LIGHT

- Lighting should be oriented to pedestrian routes, in particular at intersections and pedestrian crossings, avoiding dark areas on sidewalks or lights that may dazzle pedestrians and drivers.
- In urban areas, lighting devices will be placed as close as possible to the carriageway, whereas in peri-urban areas as close as possible to the outside of the road to prevent potential car drivers from leaving the road and properly illuminate the pedestrian route.

12. COMPETITION BETWEEN DIFFERENT USES

As regards friendly mobility, it must be designed in such a way that there is no competition for spaces. Thus, widened intersections, lack of curb extensions, or the possibility of invading spaces reserved for pedestrians should be avoided. These areas subject to potential competition give rise to conflicts and dangers that negatively affect the good quality of pedestrian traffic. Therefore:

- Pedestrian-vehicle visibility must be ensured and solutions justified on the basis of maximum traffic speed.
- Curb extensions should be placed at corners.
- At intersections, the pedestrian route continuity shall be given priority.
- No parking spaces shall be created next to pedestrian crossings.

13. ENTRANCES

Except in those cases where a street or area is surrounded by others with traffic calming measures, there should always be an entrance to the zone. For this purpose, preferred options are roundabouts and speed breakers.

In roads passing through villages, towns and population centres, it is necessary to mark the entrance to areas where people walk along the carriageway, especially in narrow lanes. Thus, the entrance should be not only a traffic calming measure, but also a sign to alert drivers about pedestrians.

Devices such as dragon's teeth or other duly justified measures may be used in areas where it is necessary to signpost the entrance.

14. TRAFFIC CALMING MEASURES

Traffic calming devices must meet the specifications included in the Proposal for Designing Safety Devices.

15. TRAFFIC CONSIDERATIONS

Notwithstanding the aforementioned, the provisions of the Ordinance for Road Safety of the Provincial Council of Pontevedra and the General Road Regulations of Galicia, the following additional measures shall be established in the new actions of improvement and refurbishment.

15.1 IN POPULATION CENTRES

- Overtaking shall be forbidden.
- Left turns will be limited if there are change of direction points (roundabouts, botts' dots, turns to side streets, etc.).
- Maximum traffic speed will be limited to 50 km/h if there is a sidewalk and to 30 km/h in other cases.

15.2 OUTSIDE POPULATION CENTRES

- Horizontal signage shall include side rumble strips and side cat's eyes.
- This signage shall be marked with a double continuous centre line with white double-sided cat's eyes and rumble strips in:
 - Sections where high accident rates have been reported.
 - Routes with additional slow or fast lanes.
 - Roads for automobiles, according to Law 8/2013, of 28 June, on Galician Roads.
- Left turns shall not be allowed if there are change of direction points (roundabouts, botts' dots, turns to side streets, etc.)
- Intersections will be protected:
 - Enhancing their presence by reducing the lane width and creating a central painted island.
 - Ensuring visibility between intersection roads.
 - Incorporating pre-warning and speed reduction devices, where appropriate.

- In road sections with a high accident rate, micro-surfaces cold-applied will be incorporated to improve adherence and decrease speed naturally.

- Maximum speeds will be:

- 80 km/h, with 3.5 m lanes and hard shoulders with a width greater than or equal to 1 m.

- 70 km/h, when there are 3.5 m lanes and hard shoulders with a width greater than or equal to 0.5 m or 3-m-wide lanes and sidewalks of a width greater than or equal to 1 m (the latter option is preferred).

- 60 km/h, with lanes less than 3 m wide and hard shoulders of a width greater than or equal to 0.5 m.

- 50 km/h, when there are lanes less than 3 m wide, with or without shoulders.

16. PAVEMENTS FOR FOOTWAYS

In general, with the aim of establishing a standard criterion for pedestrian routes the following types of material shall be used in cross sections of footways:

- Concrete (coloured and grey)

- Coloured surfacing

- Decomposed granite stabilised with a binder (cement, glass cullet, polymers, etc.)

In pedestrian, non-urban or in sparsely populated areas, such as footways that need to be improved, i. e., on the Ways of Saint James, leisure areas, etc., the material to be used shall be soil (non-plastic sandy granite, with a maximum size of 20 mm) with conglomerate rock and well-compacted.

In areas that can be classified as urban, with aligned buildings, it should preferably be 16 cm of concrete HF-3.5 with low-heat hydration cement, mesh and contraction joints and mat reinforcement to avoid cracking.

In some cases, depending on the environmental conditions and for justified reasons, other types of solutions, such as coloured mixes, slurry, etc., may be chosen.

