

Guidelines for cycle facilities urban area

English version



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Ministry of Infrastructure,
Transport and Housing,



Centre for Studies on Urban Planning,
Transportation and Public Facilities

Références Collection

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Préface

Demand for greater use of the bicycle is growing in today's society. All cities with more than 100,000 inhabitants have launched programmes for establishing urban transportation plans (PDUs). The current legislation requires that vehicle traffic be restricted in urban areas. It comes as no surprise, therefore, that many cities have incorporated proposals favouring use of bicycles in their PDU as a non-polluting alternative.

The new success of the bicycle is not simply a response to the inconveniences of automobile traffic. A number of other features – physical exercise, more intimate contact with the environment and, indeed, greater conviviality among town residents – are seen as positive values and give pleasure to the user. Riding a bicycle is now seen as part of a lifestyle which corresponds to 21st-century values.

The development of facilities for cyclists is a delicate subject which requires sensitive treatment, particularly because, unlike the motorist, the cyclist is not protected by protective bodywork and is therefore very vulnerable and more exposed to accidents.

The teams that have worked on this document have taken great care in drafting their conclusions. They have sought to take advantage of the experience of pioneers and the knowledge of top experts. The work of the Club des Villes Cyclables has been particularly valuable. Similar operations in other countries have also been studied with care and have proved to be a rich source of information. As a result, we believe that this guide will be a valuable tool for those engaged in developing facilities for cyclists.

However, this research has not succeeded in removing all reservations. Given the state of knowledge today, it is difficult to identify the most appropriate solution for any set of circumstances. All too often, the many obligations and constraints create difficulties and great sensitivity and judgment are required in evaluating the advantages and disadvantages of each specific situation and in finding the best possible solution. This guide explores the arguments, where appropriate, that led to the recommendation of one option over another, but it should not be seen merely as a manual for implementation, but also and above all as a tool which helps developers reflect on the various options available.

However, this guide should not give the impression that it has all the answers that the expert is seeking. We cannot recommend too strongly to readers that they consult local cycling associations and that they take a ride on a bicycle and test real traffic conditions for themselves. The combination of personal experience and the objectivity provided by a thoroughly researched manual is in fact the best way of introducing well-planned facilities.

This report concentrates mainly on the conception of facilities for cyclists, while offering ideas for specific features (e.g. intersections). For a better understanding of local conditions, it is essential to place one's analysis within a broader context (e.g. the roadway) and to consider the city infrastructure in its totality. From this perspective, we are no longer looking at individual cycle paths, but at a complete and coherent network. What is the use of a cycle path if there is nowhere to park it safely at the end of the journey? Issues such as this must not be neglected by planners.

We wish our readers, as creators of cycling facilities, success in their ventures and much pleasure for cyclists in using them.

André LAUER
Director, CERTU

Forword decembre 2007

Since april 2007, when the former guide was printed, cycling has encountered numerous changes in France.

First of all, thanks to the involment of local authorities , the social demand has grown. Cycling is now a transport mode involved in all length of trips in urban areas.Thanks to local cycling policies cycling is becoming a reality in everyday life as a result of the provision of more cycling facilities and services. As cycling is growing, it is better percieved by other users, and get a better safety.

Cycling gets a large interest in the subjects that the Departement for sustainable transport and ecology is in charge with : sustainable development through its contribution to plans as the climat plan, transport and greenhouse gaz effects plan, road safety plan with important projects like «hight street code» or «shared street» and all the change that it involves as far as guidelines or regulation (road signs), accessibility...

Last but not least, in april 2006 the President of the Republic has named M Hubert Peigné as inter-ministerial coordinator in charge of developing cycling with the main objective of getting all the stakeholders either from the political word or from the association the stick to an efficient policy to develop walking and cycling.

Introduction

Since the 1990s, CERTU has published, in partnership with the Club des Villes Cyclables, several technical guides for planning cycling facilities in an urban environment. While many local authorities are already committed to introducing programmes involving less polluting forms of transport, CERTU realised that there was a pressing need for a more complete report, which would help people responsible for developing policies specifically for cyclists.

These *Recommendations for Cycling Facilities* draw heavily on our previous publications, but have also taken into account the programmes in French towns committed to encouraging cycling and guides published in other countries. The manuals used in the Canton of Bern and the Netherlands, which among the first to take an interest in this area, were particularly useful.

While this report does seek to offer guidance on developing policy, its main purpose is to provide help with practical implementation and detailed information on technical aspects. This new version of 2008 allow us to include the experiences of the last 7 years .

The first chapter offers an overview of cyclists' needs and of the way they interact with other users.

Chapter 2 reviews the various tools available for the definition and implementation of coherent policies in favour of cycling. Some of these tools are defined by regulation. The authors describe how to make the most of procedures relating to town planning legislation or urban transportation plans for encouraging greater use of the bicycle. Other tools are simply our suggestions for districts

or cities when developing coordinated action plans for cyclists in their area.

Chapters 3 to 7 contain technical recommendations for cycling facilities and offer ideas on the various types of lanes that can be built for cyclists. These propositions, particularly insofar as they concern geometry, will ensure proper levels of security. These should not be seen as 'obligatory', or even as 'standards' that must be imposed, nor does their publication imply an obligation to conform to any given existing set of facilities. The large number of sections describing these facilities should not detract from the fact that a well-managed policy on reducing traffic speeds will also enhance the introduction of multiple forms of transport in the same area while maintaining road safety standards. This subjects are still evolving

The last three chapters provide a rapid overview of fundamental policy issues with regard to cycling facilities: parking and theft, interchanges between transport systems, and promotion of cycling. These issues are relatively new and likely to evolve over the years to come, perhaps more rapidly than other topics raised in this report.

At the time of publication, *Recommendations for Cycling Facilities* aims to be one of the most comprehensive reports on the integration of cycling facilities into road network planning.

Since then, new guidelines have been published (guidelines for cycles routes 2004) dealing with inter-urban, peri-urban, and when a route is getting through a village, guidelines on road signs for cycling facilities has been published (changes in the highway code in 2001, new regulations of road signs , accessibility...) all those needed to be added to the former version of this document.

1 Cyclists and other users

When planning facilities for cyclists, it is absolutely essential to understand their behavioural patterns and expectations. The main priorities for decision-makers are to ensure that cyclists enjoy the best conditions possible for their own safety and to avoid conflicts with other categories of road users: these priorities can only be met by finding solutions which take into account all groups of users sharing the road system and public spaces.

1.1 Different uses of the bicycle

Bicycles can be used in at least three different ways:

- daily transport between home and school or workplace, which can also take in other destinations for shopping or leisure activities (sport, cinema, library, etc.). Whether users cover the distance by bicycle only (door-to-door) or by a combination of bicycle plus public transport, these journeys usually take place in urban or suburban areas;
- sporting activities using existing inter-city road networks (racing bicycles) or country tracks (mountain bikes) but also involve entering and exiting towns;
- recreational activities in local areas for family outings or along planned circuits for tourism.



Teaching children to become autonomous



A fast and economical way to go to work

For each of these uses, there are several categories of cyclists.

There are two categories of city cyclists, as confirmed in a 1998 behavioural study carried out by INRETS (ref. 18) which involved use of a bicycle equipped with cameras. The first category covers 'rapid and experienced' riders who prefer a direct route, take advantage of cycle lanes and do not hesitate to move into car traffic. This category rarely uses cycle paths. In the second category, we find cyclists riding more slowly or carrying heavy packages: they prefer to avoid confrontation with cars. These cyclists will use cycle paths, where they exist, pavements, or bus lanes.

However, cyclists in both categories will seek to reduce the number of times they have to stop, for example by slowing down when approaching traffic lights in order to pass at green. Their objective is to maintain speed despite the many obstacles: cars double parked or turning, buses leaving bus stops, etc. Ideally, planners of cycling facilities should take into account both groups of users, particularly since cyclists can move from one category to the other, depending on circumstances: for example, an expert cyclist will from time to time carry a heavy load or a baby, or accompany a child.

Racing cyclists, who are mainly interested in maintaining regular speeds, do not spend much time in town: they prefer major country roads, even if there is heavy traffic, to quiet twisting roads; they avoid greenways in reserved areas, such as towpaths, especially if they follow the curves of rivers and canals and if there are many walkers. Sometimes, they will avoid cycle lanes running alongside inter-city roads, preferring the road itself because its surface is smoother and less cracked, especially if the lane is covered with gravel or dead branches, due to inadequate maintenance.



Group of racing cyclists before the climb up the mountain

Recreational cyclists seek quiet tourist routes in natural surroundings and prefer to use reserved areas when travelling long distances, towpaths alongside navigable rivers, and roads with little traffic. They will often go on all-day trips or even longer journeys and are prepared to make slight detours to avoid steep slopes or noisy and polluted areas full of traffic. They are less worried about gravel than racing cyclists, since their tyres are more robust but, as they often ride long distances, they are particularly sensitive to the quality of road surface.



Family returning from the beach

1.2 Cyclists' needs

The following table gives a summary of cyclists' expectations. It comes from the Dutch guide *Sign Up for the Bike* and was recently reprinted in *Promising*, a European Report published in 1999 for the promotion of quality cycling facilities.

Safe Routes	Sensible Routes	Routes without Unnecessary Detours	Attractive Routes	Comfortable Routes
Where there is a high level of fast-moving traffic, cycle lanes must be separated from the road.	Network of continuous and fully interlinked cycle paths. There is no justification (e.g. 'impossible to create a cycle path') for breaking the flow of cycle traffic.	The most direct route is always best, except where the road is particularly steep or there are too many intersections.	Access to main roads; paths linking sports areas, cultural activities and commercial areas; a well-signed network easily understood by all users.	Flat surfaces, since bicycles have no suspension; limited exposure to noise, wind, and heavy lorry traffic.

Five methods for a successful network of cycling routes (*Sign Up for the Bike*, 1993)

1.2.1 Safe Routes

Unlike drivers who are 'protected' by their car, cyclists are particularly vulnerable road users. In order to evaluate the real dangers faced by cyclists, it is important to have hard statistics on accidents and on the number of bicycles in circulation, distances covered, time on the road, etc. The only official source of data in France is the *Bilan annuel, statistiques et commentaries*, an annual report published by the Observatoire National Interministériel de Sécurité Routière (ONISR). However, these figures tend to underestimate the number of persons injured; numerous accidents, especially those only involving cyclists, are not reported to the police and, for this reason, are not included in statistics. In 2006, there were 82,993 corporal accidents. Of these, 105,980 were injured among them 41,869 went to the hospital for more than 24 h and 1,419 were killed. The number of cyclists killed was 190, 1,804 went to the hospital more than 24h and 2,889 received slight injuries. Generally speaking, accidents involving cyclists are three times more numerous in urban areas, but these accidents are less serious than those in country areas; they usually take place in the late afternoon or early evening because bicycle lamps are weak or not used. Old people and children are particularly vulnerable. Accidents are more frequent on secondary roads where there are more cyclists. Overall, there are more accidents on stretches of roads between intersections, than at intersections: 2/3 away from intersections. The main factor is the difference in speed between cars and cycles, followed by insufficient respect for the Highway Code by both cyclists and car drivers, as they tend to use the road regularly or underestimate the danger, or cycling facilities are inadequately or poorly signed. Fifty percent of accidents involve a cyclist hit by, or colliding with,

a car while riding in a straight line: most often this involves a driver overtaking the cyclist or opening a car door. Safety is particularly dependent on attention to detail. Roads are often a collection of minor obstacles that cyclists have to avoid: rail or tram tracks, high kerbs, metal plates and manhole covers, slippery surfaces on rainy days, etc. Cyclists need to avoid these obstacles or ride over them as quickly as possible in order to keep their balance. Town planners must therefore ensure that curves can be easily manoeuvred, especially when entering or leaving reserved areas, car parks and pedestrian areas. Kerbs should be at few centimeters over the road surface (accessibility of blind people).

Planners should avoid placing gutters in cycle lanes and ensure that grates over rainwater drains are on a level with the road surface and that their slots are perpendicular to traffic as bicycle wheels can catch in them. In city streets, it is better to move drains to the pavement area and replace the usual square covers with narrower rectangular grates.

There are many forms of protection barriers which can clearly designate space for the different users. However, these are often dangerous for cyclists if they are badly placed or poorly signed, in particular where there are road works. These include stone bollards, posts, barriers, raised kerbs, flexible bollards and markers, safety rails, etc.

In interurban areas, town planners can incorporate additional space on the roadside where property fences line the routes. On the other hand, a cycle path must be protected when placed close to a major road, alongside a slope for more than 3 metres, or next to a waterway with steep banks. Guidelines for crash barriers are dealt with in 3,6,2, page 53..

1.2.2 Sensible Routes



Traffic flow and safety on a bridge

Cyclists do not judge a route solely on its safety precautions; they are also interested in having long and continuous routes. They want to be able to switch easily from local roads without cycle paths, to cycle paths or lanes on roads with speed limits higher than 30 km/h, protected routes using existing bridges and tunnels, and overhead or underground passages reserved for cyclists and pedestrians when crossing major roads, etc. Horizontal and vertical signing of the route should also be available. It is important to have cycle parks near stations, public buildings; and schools and these should be visible, easily accessible and equipped with anti-theft systems. Providing such

facilities will ensure that cyclists feel confident about reaching their final destination.

1.2.3 Routes without Unnecessary Detours

In urban areas, obstacles often lead to interruption of the free flowing of cycle traffic (ref. 19): these can be natural features (waterways, steep slopes) or roads and public places (urban expressways, one-way streets, industrial areas, railways, hospitals, large fenced parks where bicycles are forbidden or limited to certain periods of the day). Having to ride around these obstacles and lack of protection when crossing them, due to the passage of cars, trams, or trains, can be very dissuasive for cyclists. Like pedestrians, cyclists will always look for the shortest route from A to B, yet the facilities that are offered force them to take long detours for their own safety. There will always be the temptation to cut corners!



One-way street for cars, but two-way for bicycles

Solutions can often be quite simple: two-way paths for cycles in streets which are one-way for motor traffic; allowing cyclists to use bus lanes; cycle paths alongside the pavement allow pedestrians and cyclists to share space; using private areas to cross large residential areas, housing estates, parks and public gardens; creation of greenways in suburban areas, etc.



Only cyclists can cross at this intersection

Gutters and ramps can make stairs easier for cyclists: they can dismount and push the bicycle along in the gutter. To allow space for pedals, gutters should be placed about 30 cm from the stair wall or barrier. Wherever possible, gutters and ramps should be placed on both sides of the steps for passage in both directions.



A simple gutter means no more carrying the bicycle

1.2.4 Attractive Routes

To ensure the comfort and safety of cyclists, it is not enough just to set aside separate paths for their use. They must have easy access to the town centre and good signing of cycle routes and parking areas. These measures will encourage them to be fully integrated into public areas.

From now on, council regulations must make it mandatory for cyclists to take cycle lanes or paths. If there is no obligation to do so, cyclists will continue to use the roadway if, in their opinion, cycling facilities are ill-adapted to their needs, too narrow or rudimentary, or not properly maintained.

Cyclists are particularly sensitive to the environment, when it comes to long-distance journeys, and it is particularly important that routes are sheltered from wind, noise and sun. Lateral winds, for example, are often dangerous for cyclists and wind in general accentuates the cold. In areas particularly exposed to windy conditions, the best and most effective protection are natural barriers, such as banks, windbreaks and hedges of evergreen shrubs (oak, hornbeam...) or trees (thuja, pruned cypress, pollards).

However, natural barriers are not very effective for reducing noise; it is better to use excavated material or a combination of barricades and thick vegetation. Placing cycle paths at a distance from the road or behind earth banks not only reduces traffic noise but also danger from turbulence. To reduce injuries and punctures, shrubs with toxic berries or spiky twigs must be removed (e.g. yew, chestnut, hawthorn, acacia).

1.2.5 Comfortable Routes

The pleasure of cycling can be enhanced by a number of measures, which make use of a variety of services, such as:

- good maintenance of the road surface,
- elimination of projections at feeder links,
- marking of routes,
- fines for illegal parking,
- publication of a cyclist's guidebook, including maps of cycle routes ...

Without regular maintenance, weeds will invade the cycle path and reduce its width. Despite the presence of low barriers, vegetation can grow over paths and reduce the riding area by as much as 30 cm. In addition, gravel, dead leaves, broken glass, and various types of rubbish contribute to degradation of the cycle path: the risk of skids is higher, especially on curves. For these reasons, cycle paths must be maintained regularly and frequently, or they will not be used: regular patrols by maintenance workers; use of suitable cleaning equipment (street sweepers, road cleaning machines); pruning and mowing; emergency maintenance following bad weather conditions.



A path without maintenance is a path without cyclists



A path with good maintenance is a path able to be used by cyclists



Cycle path obligatory, but impractical, and not respecting regulations



Well design and suitable cycle facility.

1.3 Shared use with other users

Co-existence of various types of users can take place: either by sharing space, where their behaviour patterns are compatible, or by creating separate spaces. Wherever possible, it is better to encourage sharing.

1.3.1 Pedestrians

Under the provisions of the Decree of 14 September 1998, which amended certain rules in the French Highway Code, children under 8 can ride bicycles on pavements and, unless otherwise provided for by the authority invested with police powers, cyclists can use pedestrian areas, on condition that they ride at walking pace (see also sections 2.1.1 and 3.3.2 below). On pavements, cyclists and pedestrians are required to share space, yet they do not travel at the same speed. Pedestrians with reduced mobility, handicaps or reduced vision want clearly defined limits and tactile signs, separated lanes. It is both technically possible and perfectly justified. Numerous rules among them decret 2006-1657 and 1658 from the 21st of december 2006 and arrêté from the 15th of january



Cyclists are allowed in pedestrian areas

spell what are the rules for design taking account of the access for all persons with handicaps related to streets and public buildings.

1.3.2 Roller-bladers

As a growing leisure sport, there are many roller-bladers in urban areas and this has now reached such proportions that the Île-de-France Urban Transport Plan includes activities for the promotion of roller-skating, together with walking and cycling. As in neighbouring European countries (Belgium, Germany), bladders and skaters are now considered pedestrians, confirmed by the



Roller-bladers are not allowed in cycle lanes

Ministerial Response of 30 November 1987 and the Senate's Response of 22 February 1996. As a result, roller-bladers are now required to respect Articles R 217-R 219-4 of the French Highway Code and travel at walking speeds on pavements taking care of other pedestrians.

Article L 131-3 of the General Code for Local Authorities, which defines the police powers conferred on mayors, town councils can limit access to or forbid roller-bladers, but does not allow them to authorise use of the road. Roller-bladers are more particular than cyclists about using smooth surfaces. They tend not to travel in

straight lines and, according to the Association Roller Squad Institute, need a minimum space of 1m 60, which is slightly more than that required by cyclists. An interministerial working group is studying the consequences of this new form of transport in urban traffic and its recommendations may lead to amendments to the Highway Code;

1.3.3 Motorcyclists

Motorcyclists travel at the same speed as cars in urban areas. However, the difference between speeds used by motorcycles and bicycles create dangerous situations for both sets of road-users. For this reason, the Decree of 14 September 1998 ruled that cycle paths and lanes could only be used only by bicycles or tricycles. The authority invested with police powers has the right to authorise access to mopeds, where such an option is explicitly signed (see the Chapter on Signing). The Highway Code authorises mopeds to have access to safe waiting areas.

1.3.4 Motorists

We should not forget that the main problems relating to having cars and cyclists travelling in the same space are due to their differences in terms of volume and of speed. Parked cars can also be an important source of conflict: opening doors, blocking entries and exits, illegal parking, or illegal waiting. The number and speed for vehicles make the coexistence of cars and bicycles impossible except in areas where traffic is low and speeds are moderate. On roads with high-speed traffic, each category must have their own lanes. Where there is kerbside parking alongside cycle lanes, opening doors are particularly dangerous. To avoid accidents in these conditions, cycle paths must be placed at least 50 cm. from parked cars.

When using angle-parking, motorists entering head first need to take particular care when reversing back onto the roadway: this manoeuvre is particularly dangerous for cyclists and other

users, because the motorist has very limited visibility. It is better to increase the size of parking spaces or, if this is not possible, to change the angle so that cars can reverse into the parking space and leave in forward gear, which will give them much greater visibility.

When introducing cycling facilities, it may be necessary to change parking areas or move them to side roads. Compromises will have to be found to avoid penalizing local residents. In addition to including authorised bicycle parking facilities, temporary parking spaces must be made available for delivery vehicles. Their dimensions must be defined in terms of the size of delivery vehicles and



Disrespect for cycle lanes puts cyclists in danger

the number of deliveries to the shop or warehouse in question. In no circumstances should motorists wait in cycle lanes (e.g. in front of bars, tobacconists, bakeries, chemists, etc.). For this reason, the police must monitor cycle lanes, similarly to bus lanes, and keep up regular and strict surveillance during the first months after their installation. Illegal parking forces cyclists to make sudden moves in and out of cycle lanes and this greatly increases the risk of collision with other vehicles and discourages less expert cyclists.



Where's the cycle path?



Safer than riding in traffic

1.3.5 Public transport

In France, planning for tramway networks also includes space for parallel cycle lanes and thus limits the need for trams and bicycles to share space. The main problems arise when cyclists have to cross tram tracks at intersections: they need a minimum angle of 30-40°. However, cyclists in many towns have to share lanes with buses on a daily basis (see Section 3.3.5).

In most cases, there are no specific lanes for buses or bicycles and the ordinary rules of the Highway Code apply. The main source of problems for bus drivers is their inability to predict cyclists' behaviour. In particular, they point out that overtaking cyclists force them to move into traffic, a particularly difficult manoeuvre for drivers of longer buses. In addition, they often have difficulty when leaving a bus stop because of cyclists riding into their blind spot. The absence or inadequacy of lights make cyclists almost invisible, especially on rainy days or at night, as they can easily be confused with the strong headlights of other vehicles. Cyclists usually

cite the same problems (i.e. buses leaving bus stops and overtaking) but also raise the difficulties caused by the size of buses (especially articulated buses) compared to bicycles.

Fortunately, this perception of mutual danger is mostly subjective: annual statistics show that, in fact, there are few serious accidents involving buses and bicycles.

2 Legislation and Tools for Planning and Programmes

2.1 A legislative and regulatory framework

2.1.1 The Highway Code

In general, traffic rules apply equally to motorists and to cyclists. However, some specific provisions concern cyclists, following amendments in their favour contained in Decree of 14 September 1998. Articles R 110-2 and R 431-9 stipulate that cycle lanes and paths are now reserved exclusively for bicycles and tricycles, and signing was changed to reflect this amendment (C113 sign, see p.70). Mopeds are no longer allowed to use cycle lanes unless specifically authorised by a decision by the authority invested with police powers, as indicated by the placing of a M4d2 sign beneath the C113 sign, and only for two-wheeled mopeds without sidecars or trailers. By implication, cyclists are not obliged to use cycle lanes and paths, except where specific provisions have been made by the authority invested with police powers: these should be posted on a B22a sign. Cyclists are also authorised to ride at walking speed in pedestrian areas, as defined by Article R 110-2, and within perimeters established by the Mayor in conformity with Article R 411-3, except where there are specific provisions laid down by the authority invested with police powers: this information should be displayed for users on a C109 sign. Articles R 415-2, R 415-15 give the appropriate police authorities the possibility of modifying intersections as follows:

- creation of safe waiting areas, marked by two distinct stop lines, on access roads that are equipped with traffic lights controlling all categories of road-users. These areas can allow cyclists and mopeds to wait for the green light in front of other vehicles, which are not allowed to enter the

waiting area until they have a clear exit;

- installation of separate sets of traffic lights for bicycles and mopeds, and for other categories of vehicles;

- creation of a lane to be used by bicycle and moped riders when turning right at an intersection.

Article R 414-4 specifies that cars must come no closer than 1m 50 to a bicycle or tricycle (or pedestrian, horseback rider, etc.) when overtaking outside town centres, and 1 metre within built-up areas.

Article R 415-4 stipulates also that, when the rules of priority apply, a cycle path is considered to be a lane on the road along which it runs, unless otherwise indicated by signs.

By virtue of Articles R 43, R 192 and R 217, all users must, except in the event of absolute necessity, remain in the space specifically allocated to them: cyclists on the road, lane, or path; pedestrians on pavements or verges. Only two exceptions are allowed: children under 8 are authorised to ride bicycles on the pavement and, so long as they cycle at walking pace and do not inconvenience pedestrians. Outside built-up areas and only when routes are cobbled or under repair, cyclists are permitted to ride at moderate speeds on pavements and pedestrian pathways.

Article R 189 specifies that cyclists do not have the right to «ride more than two abreast on the road; they must move into single file after dusk and in all situations where traffic conditions require, and especially when other vehicles want to overtake and indicate such a move».

Article R 191 foresees that «bicycles and other two-wheel hand-driven vehicles are to be tolerated on the roadway». This article refers particularly to areas where the lanes at pavement level are, for a variety of reasons (road works, crowding...),

momentarily impracticable.

2.1.2 Laws encouraging the development of alternative forms of transport

The French Act of 30 December 1952 on guidelines for domestic transport (LOTI) indicates, in Article 1 that «domestic transport systems must satisfy the needs of all users and make provision for an offer of facilities in keeping with their right to travel and their freedom to have a choice of transport systems». Article 28 indicates the general principles for organisation of transport, traffic and car parks which must permit «a more rational use of the car and accommodate pedestrians, two-wheeled vehicles, and public transport». LOTI established the concept of urban transportation plans (PDU).

The Clean Air and Rational Use of Energy Act (LAURE) 30 December 1996 reaffirms the prime objective of «reducing automobile traffic, developing bus services and transport systems which reduce costs and pollution, notably through encouragement of cycling and walking». Article 14 of LAURE amends LOTI Article 28 and places towns with more than 100,000 inhabitants under an obligation to develop a urban transportation plan with the objective of introducing a coordinated plan for the «coordination of various uses of all forms of transport, in particular through allocation of appropriate lanes on the roadway». The law requires that town councils approve PDUs before 1 January 2000.

LAURE Article 20(article 228-2 of the environment code) specifies that **«as of 1 January 1998, the creation or renovation of urban roads, with the exception of motorways and expressways, must include provision for cycle lanes which are provided with facilities such as paths,**

road markings, or independent corridors, in accordance with traffic needs and constraints. Development of bicycle lanes must take into account the Urban Transportation Plan where such a plan exists». Since application of this article is not conditional on the issuance of a decree, it would appear that it applies to all towns and communes, regardless of size. Several options could be explored: obligation, renovation, cycle route, etc. A clear definition of these terms will depend on future jurisprudence, but we can make some observations.

- **The notion of obligation**

Given the expression '... must include ...', the legislator specifically introduced the notion of obligation: for all new or renovated urban roads, the contracting authority is responsible for ensuring that facilities encouraging use of bicycles are planned.

The article applies only in urban areas.

- **The notion of renovation of a roadway**

Can simply renewing the tarmac be considered a 'renovation' of the road? In the absence of more precise implementation orders, we will have to wait for the jurisprudence. However, all road works programmes which include renovation of the roadway, no matter how basic, do offer an opportunity to reorganise the available space in favour of pedestrians and cyclists. For example:

- operations involving geometric characteristics, such as changing the position of kerbs;
- reorganising or upgrading the road (changing direction of traffic, new arrangements for parking, introduction of safety measures for pedestrians, allocation of lanes to public transport, landscaping programme, etc.);
- upgrading underground networks, where this

— renovations along several hundred metres which involve digging up the entire road surface.

Application of this article could lead, in the short-term, to the installation of a complete cycle network with satisfactory interconnections.

- **The concept of a cycle route**

The law is strict with regard to the creation of cycle routes: it is not enough to provide cycling facilities on a 'case by case' basis for isolated sections of the network. A route is defined as a «path for travelling from one point to another»; it must therefore have a beginning and an end, a certain length and overall continuity over the entire distance. A section of roadway in no way constitutes a cycle route.

- **Consistency with the Urban Transportation Plan**

Where an Urban Transportation Plan has been adopted and covers areas where road works are to be carried out, it is essential that cycle routes are planned in line with the guidelines laid down in the PDU. By no means does this imply that nothing needs to be done if the PDU does not include plans for the road in question. If an PDU only refers to the introduction of some major cycle routes and provides simple guidelines for the rest of the network, without a concrete definition of how these will be linked, new road works must be seen as an opportunity for planning that section of the cycle network and for carrying out the necessary modifications.

- **The development of routes**

Article 20 does not apply to expressways and motorways. However, when there are plans to upgrade a route currently used by bicycles as a motorway, expressway or bypass on which two-wheeled vehicles are prohibited, this is a good time to think about reconditioning the road. When creating a new expressway on which bicycles are excluded, the reconditioning programme (e.g. creation of road junctions) should include facilities for cyclists. By default, the law

covers the entire urban road network and makes no distinction between a four-lane thoroughfare and a minor road with very little traffic. It does not specify whether the location of such facilities must, in all cases, be taken into account only where they will be close the limits of the road to be constructed or renovated: in the absence of ordinances, we will have to wait for jurisprudence to indicate whether, if such works are technically not feasible, cycling facilities can be transferred to one or more adjoining routes. In any event, given the arguments outlined above, all programmes for future road works should take into account facilities for one or more cycle routes. Let us cite just three examples:

— the works area is situated on a cycle route which has already planned and perhaps even partially in place: the route needs only to be upgraded in order to conform to the existing plans;

— the works area does not appear on plans for a cycle route, but the local context makes it possible to install a new section to the overall plan or extend an already partially-built cycle network;

— the works area is not in an area where there are plans for a cycle route or where the context does not allow the incorporation of such a route (e.g. dangerous traffic, too narrow to meet the minimal requirements for the safety of cyclists); in this case, it might be appropriate to introduce changes which will reduce traffic speeds, such as a 30 km/h speed limit, and thus ensure that cyclists will have the benefit of good safety conditions.

In conclusion, Article 20 requires that cycling facilities be introduced, but leaves authorities with plenty of scope and common sense free to interpret how they manage, install and plan the cycle network.

2.1.3 An interministerial instruction on road signs

The main rules relating to specific signing for bicycles can be found in Chapter 5 of this Guide. A certain number of modifications in favour of bicycles, and in particular with regard to road marking, have led to changes in the inter-ministerial instruction (Order of 24-11-1967 and amendments) in 2002. Other changes will come.

2.1.4 The instruction and recommendations for taking account of cyclists in road development

The instruction of 2 November 1995 applies to the national road network in both urban and rural areas, but the annex to the instruction includes recommendations for all those involved in road management. «In the future, it is essential that all road transport studies take cyclists into consideration, either to ensure their integration into future road networks or, where such consideration is impossible, to justify their exclusion». It specifies or confirms the precautions to be taken during these studies and the creation of infrastructures for cyclists. The objective of this instruction is to ensure that road planning architects take cyclists' needs into account. These considerations now seem to be better understood and indeed have been strengthened by the enactment of LAURE (Article 20).

2.2 Tools for introducing a cycling policy

2.2.1 The Urban Transportation Plan Cycle Master Plan

In conformity with the provisions of LAURE, an organising authority develops, implements and

revises the Urban Transportation Plan for the urban transport systems operating in its territory. Decisions taken by road network authorities and traffic police within the territory must either be compatible, or adapted to comply, with the PDU's objectives. An evaluation must be carried out at the end of each five-year period, followed, if necessary, by a revision of the PDU. Follow-up indicators must be identified from the beginning of the project and should cover the development of 30 km/h areas, cycle routes, parking spaces for bicycles and also use of the facilities once completed.

Even though towns with a population of less than 100,000 are not obliged to introduce PDUs, they can easily adapt the concept to local conditions. Given its dual purpose (evaluation and future planning), the PDU has proved to be an important tool for both council members and engineers.

Towns can also set up less complex programmes, such as transport, speed-reduction, or even transport safety programmes. As with the preparation of a PDU, an in-depth analysis of the current situation must be carried out and this will contribute to the drafting of guidelines and objectives to be met, which can be incorporated into a transportation plan. This plan can apply to the whole town or to sections of the urban or outlying areas. The local council will be responsible for implementing the plan, in partnership with local organisations, by making use of pre-project studies and taking into account such issues as safety, traffic, the environment, town planning, and community lifestyles. An assessment of all roads can lead to a redefinition of speed limits as part of the process of creating a coherent cycling network.

In its PDU and master plan for development and town planning, the Greater Lille Council emphasised that, «development of the public road network cannot separate out areas for

each category of users. Only an approach which integrates all forms of transport and all uses of the road network will allow the introduction of quality services and ensure that pedestrians and cyclists enjoy the best possible conditions for their journeys in and around the city».

2.2.2 The Cycling Charter

The decision to promote the use of bicycles can be reinforced by a cycle master plan and a cycling charter, which can be developed at the same time as, or independently of, the PDU.

For many cities, the cycling charter takes the form of a political commitment endorsed by all partners. It establishes a master plan for technical questions. Some cities have taken a different approach. But whichever option is chosen, these documents provide the local population with proof of the local authority's strong commitment and will provide valuable input for all future urban planning projects.

Example: Greater Lyon Council (Statement of Political Commitment)

I The context

37% of all journeys cover a distance of less than 3 km. Approximate share of different forms of transports: car, 77%; two-wheeled vehicles 2%; public transport, 21%.

Bicycles represent about 0.7%.

II The objectives

Recognise the bicycle as a form of transport in its own right; encourage cyclists by creating and signing cycling routes; adapt land use regulations to accommodate cycling facilities, by ensuring their co-existence with other forms of transport.

III Resources to be mobilised

Resources are required for the facilities, parking equipment, and promotion and information campaigns which will ensure general recognition

of, and respect for, cycling facilities by motorists. A programme for introducing these facilities should normally last about 4 years.

IV Budget

The budget was increased from FRF1.5 million to FRF10 million from 1998.

Voted unanimously by the Greater Lyon Council, the charter was signed by GLC councillors, the general council, the transport authority, the public transport services operator, and the DDE (Departmental Infrastructure Directorate).

Example: the Lille Rural Council (Technical Reference Document)

Two complementary charters will contribute to the development of short, pleasant and safe routes for pedestrians and cyclists. The Charter on Speed Limits defines technical specifications for reducing vehicle speeds in urban areas and facilitating the co-existence of various users of the road: «aggressive behaviour by motor traffic in towns is not only due to the space occupied by cars but also to their speeds, which are all too often ill-adapted to sharing the roadway with other forms of transport». Together with this charter, a master plan for moderating speeds was annexed to the Urban Transportation Plan; further, a map indicating all 30 km/h speed limits was drafted to complement to the master plan for cycling routes, since these areas did not require any modification to accommodate their use by cyclists. The Pedestrian and Cyclist Charter contains a number of technical recommendations for developing cycling routes and pedestrian areas: for example, description of various cycling facilities which will contribute to the creation of a cycle network, inclusion of this network in the Land Use Plan (reserved sites), planning of intersections.

2.2.3 The Cycle Master Plan

Having a master plan means that planners can ‘think cycling’ and this is essential for incorporating cycling issues in the development of road and town planning projects. As a permanent reference document for making policy decisions, a cycle master plan contains:

- a general and indispensable framework to assist councillors and technical services in establishing priorities and for programming facilities;
- indications for technical coordination of facilities,
- guidelines for establishing investment and operational budget policy.

■ The territory covered by the study

The cycle master plan is very useful for plotting daily journeys in the area under study (city, town, commune, or department). For bicycling touring routes, the plan should take into account not only the department, but also the whole region. In any event, it is always better to give the study a very broad framework, which can always be scaled back, rather than to have to increase its scope at a later date.

■ Ensuring coordination over time

The fact that responsibility within a given area is so fragmented implies that coordinating responsibilities is a very complex task when defining a coherent master plan. The various elements involved (town planning, transport, investment operations) imply the involvement of communes, city and greater city councils, departments, State and regions. The initiative for developing coordination schemes must emerge from a real political commitment to coordination and dialogue and to their implementation over

the long-term. To ensure consistency with the master plan’s objectives, there must be a collective commitment to bringing the various authorities involved in transport policy together. This will also ensure the provision of the resources necessary for implementation and maintenance of the facilities and will, throughout the programme’s existence, be reinforced and offer opportunities for engaging in a debate with various players, whether councillors or engineers.

Encouraging complementary forms of transport leads to the promotion of attractive transport facilities for cyclists, pedestrians, users of public transport systems and, at the same time, reduces use of private cars. By building coherent arguments based on sectoral interests contributes to a decompartmentalisation of services and the development of interdisciplinary programmes. It is essential to hold regular and useful meetings with the population and users throughout the process: a good understanding of the benefits, weaknesses and inconsistencies of current conditions for bicycle journeys is absolutely essential at this level.

■ The development of a cycle master plan

Each town, each department is completely free to adapt its work scheme to the local context. It is therefore essential to adopt general principles that are acceptable to all persons responsible for implementation of the cycle master plan and above all for making the necessary political decisions. For these reasons, we recommend the creation of two separate structures: one political and the other technical.

• The Pilot Committee

The person with overall responsibility for the project (mayor, city council president, general council chairman, etc.) nominates a councillor to

— the department and the region (councillors or agents),

— State departmental and regional services (prefecture, DDE-DRE (Departmental and Regional Infrastructure Directorates), DIREN (Regional Directorate for the Environment), DRT (Regional Directorate of Tourism), DRJS (Regional Directorate for Youth and Sports).

This committee will establish guidelines for the development of a reference document. Depending on issues to be discussed, other interested parties, such as key players, user associations, and shopkeepers, can also be invited to meetings of the Pilot Committee.

- **The Technical Committee**

The members of this committee are usually engineers from town planning, road planning, and parking services, representatives of the police and of the public transport authority, representatives of departmental, regional and State authorities, together with engineers from other city services (e.g. operators of city and intercity public transport services, town planning agency, railway services, car park operators). It is a good idea to include user associations in the membership.

- **A multi-phase task**

Experience has shown that establishing a works programme does not take place in a single linear movement, but through regular and frequent exchanges between the technical and the pilot committees. There are three essential phases: analysis of the existing situation, definition of the objectives to be met, and allocation of the necessary resources. Plus, of course, the final evaluation phase, which is absolutely essential.

- **Analysis**

Collected data must be classified, analyzed and presented using graphic displays: map of the road network and road regulations; map showing existing cycling facilities and any other useful information on

cycle traffic (e.g. areas with heavy cycle traffic, areas prone to accidents involving bicycles, mopeds and other users); identification of obstacles for bicycle traffic, etc. Once these maps have been established for neighbourhoods or homogenous zones, or even at a wider scale, it is easier to see the potential for difficulties, to analyse their relative importance and to identify the causes. Analysis of this data can be carried out by the various players and incorporated in a report for presentation to the Pilot Committee.

- **Objectives and proposals**

Once the appropriate councils have approved the analysis, the project's principal guidelines can be defined in accordance with a Cycling Charter. This should take place before, or at the same time as, the development of plans for the introduction of the network. During the various phases of the works programme, a series of promotion campaigns should be launched to inform the local population and its representatives.

The technical team will also be responsible for proposing appropriate solutions in terms of facilities, regulations, and promotion campaigns. In addition, they will draw up submit a provisional budget, works schedule, and procedures for implementation, follow-up and evaluation of results over time (type of materials, usage, damage, etc.).

- **Implementation**

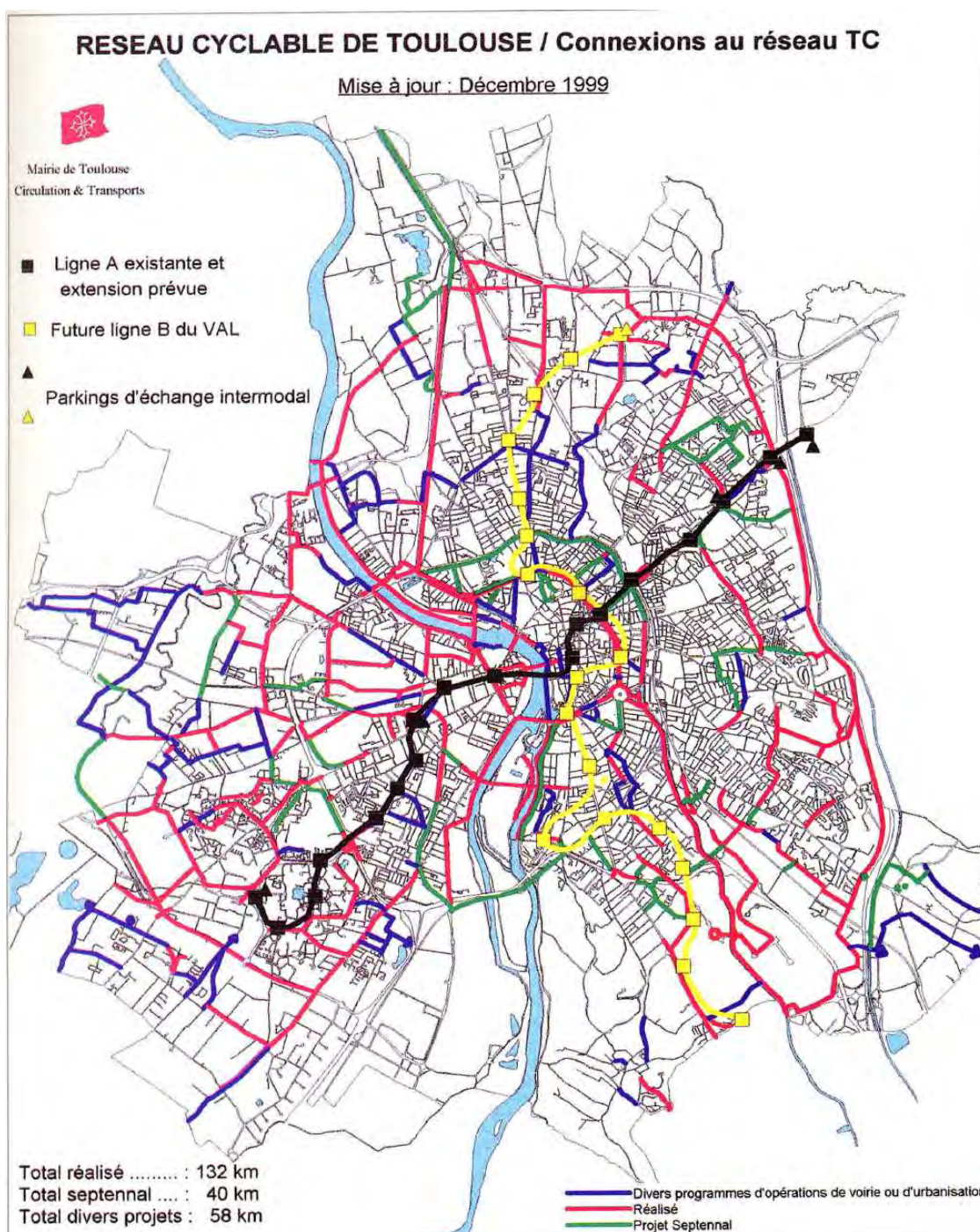
In general, implementation of these projects is carried out by services responsible for infrastructure, road systems and transportation, since these teams are well-placed for managing the opportunities offered by the planned network efficiently and even for anticipating its future implementation.

- **Evaluation**

This last phase is essential: it ensures that the operations will be reviewed in terms of pertinence and efficiency or will lead to proposals for improvements in the facilities created. An

analysis of the various road users' behavioural patterns (which can change radically from one sector to another) and of users' appreciation of

improvements or deterioration of safety conditions will allow the project leader to see whether the chosen solutions should be reassessed.



The national debate on cycling facilities has taken a similar approach. In recent years, tests have been carried out in a number of French cities, users' behaviour patterns have been analysed (INRETS), and safety conditions have been reviewed. As a result, recommendations now encourage shared use of road networks by the various groups but also a shift away from separating the different transport systems, as advocated during the 1970s and 1980s. As a result, this guide is not so much a 'collection of solutions' as a 'photograph' of the situation today.

To illustrate this evolution, let us consider recommendations relating to cyclists near bus-stops. A few years ago, cyclists were expected to stay behind the bus waiting at bus-stops in towns in order to protect them from overtaking motorists. However, this has resulted in cyclists coming into conflict with bus passengers at the bus stop and pedestrians on the nearby pavement. The recommendation has now been withdrawn in many places.

Example from the Department of Bas-Rhin

Like large city areas, more and more departments are setting up their own cycle master plan. Let us look at the situation in one department which has taken the lead in this area: the Department of Bas-Rhin.

Adopted in 1992, the cycle plan was given three objectives: improve safety conditions for cyclists, particularly school children; develop cycling routes for leisure activities; and, generally encourage greater use of bicycles as an alternative to cars. It has based on three elements: creation of a structural and long-distance network of cycle paths, with a variety of facilities; creation of routes linking the department's towns; and, development of local cycling routes.

When choosing a specific cycling facility, a comparison of all possible options, including introduction of

parallel lanes on roads with low traffic, was carried systematically out and was followed by a review of obstacles identified in each area.

This study distinguished between three major categories of facilities:

1. Reserved areas:

— *cycle paths alongside departmental roads (minimum width = 2 to 2m 50);*

— *'greenways' (alongside canals or disused railway tracks);*

— *cycle lanes next to roads (minimum width = 1m 50 to 2m).*

2. Cycling routes or tourist circuits on existing roads with low traffic:

Here the idea is to create routes that are not necessarily restricted to cyclists, but are also accessible to other categories of users and that are properly signed for directing cyclists and guarantee a continuous and properly marked itinerary from one destination to another.

3. Development of wider cycle lanes alongside major roads (hardstrips resurfaced for bicycles) for multiple users: access for cyclists, emergency stop lane for vehicles, mini-lanes for emergencies, improved visibility (fewer obstacles to landscape maintenance, etc.).

The annual budget for introducing these cycling facilities was fixed at approximately 19 million from 1991 onwards.

2.2.4 Land Use Plans

Necessary for assisting with communal planning, land use plans are a useful tool for managing urban spread, which is the biggest factor in generating motor traffic. In order to manage the needs of traffic, land use plans must take into account guidelines contained in urban transportation plans, where they exist. In any event, the «efficient management of land» is a top priority in terms both of moral obligations and of decisions to be taken by local councillors (Town Planning Code, Article L 110).

Establishing rights-of-way, when revising land use plans, is sometimes the only solution for introducing the planned cycling facilities: for example, taking advantage of specific rights-of-way or of rights-of-way to widen a road and thus opening up other options for improving facilities for cyclists. In addition, this will authorise requests for free transfer of land when submitting requests for building permits. In the Regulations for Land Use Plans, the wording of Article 3 (which covers access and roads) encourages continuity for pedestrians and cyclists. The safety of cyclists can be improved through the introduction of provisions contained in Article 12: limiting the number of parking spaces in town centres (except for residents) encourages use of public transport or of bicycles, which in turn reduces car traffic.

Under the provisions of Article R 123-21 of the Town Planning Code, any commune wishing to do so can «issue restrictions relative to obligations in terms of the creation of car parks» in the Regulations for Land Use Plans. In this regard, it can define either minimal standards for parking, or maximum standards which limit the possibility of creating private car parks. It can also adapt its standards according to specifications for constructions and in particular distinguish between constructions for residential use and those for business activities, depending on the neighbourhood or sector; the rules governing the building of car parks can also be defined in Article 12 (examples can be found in Chapter 8).

2.2.5 The national cycle route network

During meetings of the Interministerial Committee on Town and Country Planning (Comité Interministériel d'Aménagement et de Développement du Territoire - CIADT) held in December 1998, France adopted a programme of national cycling routes covering some 9,000 kilometres. One of the main objectives of this network was to develop green and rural tourism.

Its introduction, included in the Agreements between Regional and Central Government, will be subsidised by the State, appropriate local authorities (regions, departments, communes) and, on occasion, the European Union. These medium- and long-distance cycling itineraries will be known as 'cycle routes'.

Depending on the current infrastructure, these cycle routes can incorporate sections of existing greenways (defined on p. 32 below), cycling facilities in urban areas, of minor roads with low traffic, and forest roads. Each route must be made safe, be linear, continuous and signed. It must ensure that there are links between regions and the routes run through town areas in good traffic conditions. The suggested routes must be pleasant and avoid using excessively steep hills. In order to permit users to make attractive and comfortable stopovers, authorities should encourage the development of a variety of services along the 'cycle route', including accommodation, restaurants, maintenance, communications, hire companies, baggage transport services, etc. Maps and guides should be published as the cycle routes are put into service.

■ A European dynamic

Over a number of years, several European countries, including Denmark, The Netherlands, Germany, and Switzerland, have established medium- to long-distance cycling routes.. Others have joined them with a strong will: United Kingdom, Spain, and France. The European Federation of Cyclists (ECF), in collaboration with the European Union's DG VII (Transport), is working on the EuroVelo programme, which is due to be launched in 2012. EuroVelo will establish 12 long-distance cycling routes linking towns across European regions, including a number of thematic routes: the Gourmet Route, the Pilgrimage Route, the Atlantic Route, etc. France is involved in the development of five of these routes. The objective is to encourage environmentally-friendly tourism,

and generally greater use of the bicycle, since local cyclists will also be able to take advantage of these routes.

EuroVelo has set the first phases of development: an evaluation study for each route, promotional brochures, etc. Its objective is not to build new European cycling routes, but to coordinate and promote existing routes. 'EuroVelo routes' will follow and link up with itineraries developed by each country or region, on condition that they respect certain criteria of quality. The EuroVelo project can be compared to the European motorway system: it will create a homogeneous cycling network across Europe and allow cyclists to ride through regions right across the continent.

To meet EuroVelo's specifications and be eligible for co-financing from European structural funds, cycling itineraries must respect the following

criteria:

- roads included in the network must be either 'greenways' or capable of taking no more than 1,000 vehicles per day; the cycle path, including marking, must be no less than 2m wide to allow cyclists to ride two abreast,

- roads with inclines of more than 3% must be so indicated on maps and guidebooks, while inclines of more than 6% should be avoided (maximum slope allowed: 10% in mountainous regions).

EuroVelo routes must be open to cyclists all year round, have a good riding surface, pass close to stores and accommodation every 50 kilometres and offer connections with public transport at least every 250 kilometres.



The National Cycling Route Scheme

(source: CIADT 1998)



■ The Greenway Concept

The greenway is an route based on a reserved area which can be used by non-motorised users, including pedestrians, joggers, cyclists, roller-bladers, and people with reduced mobility. It can make use of existing rights-of-way, disused railway lines, forest roads, and paths in city parks, or can be created specifically for this purpose.

First introduced in North America and then in Europe (notably in Great Britain), greenways have proved very popular almost immediately after they are launched. They are often seen as 'linear parks'. In some areas, for example, where railway lines have been converted into greenways, they maintain interesting heritage areas (viaducts, tunnels in sculpted stone, etc.) while offering long and low-traffic sections which link town centres and a maximum number of suburban areas.



Restrictions are necessary to prevent access to motorised vehicles



Here cyclists and pedestrians have separate paths

In urban areas, they provide the backbone for alternative transport networks as they pass by schools, sports and cultural centres, etc. To develop this aspect, it is essential that the routes are incorporated into a linked network of feeder services and exits. By implication, they encourage greater use of cycling routes by these alternative forms of transport and thus improve such aspects as quality of life, quality of air, and public health. In rural areas, they contribute to the development of new forms of tourism which respect the environment. Greenways can also be included as sections of long-distance cycle routes.

By definition, greenways are two-way and, while they can vary greatly in size, their width must be no less than 2m 50. In areas close to towns, where the number of pedestrians tends to be higher, they can be broadened to 3m, or even 5m, or split into two separate paths for cyclists and pedestrians. In France, a review of cycling paths of varying widths has shown that offer creates demand: certain paths are used by more than 2,500 cyclists per day, compared to maximum levels of 500 to 600 cyclists on traditional routes.

When developing greenways, it is important to examine the ways in which different users use the available space: it may be useful to provide cyclists and pedestrians with separate lanes in certain areas by markings, separators, different surfaces. All the greenways are not suitable for horse-riding. It is often better when possible to provide them a dedicated route.

Once no longer bothered by cars, users will often relax and pay less attention to traffic on these routes, especially in the countryside. It is therefore important that careful attention is given to installing clearly visible and informative horizontal and vertical signs and that speed humps are installed to force cyclists to reduce speed.

The appropriate vertical sign was the B7b Sign, «no access to motor vehicles». It is now the C115 «greenway» sign. Sign M9z can specify if horseriding is not allowed, if it is forbidden by the police authority. The end of the greenway is a C116 sign «end of greenway»

■ Entry into, and passage through, towns

Disused railway lines offer several advantages: gentle slopes, usually less than 4%, passages of regular width, lack of obstacles, good load-bearing capacity for route construction and maintenance equipment, drainage systems and existing crossing structures (bridges, tunnels). They provide excellent access to town centres with a minimum of intersections with roads. Waterways equipped with towpaths offer more or less the same advantages. Where these are not available, cycle paths will have to be created alongside roads carrying heavy traffic.

Wherever possible, the cycle route should take advantage of side roads to cross towns. Speed limits on these roads should be 30 km/h and

alternations may need to be made to some roads to improve safety, either along their entire length or at intersections with major roads (plateaux, safety zones, etc.). Some roads should be reclassified for the exclusive use of cyclists and pedestrians.

Regardless of the options chosen, cycle routes must be continuous through the town from the entry point to the exit point and have interconnections with existing local cycle networks.

Cycle route	Greenways
A cycle route is a marked, safe and continuous route of medium to long distance, which serves the department, the region, the nation, or Europe	A greenway is a facility which is not part of the road network, and is reserved for the exclusive use of alternative forms of transport: bicycles, pedestrians, roller-bladers ...
Elements	
Roads, cycle paths, greenways.	Specifically created tracks, disused railway tracks, service and maintenance access roads for canals and rivers, forest trails, communal paths in natural heritage areas (this list is not exhaustive).
Can make use of reserved areas or quiet roads.	Always in reserved areas where motorised traffic is banned.
For whom?	
Leisure cyclists and cycle tourists, various other users of the route.	Family and leisure cyclists, joggers, roller-bladers, pedestrians, people with reduced mobility; can be incorporated into long-distance cycle routes for touring cyclists.
Objective	
To ride along a safe and signed route, often for several days.	To allow people wanting to cycle, roller skate or jog and people in wheelchairs to have access to areas without motorised traffic, in both urban and rural areas.
Characteristics	
– Tourist or scenic route adapted for cyclists, – good quality riding surface.	- Wide enough to accommodate all the various categories of users, - good quality surface, adapted specifically for wheeled traffic.
Length	
Unlimited length, broken into easy half or full-day sections designed for the average cyclist.	Linear routes of limited length, not broken into sections, but equipped with seating areas at regular distances.
Facilities and additional services	
Hostel or hotel accommodation, cafés or restaurants, repair shops, public transport able to take bicycles, route guides (in two or more languages)	Entry and exit points (equipped with parking areas, maps and codes of good behaviour), markings, information panels, seating and service areas -water, benches, picnic tables, rubbish bins, hitching posts, etc.
Other routes: For many years, the FFCT (Fédération Française de Cyclotourisme) and the FFC (Fédération Française de Cyclisme) have developed their own routes using roads open to automobile traffic or marked tracks for mountain bikes.	

3 Types of Cycle Way

3.1 Cycle Way Designs

There are different types of cycle way depending on their usage and environment. The designer will prioritise visibility to encourage correct behaviour in terms of speed and awareness on the part of all users. There are three possibilities: mixed, separated or excluded. The choice of cycle way will also depend on whether it is in a town or in the open countryside.

- **Mixed**

The path is shared by all users. For calmed traffic areas, whom should be included in 30 km/h zones, integrating cycles with general traffic is ideal.

- **Separated**

Motorised vehicles are kept away from other transport methods that are different in terms of speed and vulnerability (pedestrians and cyclists). For most 50 km/h routes, separation involves a cycle facility close to the lane for motorised vehicles so that a car driver could see the cyclist in his right hand side rear-view mirror the cyclist.

- **Excluded**

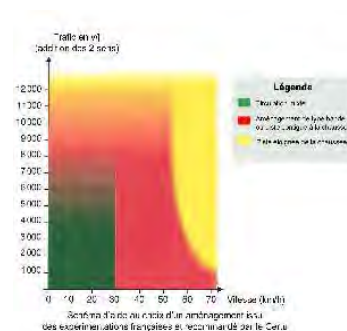
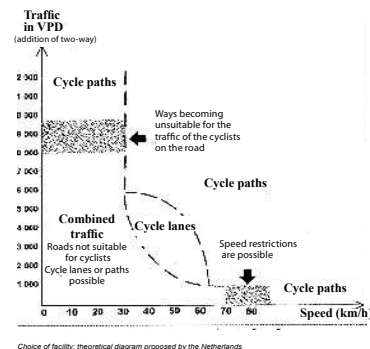
This is most suited for high-volume traffic routes (avenues, boulevards, etc.) where there is a lot of motorised traffic, which is often the case for 70 km/h roads. This also applies to urban expressways, which are like motorways, expressways or bypasses. In these cases, the road is only for motorised traffic and pedestrians and cyclists are excluded from using them or passing alongside them. This exclusion provides fairly high-speed routes and high-volume traffic flow. In this case, cycle paths, separate pedestrian walkways or alternative routes need to be provided.

According to a Dutch study (ILS-1991), the safety record of cycle lanes is particularly positive for motorised traffic of less than 6-7,000 VPD; the same study found that, for higher traffic levels, cycle paths

give the best results. This is why the limit of 6,000



2 x 2 lanes transformed into 2 x 1 lane with cycle lanes on either side



VPD appears in the CROW graph (Holland), used or adapted by several European countries (UK, Germany, Denmark). There are differences of opinion on

the use of this graph according to a Swedish study (Llungberg), which says that safety results on cycle paths are not as good as on cycle lanes at intersections. The experience of French cities, especially those in the Club des Villes Cyclables,

shows that it is possible to create cycle lanes on roads with higher levels of motorised traffic and get good safety levels as long as facilities are put in place to reduce speeds. That is why Certu and the Club des Villes Cyclables recommend the use of the latter.

In towns, the best approach is to encourage reduced speeds wherever possible to allow cycles to be integrated into traffic: reducing the number of lanes and reinstating two-way traffic rather than

one-way routes are examples of this.

On distribution roads (max 50 km/h), contigue cycle facilities rather than paths away from the motorised vehicle lane encourage. This solution requires strictly controlled parking. Speeds on this type of road should be at an acceptable level of not more than 50 km/h.

To create a cycle way on a high-speed, high-volume road (70 km/h), road space needs to be shared in several ways, such as:

- creating a cycle path between the pavement and the road so cyclists can be clearly seen;
- moving parking areas to create a cycle path between the pavement and parked cars.
- using a part of the pavement, if it is wide enough to create a pavement cycle path;

In new urban areas (mixed development zone, etc.), there is plenty of scope for designing a secure and comfortably wide cycle way that is either separate from or part of general traffic.

In the open countryside, the same approach is applicable to main and secondary roads, with the exception of motorways. Some secondary roads with features that slow traffic down naturally (corners, hills, etc.) are still dangerous for cyclists because they are not as wide, visibility is lower and some motorists still drive excessively dangerously (especially in the rain). This is a real problem and will only increase with the number of cyclists but for now, solutions need to be found on a case-by-case basis. There are also a number of small quiet roads that make very interesting cycle routes.

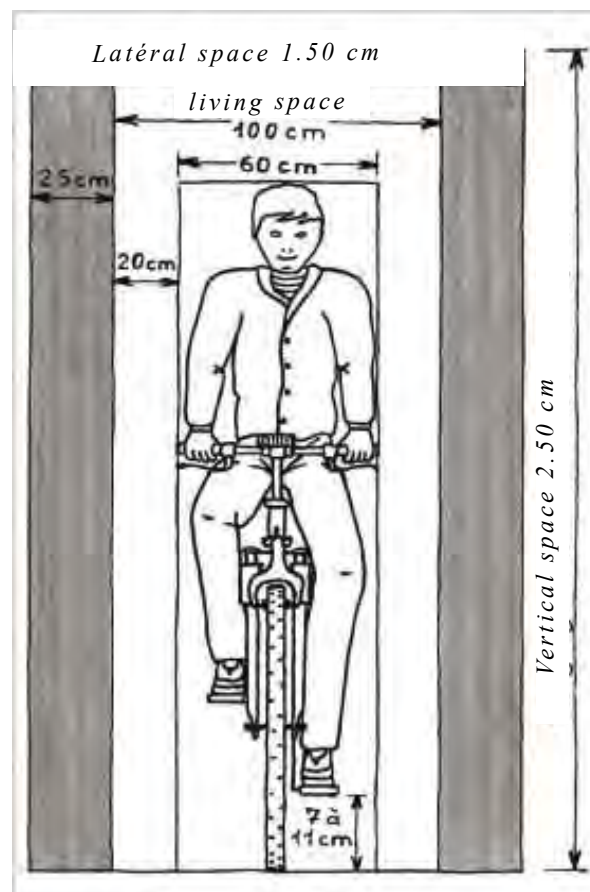
3.2 Cycle Way Width

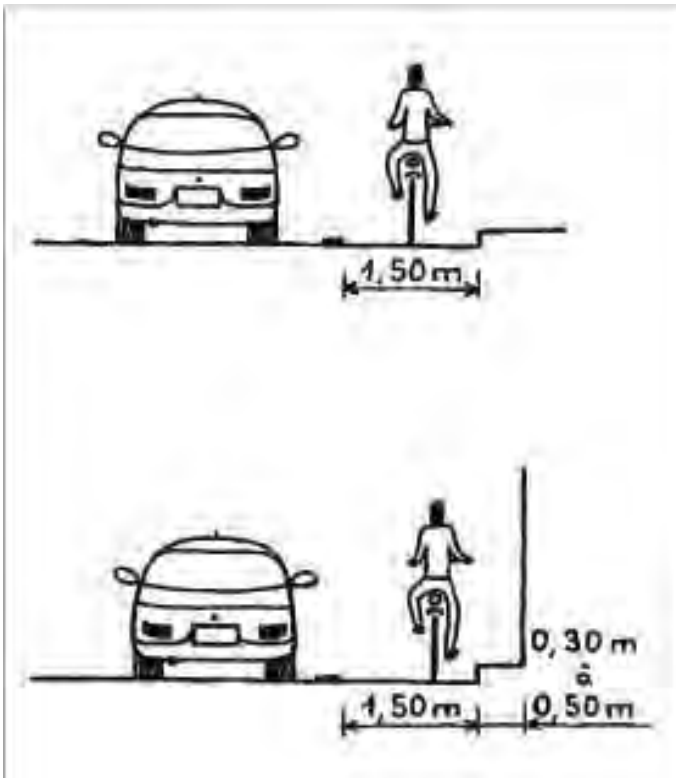
3.2.1 Clearance for Cyclists

The diagram opposite often features in cycle way design manuals from abroad.

These match the average clearance for a normal section cyclist. On corners, steep hills or at traffic lights and even in areas with strong side winds, the cyclist has a much less straight trajectory and therefore occupies more space on the road. It is generally agreed that the below dimensions need to be increased by 0.20 metres to take these features into account.

In the case of wall effects, parking areas tunnels, cyclists and pedestrians instinctively give 0.50 metres clearance. This needs to be integrated into any cycle way.





Widen lanes for wall effects or parked cars

3.2.2 Defining the Width of a Cycle Way

Several factors need to be taken into account:

- the type and rate of traffic expected: adults, schoolchildren, and families on excursion? Is the cycle way also used by others (roller-bladers, pedestrians, mopeds, etc.)? Is it one-way or two-way, in a town or in the country? Can two cyclists overtake safely? etc.

- the immediate environment of the cycle way regardless of parked cars or unusable areas (gutters, drains, etc.), wind created by passing trucks going at full speed, uphill or downhill sections?



Cycle lane too narrow



More comfortable cycle lane.

3.2.3 How to Choose the Width

The most commonly used width in European guides (The Netherlands, Denmark and others) is 1.5 metres excluding line markings for a one-way lane in mid-link. Experiments in French cities have

shown that this is a good compromise. It allows for future use of cycle ways by roller-bladers. It is sometimes possible to reduce this lane width a little at certain points over short distances or where there is less motorised traffic but width should not go below 1 metre excluding line markings. Conversely, there may be specific reasons for wider lanes: high volumes of motorised traffic, young cyclists, roller-bladers or parked cars. Widths of more than 2 metres should be avoided to discourage illegal parking..

A one-way path should be wider than 1.5 metres to allow for maintenance machinery. Paths created in cities are usually 2-2.5 metres.

For two-way paths, a size of 2.5-3 metres is recommended in urban areas. In the open countryside, width is usually 3 metres. This can go up to 5 metres for les greenways on the outskirts of cities or where there are a lot of cyclists, pedestrians and roller-bladers at the weekend, especially near car parks.

3.3 Calmed Traffic-Compatible Facilities

3.3.1 30 km/h zones

Intended to slow traffic down and reduce its volume, 30 km/h zones are ideal areas for cyclists. They do not need specific cycle ways such as lanes or paths. A 30-km/h zone cannot simply be identified with a single vertical sign (decree of 29/11/90): the very way in which it is built and situated must actually force motorists to reduce their speed. Speed-reducing facilities include changing the shape of roads with plants and trees or using street furniture (streetlamps, benches and cycle paths).

When «sleeping policemen» (0.10 metres high and 4 metres long) or trapezoidal speed bumps (a 2.5-4 metre platform no higher than 0.10 metres with up and down ramps of 1-1.4 metres) are used, they must not disturb cyclists whose speed is much lower and braking distance much shorter than motorists'. This is why speed cushions and tables are best (Guide des coussins et plateaux - Certu - 2000).

Pinch points narrow the road to 3 m allowing only a single vehicle to pass, so the car coming the other way has to wait. Where these pinch points are in place, cyclists should find a «bypass» 1.3 to 1.5 m wide on each side of the road, which they can pass through unhindered; the islands separating it from the road can be from 0.2 m wide (just a post) to 1.5 m wide (for planting a tree). With a traffic calming device or cushion in the middle of the pinch point, (illustrations p.38), lane width can go up to 3.5-3.75 m for regular bus traffic. The geometric features of a cushion are as follows: width 1.75-1.9 m (1.8 m if high volume of HGV traffic), length 3-4 m; width of side ramps 30-35 cm and 45-50 cm for front and rear ramps, high between 6 and 7 cm.

Another solution involves narrowing the road with buildouts, for example every 20 m, allowing space for only three or four parked cars between each buildout. These can be used for planting trees, giving the street a more human touch, or one or two hoop stands for cycles, while keeping a minimal road width for pedestrians to cross.

At junctions, mini-roundabouts (radius < 12 m) and tables keep speeds down and make intersections more visible.

30 km/h zones generally concern a group of streets but it is possible to create a 30 km/h zone on a single street if it is longer than 200 metres: this can provide a cycle route in places where it is

impossible to create safe cycle ways on busy roads but there is an opportunity to create a 30 km/h on a parallel street close by. It is preferable to include all streets crossing the 30 km/h area between the central route and the main road to allow cyclists easy access to shops and services on the main road.

In shopping districts, pedestrians can cross the street anywhere;

as they do not hear cyclists approach,

it is possible to remind them it is a cycle way with a simple cycle logo painted on the road and repeated at regular intervals.



Pinch point with bypass



A typical cushion

3.3.2 Pedestrian Zones

On a pedestrian zone identified by a C109 regulation sign, modification of article R 431-9 of the highway code authorises cycle traffic at walking speed, taking care of pedestrian. This is the only time in urban areas when cyclists and pedestrians can use the same space. Article R 412-7 of the highway code says each road user must travel in the area assigned to them. It is always possible to add C50-type recommendation signs to the entrance of a pedestrian zone reminding cyclists to travel at walking speed and recommending that they walk their bikes at busy times.



Sign C109 has been used since 14/09/99

Since 1993, the Parisian local authority has been experimenting with specific pedestrian zones giving priority to non-polluting forms of transport. The Green Network is a group of streets for pedestrians, cyclists, wheelchair users and rollerbladers as well as public transport. These streets join together to form a network that is easy to reach with practical and pleasant itineraries. The Green Network is a space for moving and a more human concept of a street, making it a place for meeting other people. Plants and grass for relaxation and game-playing replace cars. service

cars and residents with car parks can access these. Only security vehicles, delivery vans (at certain hours), green streets.

3.3.3 Traffic on Side Paths and in Parks

In some cities, there are side paths running parallel to major roads. With a few simple additional features and traffic calming, these much quieter routes can be used as cycle ways..

Signage is very important: guidance is necessary so that even a stranger to the city can find their way onto the side path. These side paths could become the backbone of a future cycle network with the addition of local cycle way links. Particular attention needs to be paid to the use of intersections between these side paths and roads crossing them.

Parks are essential traffic-free areas in towns and, especially for children and families, one of the only places where they can ride and play together on their bikes in complete safety. Bylaws, some decades old, forbid the use of cyclists in parks at certain times or constantly. At a time when government directives are encouraging people to use cycles more often and have allowed the under-eights to use them on pavements, such bylaws should at the very least be moderated.

3.3.4 Streets where one way is for cyclists only

By definition, these are two-way streets where one way is exclusively for the use of two or three-wheeled cycles.

After a number of experiments in different cities, the Club des Villes Cyclables has drawn up a list of types of route where this sort of cycle facility has been authorised, sometimes for more than

ten years (see bibliography, reference No.32): the assessment has covered the status of the road, its width, profile and traffic, distinguishing motorised and two-wheel vehicles plus any specific facilities installed. There are no accidents on these roads, despite some poor parking. This is a result of good reciprocal vision on the part of the protagonists. If a car door is opened, the cyclist hits the front of the door, not the corner, and closes the door on the passenger whereas, for vehicles parked in the same direction as a cyclist, the fact that the door is blocked open worsens injuries.

This is a useful policy for all local roads if speed limits are observed. There is no minimum width for this type of road: it works equally well on very narrow roads where car traffic and speeds are very low. However, visibility has to be improved at every intersection. Street length varies from 150 to 700 metres, with most around 200 metres. Some cities have removed a number of parking spaces or a lane of traffic to put this method in place. Contra-flow cycle lanes are made official with a municipal bylaw and the use of regulatory signs. The bylaw is drawn up in the same way as for bus lanes: «between x street in x direction, traffic is forbidden for any vehicle except two or three-wheeled cycles.» In all cases, regulatory vertical signs are placed at each entry and exit together with road markings showing the cycle picture and an arrow giving the direction of traffic (see chapter on signs).

For road markings, the club's survey helped draw up the following table (where $u = 5$ cm):

Motorised traffic Width	< 1000 VPD	1000-5000 VPD	5000-8000 VPD	> 8000 VPD
< 3.50 metres	No markings	No markings	X	X
3.50m < W < 4.50m	No markings	Markings	X	X
W > 4.50m	Markings	Markings	Lane or path markings	Path

X Not very realistic or not recommended.

If the usable width excluding parking allows, $3u$ (15 cm) continuous separation markings between the car route and the cycle route should be made in the absence of roadside parking - the least preferable option - or $T3\ 5u$ discontinuous lines in all other cases.

At each end, it is recommended to create a traffic island or white painted island or, if road width does not allow this, a continuous white line over several metres. In their direction of travel, cyclists should find at the end a sign indicating who has the priority.

In front of private houses used by cars, it is recommended to highlight the lane (green colour, arrow giving the cyclists' direction of travel). In front of very important entrances, especially shops, other road users should be able to see cyclists perfectly. A build-out preventing illegal parking can, for example, be used here.



Reinforced protection at the ends

3.3.5 Co-existence of cycles and buses

This section covers all situations that may be found, whether co-existence of buses and cycles on the same lane or next to each other in exclusive lanes.

■ No bus lane and cycle lane

The only conflicts arise at bus stops: these can be dangerous when a bus nears the pavement, cutting across the cyclist's path; when the bus is at a stop and cyclists overtake between buses and cars; as buses start off from a stop and a cyclist hasn't finished overtaking (blindspot problem).

When the bus stop is on the street, the simplest solution is to interrupt cycle lane markings just before the yellow zigzags identifying the bus stop and start again afterwards. If a stop is off the road, the cycle lane does not need to be interrupted. Passing the lane behind the bus stop, i.e. on the pavement, is not recommended because it can conflict with pedestrians waiting at the stop.



Lane behind a bus stop only if few pedestrians and little space

A similar problem arises when there is a lane on the pavement or a cycle lane between the pavement and parking areas. The choice of cycle way must take into account this problem at the design stage. Other solutions need to be found or a wide enough offloading point needs to be found between the road and the cycle lane (at pavement level) or the cycle lane needs to be interrupted a few metres before the bus stop.

■ Bus lanes and cycle lanes

In most cases, the bus lane occupies the right-hand part of the road. The cycle lane must never be situated between this bus lane and passing cars due to the dangerous nature of this configuration. If a lane is to be marked, it should be to the right of the bus lane, along the pavement. With high

volume bus traffic or speed, a physical separation between the cycle lane and the bus lane is required: the cycle lane therefore becomes a cycle path. In dense urban areas, this can pose problems for deliveries, refuse collection and passenger access to the buses.



Separate bus and cycle lanes on a wide road

A new concept reconciles both modes of transport safely: bimodal sharing.

■ Bimodal Sharing

In urban areas, space between buildings is often insufficient for dedicating areas of the street to motorists, cyclists, pedestrians and public transport. Shared use by bus and cycles has a number of advantages: safety and comfort for cyclists, less use of space and reduced costs for the local authority.

Current Legislation

The highway code does not forbid buses and cycles sharing a single lane. The general code for local authorities in Article L 131-4 says «the mayor can, by reasoned order, reserve access to certain roads

in the conurbation or certain parts of roads, at certain times, for the use of different types of user or vehicle.» So a mayor's order can authorise cycles to use bus lanes in the same way as other types of vehicle (taxis, priority vehicles, etc.)



Bus and cyclists sharing the same lane

- **Bus lane in the direction of traffic**

In an «open» bus lane indicated by a discontinuous line, the cyclist and bus can leave the lane to overtake one another. The decision to allow cycles requires negotiation with the operator and drivers of the bus company. They are often reluctant to allow this measure. However, experiments carried out over several years in cities such as Grenoble, Nantes and Annecy have shown that an open bus lane of 3-3.50 m works without conflict, even if traffic levels are high, especially in the following cases:

- bus traffic is relatively limited, up to around 20 vehicles per hour and per direction, an average bus frequency of 3 minutes at peak times;
- sections between junctions and stops are short, for example in a shopping district or city centre;
- bus and cycle speeds are similar, for example on a one-way road downhill or on flat ground.

If there is a lot of traffic in either type of transport - more than 30 buses an hour or a busy cycle route - on sections of more than 200 metres, with bus stops set well apart, in uphill areas (slope of more than 4%), it is highly recommended that the bus lane be widened. If space allows, this solution can be applied in all circumstances, whatever the traffic and bus speed. With a width recommended 4.5 m (minimum 4,3 m), cyclists and buses can overtake one another without leaving the bus lane. The bus lane can be marked with a continuous white line of 5u in width or a separator that cannot be crossed.

- **Bus lane going against general traffic**

In regulation terms, buses cannot leave the bus lane: the lane therefore needs to be sufficiently wide for buses and cycles to overtake one another without crossing the continuous white line.

- **Two-way bus lane running side by side**

These lanes are generally wide enough (7 m) for shared use to work without any problem up to 30 buses an hour in each direction: cyclists can overtake buses at stops and buses can cross into the other lane to overtake cyclists; above 50 buses an hour in each direction, shared use can be more problematic. Lane width needs to be adapted as a result.

3.3.6 Multi-use side routes

This is an access road for agricultural land. This type of route is generally built along a major national road with limited or no direct access. Farmers often do not want cyclists to be authorised to use these routes because they are worried that they will be held responsible for any accidents if a cyclist slips

on a road that has become muddy with agricultural machinery traffic. As these types of roads are often alongside very busy main roads (with three or 2 x 2 lanes), cyclists absolutely need to be able to use alternative routes. To give access to users other than farmers and organise durable maintenance of these roads by local authorities, it is best to keep these roads in the public domain instead of handing them over to agricultural associations.



Multi-use side road

3.3.7 Greenways

A definition and development principles are given in paragraph 2.2.5.

3.3.8 Priority cycle route: the German example

The «cycle route» is a new concept developed in Germany (change made to the German highway code on 1/9/1997): it is a route initially intended for all vehicles where cyclists are given priority by means of relevant signs. Other vehicles are only admitted if, for example, they belong to local

residents. The speed limit is 30 km/h for all users. Cyclists are expressly authorised to ride several abreast. This is an exceptional case, as the highway code stipulates that cyclists must travel in single file so as not to disturb other traffic. Currently, to create a cycle route in France, cyclists' share of traffic must be above 50%.

In France, creation of Article R 189 of the highway code does not currently allow more than two cyclists to ride abreast and requires cyclists to move back to single file to allow other vehicles to overtake.

3.4 «Lane»-type facilities

These are hardstrips called «multifunctional lower lanes» and cycle lanes.

3.4.1 The multifunctional lower lane

This is found in interurban areas. It is the part of the hardstrip that includes the roadside markings and a lane hardstrip. The main function of the lower lane is not cyclists' safety. It was initially designed for stopping vehicles drifting off-course and avoiding collisions, allowing emergency side movements on the hardstrip. It also allows for slow vehicle traffic, provisional stops, and maintenance operations for the road as well as movement of pedestrians, which the cycle lane does not provide because it is exclusively for cyclists' use. When correctly used, this type of lane is an improvement for cyclist safety and comfort.

It is described in the document «Aménagement des Routes Principales» (see bibliography reference n°5), a technical guide for general design of main roads in interurban areas and repeated in instructions for taking cyclists into account in road design from November 1995 (see bibliography reference n°15).



A well-maintained multifunction lane is popular

The ARP states:

- if non-motorised two-wheel traffic «is not negligible», the use of hardstrips, without specific signs, is a simple method for taking cyclists' safety into account;
- if two-wheel traffic is considerable, cycle paths should be created, preferably one-way, as two-way paths cannot resolve specific situations. The methods used should be consistent and feature throughout the entire route or part of the route used by cyclists;
- a lower lane should be surfaced to allow cyclists and pedestrians to move safely; surfacing should be as easy to ride on and smooth as the road, otherwise cyclists will not use it;
- the hardstrip must be 1.25 m wide, including

roadside markings. New conditions in the highway code increasing the distance to 1.5 m for overtaking cyclists in the countryside can justify an increase in the width of the multifunctional lower lane to 1.75 m;

- the multifunctional lower lane should not have any marking other than the nearside lane (T2-3u) separating it from the road: no cycle logo, no sign, and no green marking; it does not need any specific equipment.

It helps with rapid water evacuation to drains throughout the rainy season and avoids water build-up, which is very dangerous for cyclists. It prevents gulying between the roadside and the hardstrip, especially on gradients, and also stops drops in height, which are unpleasant for cyclists along hardstrips that are not stabilised.

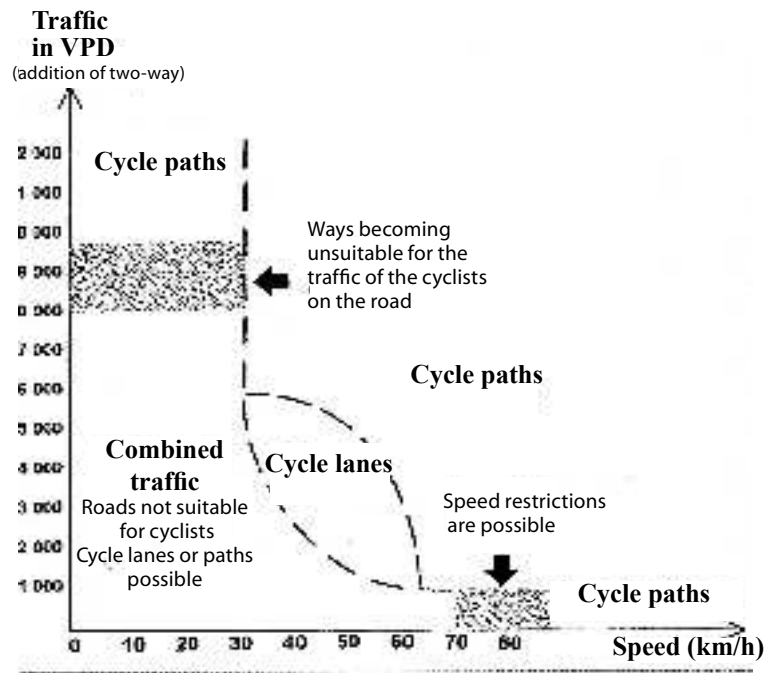
If there are a lot of pedestrians, as in popular tourist areas, it is best to use a separate route or a pavement. The road manager must therefore choose, depending on the level of cyclist or pedestrian traffic as well as motorised vehicles, on the safest option: multifunctional lower lane; marked cycle lane or cycle path.

As an example, see the technical guide to cycle-friendly departments (bibliography reference n°21): «In departmental services that have adopted a pro-cycling policy, the main criteria are as follows: when traffic is more than 1,500-3,000 vehicles per day or there are a lot of cyclists, cycle traffic must be made safer by means of a separate route alongside the road (hardstrip or cycle lane).»

3.4.2 Marked Cycle Lane

This is defined in Article R110-2 of the highway code: «on a road with several lanes, a lane exclusively for the use of two or three-wheeled cycles». It must be approved by means of a highways bylaw. It is limited on the right-hand side of the road used by general traffic by a discontinuous T3-5u painted line. Since the change to the code making the use of facilities optional, «routes recommended for cyclists» without clear legal status (no highways bylaw or vertical sign) should be avoided.

Unlike the multifunctional lower lane, which does not have any specific horizontal or vertical signs specific to cycles, the cycle lane has the advantage of constantly showing the possible presence of cycles on the road.



Choice of facility: theoretical diagram proposed by the Netherlands

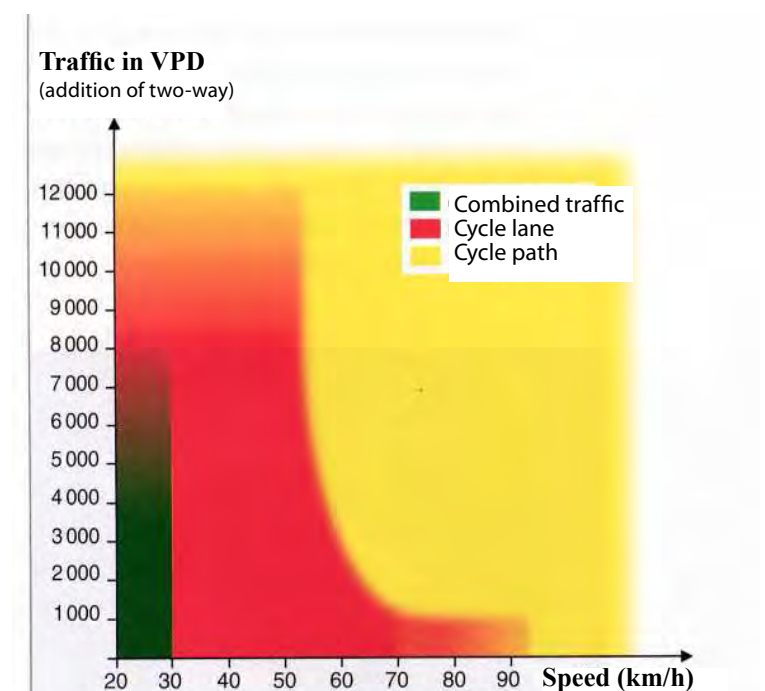


Diagram obtained from French trials and recommended by Certu

In urban areas, this type of classic lane, simply marked out, is fine for distribution roads where traffic is less and speeds are 30-50 km/h. Some road layouts and traffic densities make the «cycle lane» option suitable: this is true of avenues with a central green path or where there is only one lane or motorised traffic in each direction with the introduction of a cycle lane. In the case of authorised roadside parking, the width of the cycle lane will take this into account so cyclists can avoid opening car doors without having to leave the cycle lane. It is best to use a curb lane of around 0.50 m including marking. However, too great a width of around two metres including the gutter and any curb lane for opening doors can encourage cars to use them for stopping or driving along.

The main inconvenience of this facility, regardless of width, is the lack of protection for the cycle lane from illegal parking, which is a major danger for cyclists even if there is only one car every 100 metres. If a cycle lane is used, there must be a policy of stopping illegal parking: the use of bus lanes shows that this is possible.



Green markings reinforce regulatory markings

In open countryside, the recommendation of November 1995 given in the previous section states that that multifunctional lower lanes are better except where there are high numbers of cycles.



Cycle lane and multifunctional lower lane for high cyclist numbers

3.4.3 Cycle lane with passable separators

A cycle lane has the same features as a simply marked lane except that as well as the regulatory marking, there are separators: rubber logs in Paris, for example, vertical posts 80 cm high, lower flat posts such as in Annecy or zebras of 0.70-1.20 metres between marking lines as in Nantes or La Baule-Escoublac



Rubber separator that can be crossed

These separators are continuous or at regular intervals, or even over a few metres alongside junctions. They should not be aggressive and sufficiently low to be easily crossed and they should not catch bike pedals. Currently, road separators are not regulated for in cycle facilities. Permission is required from the road safety and traffic department.

The advantages of separators are:

- easier to see the areas dedicated to each user,
- they keep motorised vehicles away from the cycle route,
- safer junctions and pedestrian rights of way,
- cyclists can easily leave the lane if they need to.

However, the risk of vehicles stopping and parking on the cycle lane remains, with all the related dangers these pose. These separators can make road maintenance and snow clearing difficult. Some facilities are not aesthetically pleasing in an urban environment.

For good vision at night, reflecting areas are also recommended.

3.5 «Path»-type facilities

According to article R110-2 of the highway code, a cycle path is «a route exclusively for the use of two or three-wheeled cycles.» It can be one-way or two-way. A two-way cycle path needs careful design because cycles that are facing oncoming traffic have to cross the road to enter and exit the cycle path. A cycle path can be interesting in periurban areas, at the entrance to towns, where there are fewer public and private intersections if the path facilitates access to certain areas (e.g. parks, schools and sports grounds) or to another cycle route.



Flat posts alongside Annecy Lake

3.5.1 The on-road cycle path

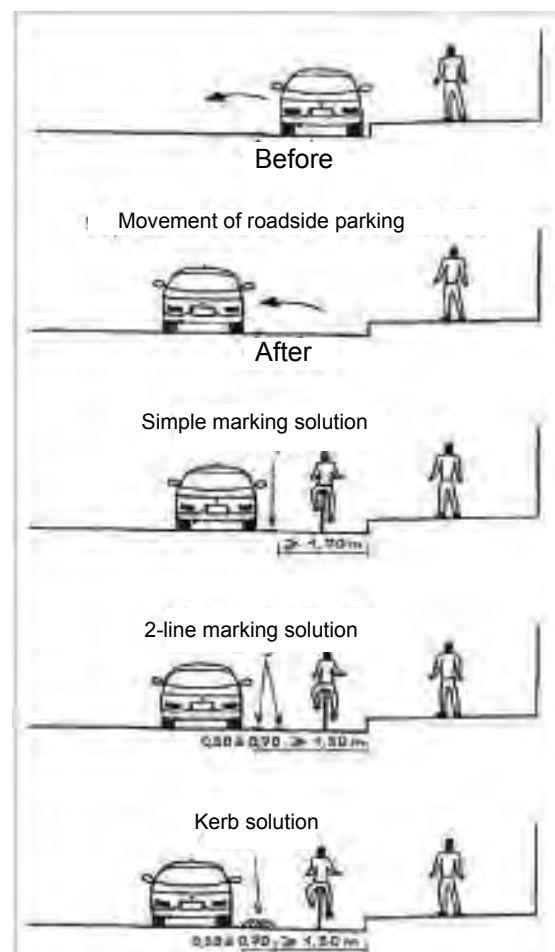
This is marked on the right-hand side of the road used by general traffic by a continuous separator that cannot be crossed such as a cement log separator similar to that used for bus lanes. A height of 15 cm dissuades motorcyclists from using the cycle path. This separator must be interrupted at regular intervals to allow dispersal of rainwater and 20-30 metres before junctions for better overall vision for all road users. It is also interrupted before residential entrances with enough space for turning

3.5.2 Cycle path between parked cars and pavement

This is created on a road between parked cars and the pavement, keeping the pavement and parking areas separate. It can be created in the direction of general traffic or against it.



Ideal for long roads without private entrances



Creation of a cycle path between parked cars and the pavement

You can simply mark the separation from parked cars with two line markings of 3u width (u=5 or 6 cm) creating a space of 0.50-0.70 metres including line marking.

If vehicles are likely to drift onto the path, another solution is to create a traffic island 50 cm wide and 10-15 cm high on the cycle path side.



Cycle path between pavement and parked cars

The width of this type of cycle path should let cyclists overtake each other as this determines the minimum sizes shown on the sketch opposite: 1.7 metres for high kerbs or 1.5 m for simple marking. Over a short distance, if the set-up allows, the width of the separating traffic island can be reduced. The best way to manage road narrowing however is to stop parking on the relevant section and keep the same width of the cycle path and separator. For rain dispersal, the best method is to interrupt the traffic island over a couple of metres in front of each inlet.

To the right of private entrances, and obviously off of the cycle path itself, bollards can be used to protect the cycle path from parking cars. Bollards should not be aggressive for cyclists (no ridges) and high enough to be easily seen by pedestrians.

3.5.3 Cycle path intermediate-height between pavement and road

This is the «traditional Copenhagen cycle path»: a grade separation of 8-10 cm between the cycle path and the pavement and grade separation of less than 5 cm between the cycle path and the road. To allow cyclists to overtake each other in the normal section, without going down onto the road or up to the pavement, the minimum width in Denmark is set at 1.7 metres without roadside parking. The intermediate-height cycle path can be a good solution in urban areas on major roads (high speeds and traffic volumes).

It is an expensive option.



Traditional Copenhagen cycle path

At junctions with major roads, such as traffic lights or roundabouts, the cycle path gradually goes down to the level of the road on approach and turns into a cycle lane in the last 20 metres, giving better visibility to all road users. At junctions with much smaller roads, it rises to the level of the pavement it is crossing.

So as not to confuse it with an authorised parking area, it is important to mark the edge of the path on the roadside with a continuous line 3u wide (u = 5 or 6 cm).

There are two major inconveniences to this: possible accidents on the kerb level between the cycle path and pavement if the space given to each user is insufficient for the volume of relevant traffic; and illegal parking. In Copenhagen, this is strictly held to night and day and unloading vehicles park on the road. This inconvenience disappears if roadside parking is authorised on the road itself: this is the concept of «cycle path between parked cars and the pavement» mentioned above.

3.5.4 On-pavement cycle path

This should not be confused with «on-pavement cycle traffic». The on-pavement cycle path is used exclusively by cyclists, regardless of their age, without any speed restrictions; «on-pavement cycle traffic», without a marked cycle path, is only allowed for children under eight travelling at walking speeds. For cyclists to ride at pavement level, it is therefore necessary to create a cycle path with a continuous white line 3u wide (9 cm) separating the cycle path from pedestrians. The continuous line is interrupted at private entrances. The order of 31-08-1999 gives a minimum pavement width of 1.4 m to allow for handicapped people. Putting a cycle path at pavement level must obviously take this into account.

«Décret» 2006-1657 et 1658 december 21 st 2006 and «arrêté» 15th of january set the new rules as far mobility and layout of public space for disabled persons are concerned.

It is strongly recommended to keep the «pedestrian» area on the building side of the pavement as given in Article R218 of the highway code and put the cycle path on the side of the road. In this way, cyclists are more visible to residents

leaving their buildings (pedestrians, cars, etc.) This also reduces collisions between the pavement and the cycle path at junctions and where the cycle path ends. Special attention should be paid to ensure that cyclists and pedestrians can clearly see the area dedicated to them. This is achieved by frequent use of a white cycle pictogram and even doubling the line marking with a green line on the cycle path side. This differentiation can also be achieved by using different road surfacing for cyclists and pedestrians that is nonetheless of equal quality and comfort so it can be more easily seen by sight-impaired people: this is possible when the pavement is being resurfaced or enlarged.



On-pavement two-way cycle path

On on-pavement cycle paths, moped users must be completely excluded.

Generally, it is not advisable to make this type of path obligatory for cyclists. Aside from the fact that pedestrians do not always follow space limitations, frequent local resident access and adjacent roads are a source of discomfort for cyclists (number of drops and raises).

Often, the on-pavement cycle path is one-way but in some cases, it can be advisable to organise cycle traffic on one side of the road:

- wider hardstrip on one side of the road,
- fewer junctions on one side (banks, parks, along factory walls, cemeteries, etc.),
- lower number of pedestrians on one side,
- junction over a short space,
- traffic-generating hubs on one side only.

Specific markings should be used showing residents' right of way.

3.5.5 Periurban cycle path

In periurban areas, at the exit from built-up areas or on some wide avenues, a cycle path can be kept well away from the road by separating it with a grass reservation or one planted with trees. There is sometimes enough space for another grass reservation between the cycle path and pedestrian route.



Cycle path separated from the road



Safe entrance-exit for built-up area

So different road users can see each other better, central reservations should not have continuous obstacles over 70 cm high, especially near junctions. Depending on the situation, the cycle path can keep or lose its priority. It can be on just one side and two-way or on either side and one-way. The minimum width is 2 m for a one-way cycle path and 3 m for a two-way cycle path.

3.6 Specific features

3.6.1 Engineering works underpasses and overpasses

There are two ways of creating a cycle route on an existing engineering works: reduce the space given to motorised vehicles or that given to pedestrians. In either case, a space of 1.4 m for pedestrians must be maintained while keeping sufficient width for cyclists.

The pedestrian route must be on the outside, by the safety railings. The way the pavement is shared must clearly show between cyclists and pedestrians: a continuous white line, for example. If the path is very busy or visually impaired people are using it, the two spaces should be physically separated.

Expansion joints are a danger for cyclists, especially in icy weather: their retraction can create considerable separation that should be taken into account when a cycle route is being created..

If a new bridge is being built, consideration should be given to an independent route for cyclists and pedestrians on either side of the bridge, below the level of the road, in the bridge deck cantilever.



Cycle path on cantilever supports under engineering works

3.6.2 Underpasses and cycle bridges

By offering users a cycle network, specific facilities may be required for getting across major obstacles such as motorways, waterways or railway lines.

Whether by means of an underpass or overpass, the cost is always less if this facility is included when designing a route.

Over a short distance, under a road, for example, a tunnel can sometimes be better than a bridge: a bridge or tunnel will take into account the grade separation imposed on cyclists and dispersal of rainwater.



Continuous route with underpass

Ideal gradients are dependent on the level to be cleared for a cyclist that remains on their bike: an example for a 5 m level (a car park at level -2), the gradient should be 2-4%. For slopes greater than 6%, an increase of 0.2-0.5 m in the cycle way width along the slope is recommended. The inconveniences of tunnels are the level of insecurity from an enclosed space (sometimes dirty and smelly) and the contrasting light levels with the outside. Comfortable dimensions are therefore required as well as graduated lighting that avoids glare and improves safety. Cyclists will only use a tunnel if they can see the other end of the tunnel when they descend. Minimum size should be 2.5

m by 2.5 m but a width of 3.5 m and clearance of 2.75 is more comfortable. In the case of a bridge, vertical clearance between the road and the bridge must be calculated to avoid any risk of damage from HGVs. Depending on whether pedestrians also use the bridge, the width can vary from 3 to 4.5 m. On each side of the bridge, European construction guidelines require 1.4 m safety grilles. From the french experience in this field we want to considerer different possibilities :

- in most of the case where the danger is low, considering the norm XP P 98 405 a safety grille height of 1 m for pedestrians only is suffisante
- along a narrow cyclist path, in a space shared with other modes, on route enbcountering a strong usage by families , the maximum set by the norm 1m20 ofr safety grilles is justified.
- In particular circumstances, for exemple narrow two way cycle path, on a high engeneering works (bridges...), it can, be as heigh as 1m40 for safety grilles.

Access ramps should have gradients of less than 6%. If this is not possible, a stairway can be used with a simple wheeling channel.



1.4 m safety grille for cyclists

4 Cycle routes at junctions

The examples given in this chapter apply to simple junctions usually found in urban, periurban or interurban areas. For more complex intersections, solutions keeping to these basic principles should be found.

4.1 Single-level junctions

4.1.1 Typical accidents

Most accidents at junctions involving cyclists fall into one of four categories (see bibliography reference n°17).

1: right-angle collisions.

These are the most frequent. Cyclists or motorists not observing priority is the main cause.

2: approaching car turning left while a cyclist continues straight on.

3: car turning right and cutting across the path of an oncoming cyclist.

4: car approaching from behind or in front while a cyclist is turning left.

5: accident at the intersection of a cycle path and a road for general traffic.

4.1.2 Basic principles

To limit the causes of insecurity, three main actions are necessary.

Slow down motorised traffic

On main roads, anything limiting speeding is beneficial to cyclists and motorists, particularly

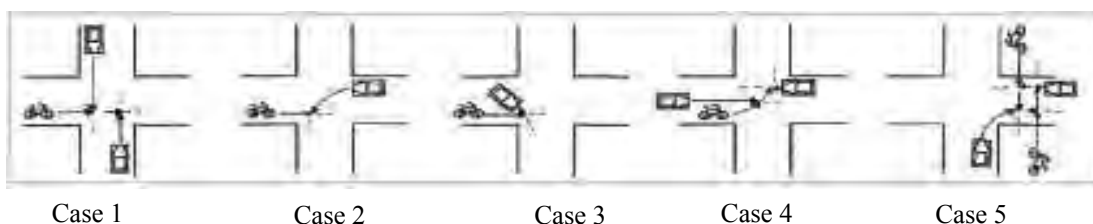
central green paths, traffic islands and mini-roundabouts. On local streets and in 30 km/h zones, classic speed reduction features such as humps, chicanes, cushions and narrowed roads.

- **Improving junction legibility**

A large, complicated junction means it is difficult to understand other users' trajectories. As a result, simplification is always better than illusory sophistications.

However, specific spaces allocated to cyclists changing direction (left-hand turn feeder lanes, boxes, indirect left-hand turns) improve safety. At crossroads, it is also a good idea to remind motorists of cyclists' presence, especially when they have priority: visual perception of cycle facilities can be accentuated with contrasting colours, frequent use of cycle pictograms or lighting.

When the route loses priority, it is important not to identify trajectories in the junction, contrary to the provisions of Article 128.1 that has therefore been repealed. If continuity of the cycle way is not obvious (at complex junctions), it can be useful to position a few cycle pictograms or draw a green checkerboard pattern.



The checkerboard solution is inconvenient because of the greater use of paint than for pictograms (initial cost, slip, maintenance).

• Increasing visibility at junctions

Motorists often ignore cyclists. To make them more clearly visible, cyclists need to be in the driver's field of vision on the approach to every junction, for example by turning cycle paths into cycle lanes, and they should not be hidden by signs, plants or parked cars.

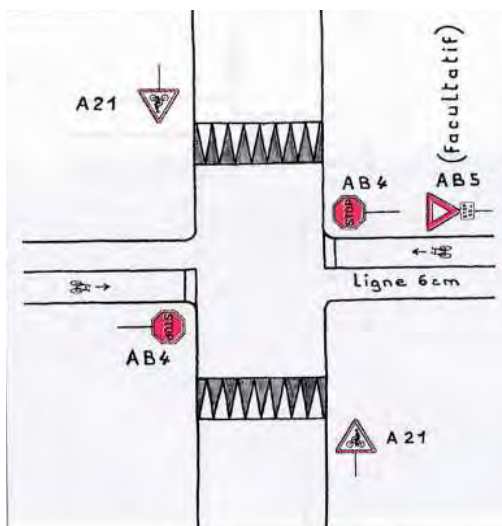
4.1.3 Application in the specific case of cycle paths

The following implementation rules should be checked:

- reduction of conflict area,
- reduction in crossing time,
- reduction in turning circles.

A cycle path can be integrated into a junction in three ways.

■ Raised junction sections



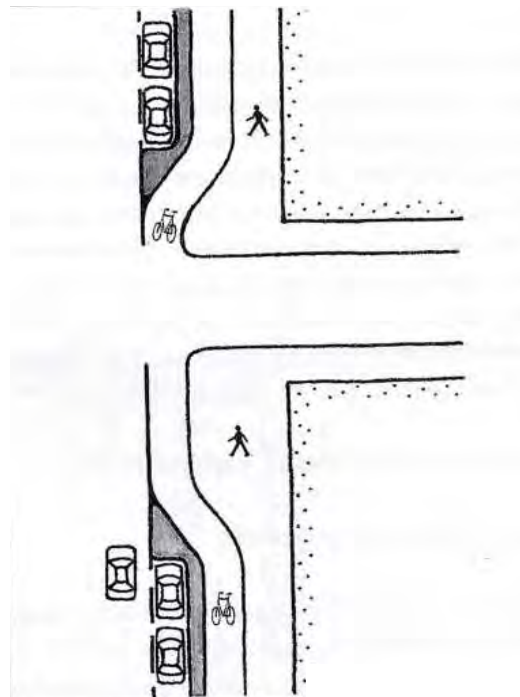
Raised table in an urban area

This solution is good for on-pavement cycle paths and mid-height cycle paths. It involves keeping the cycle path and pavement raised above road level. Drivers therefore have to cross a raised table that obliges them to slow down and be vigilant. This solution is good for crossing secondary streets with traffic levels of less than 6,000 VPD.

■ Changing cycle paths to cycle lanes when crossing a junction

In this way, drivers can see cyclists next to them or in their rear-view mirror. This solution involves:

- dropping the kerb to the right of the cycle path to road level,
- choosing a trajectory and insertion point at the safest place for cyclists.



Changing a cycle path into a cycle lane

In particular, where there is parking, it is best to bring the cycle path to road level around 20 metres before the junction and protect this space against parking. If there is no parking, the distance between the cycle lane appearance and the junction can be reduced to around 10 m.



Prevent parking 20 m before the junction

■ Moving the cycle path away from the road

This solution should be quite rare. It can be useful in certain circumstances (not very urban area or two-way cycle path in periurban area) along very busy main roads but it is not advisable in urban areas where it is best to bring the cycle path closer. Depending on the situation, around 5-10 metres distance is created so drivers can see cyclists ahead. It is a good idea to make the cycle path lose priority.

4.1.4 Single-level junctions with lights

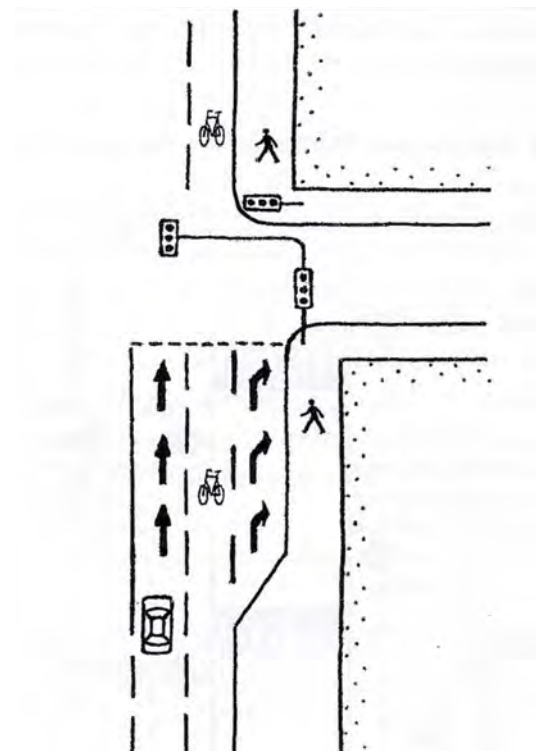
■ Clearance time

Keeping similar clearance times between junctions depending on whether there is a cycle lane or path can be dangerous.

Clearance time must depend on the shape of the junction. Speeds of around 5 metres a second can be used on major junctions and complicated or busy junctions. The French town engineering association and a Certu working group are currently conducting more specific research.

■ Vehicle right-hand turns

Cyclists and pedestrians must remain safe while crossing during vehicle right-hand turns. One of the best solutions is to slow down turning vehicles using the shape of the junction or with humps. If the road is wide enough, a traffic island with a minimum width of two metres can be created on the intersecting road.



Management of crossing streets up from the junction



Maintaining cycle continuity while allowing vehicle right-hand turns

■ Cyclist right-hand turns

A permanent right-hand turn lets cyclists join a cycle way on the intersecting road without waiting for the lights.

■ Cyclist left-hand turns

A direct left-hand turn can be dangerous on busy, fast roads. A better option is a safe waiting area.

■ The safe waiting area

These are very popular in Europe and were



Non-regulatory marking on photo (cf. p. 65)

introduced as part of an experiment in several French cities a number of years ago before being officially included in the highway code in 1998 (articles R 28 and R 4-2). Because traffic light-controlled junctions are dangerous for cyclists and motorists because their trajectories cross, a cyclists' safe waiting area lets cyclists make the most of a red light to position themselves in front of other vehicles so they can:

- be clearly seen
 - preselect their left-hand turn before other vehicles that may be going in the same direction,
 - start off before motorised vehicles, making them easier to see and giving them better opportunity to fit into the traffic
 - avoid breathing in exhaust fumes on departure.
- The idea is to push back the stop line at traffic lights for motorised vehicles. The stop line can be doubled with a green line.

If there is no cycle lane, one solution is to create an access lane into the safe waiting area so cycles can overtake the line of traffic on the right-hand side. Guidelines are to use a fallback distance of 3-5 m between the trafficsignal stop line and the pedestrian crossing marks. This will be introduced in the highway code.

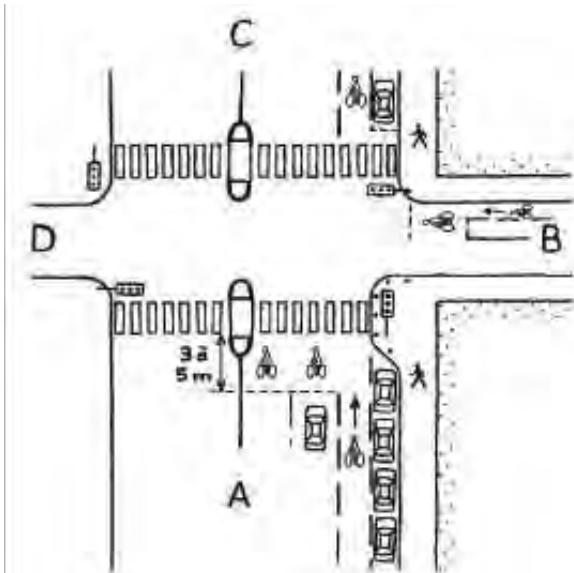


An access lane lets cycles reach the traffic light stop line.

■ Cyclist indirect left-hand turn

This is ideal for multi-lane roads where traffic is dense and applies with or without other cycle facilities. Some countries, such as Denmark, do not recommend any other method than the indirect left-hand turn.

Cyclists often use them spontaneously..



Indirect left-hand turn for cyclists

When the lights are red on branch A, the cyclist wishing to turn left (towards D) positions themselves in the safe waiting area on the left-hand side and waits for green. When the lights are green on branch A, the cyclist cannot turn left safely; they position themselves in the safe waiting area at the head of the bisecting road and cross the junction in the same way as other vehicles, i.e. when the lights go green.

■ Mixed pedestrian/cycle crossings on traffic light-controlled junctions

For simplicity, a single light for pedestrians and cyclists should be enough. But today, regulations



Joint pedestrian cycling crossing

do not allow this. It appears to be necessary to change: work is underway (Certu-Cete-Association des ingénieurs des villes de France) to create different combinations and functions for traffic lights in favour of cyclists at intersections.

■ Detecting cyclists on traffic light-controlled junctions

Given cyclists' problems at intersections, many towns have implemented simple solutions such as safe waiting areas to help them cross more safely. Around 15 towns are also using automatic detection systems (see bibliography reference n°22), often in the form of electromagnetic loops, sometimes coupled with push-buttons in the event of non-detection. This lack of reliability means the system needs to change: as part of its 2000 programme, Certu, together with the Cete agencies, are conducting detailed analyses and experiments of existing systems and will work with the various towns in creating a bill of materials based on their needs in terms of detection and counting systems. A number of prototypes will then be developed.

4.1.5 Single-level junctions in the open countryside

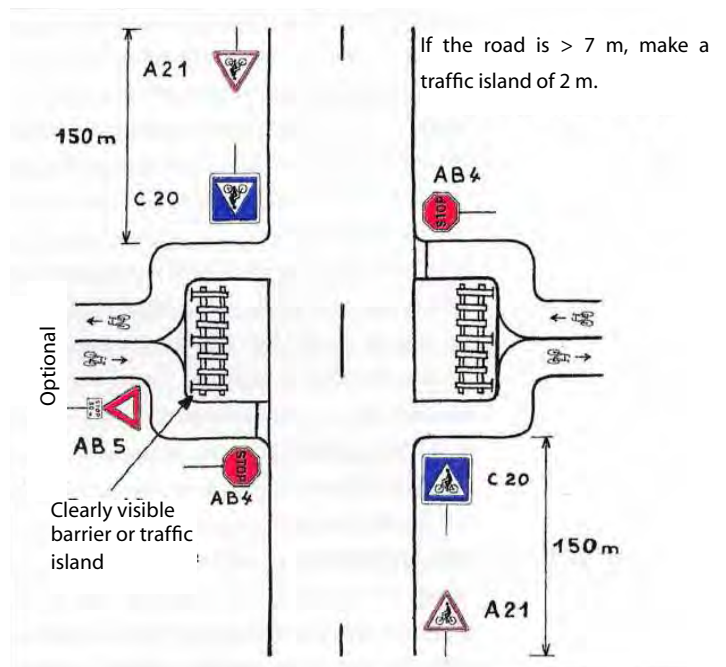
Generally, it is highly recommended to follow the principles and provisions given in the guide «Aménagement des carrefours interurbains: carrefours plans», published in December 1998 by Setra.

Accidents are largely due to a lack of vigilance on the part of cyclists or drivers who travel for several kilometres on a facility that is dedicated to them. When it comes to an intersection between a road and a cycle path, it is therefore necessary to take the following precautions:

- announce and ensure awareness of the intersection far enough in advance;
- ensure mutual visibility of cyclists and motorists by clearing roadsides (visibility triangle);
- slow users down as they approach the intersection (regulatory danger signs, central traffic island, etc.);
- place signs forbidding motorists at the start of cycle paths;
- use non-aggressive facilities for cyclists away from the roadway to slow cyclists down as they approach the intersection and limit access to maintenance and emergency vehicles;
- allow space for several cycles waiting at the intersection and, on busy sections, create a central refuge at least 2 metres wide to allow cyclists to cross in two stages;
- ensure night-time traffic is safe with the aid of reflecting material on signs and separating lines.



Protected intersection and reminder signs (avoid green background)



4.2 Roundabouts

4.2.1 Typical accidents

To better understand the safety conditions for cycles on roundabouts, CETUR carried out research in 1992 on 179 roundabouts that had had 202 accidents in 5 years (1984-1988). In 1999, a new study was started to research connections between the types of accident involving cycles and the shape of roundabouts, either in urban or interurban areas. This research, carried out by Cete de l'Ouest in the Pays de la Loire and Bretagne (Brittany), covered the period 1993-1998 with 155 accidents involving cycles and around 300 accidents involving mopeds. For cycles (first part of the study), the most frequent types of accident were:

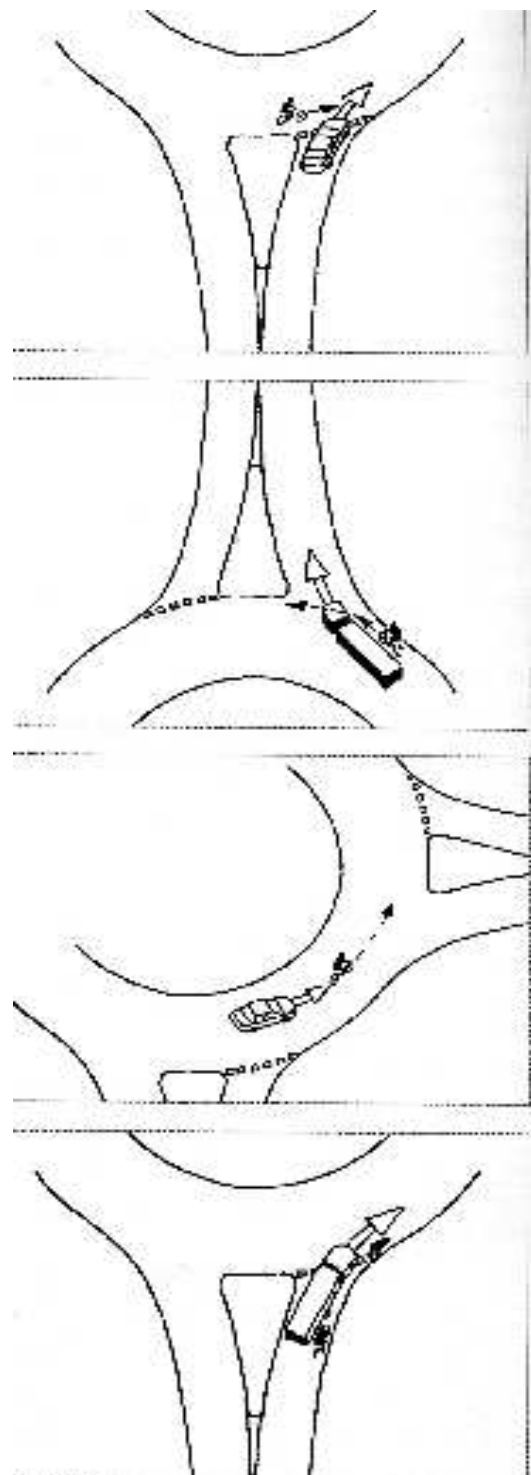
- approaching motorist not giving priority to a cyclist already on the roundabout (around 40% of the sample);
- motorists leaving the roundabout cutting across cyclists (around 20%);
- crossing in front of one another on the roundabout (around 10%);

Other types of accident occurred such as cyclists not giving way to others or cycles hitting the kerb on entrance or exit.

According to this study, roundabouts of more than 20 m in radius are the most dangerous for cyclists. Not giving cyclists priority is also a problem on roundabouts of 12-15 m in radius. Circle width is also a factor: more than 50% of accidents happened on roundabouts with a circle width of 8 m or more. Traffic is also a major factor.

When using roundabouts, two-wheeled users (particularly motorcyclists) are most at risk of an accident, even though this is lower than on other types of single-level junction (see bibliography reference n°7).

The European report Promising (see bibliography reference n°12) published in 1999 gives precise analysis of the efficiency of measures taken to improve cyclists' safety by calculating a ratio for each: benefit in terms of safety (reduction in number of accidents) or cycle use development linked to the amount that needs to be spent to implement this measure or facility. According to the experts, roundabouts are efficient facilities for motor vehicle safety and give good results for pedestrian safety: for these users, there is a 25% reduction in the number of accidents for a three-road roundabout and 35% for a four-road one compared to any other type of single-level junction. For cyclists, safety improvements are less: 10% reduction in accident numbers for a three-road junction and 20% for four roads.



The most frequent type of accident

4.2.2 General principles

■ Width of the circular roadway

To encourage cyclists' safety, the shape of the roundabout should slow down traffic on the circle. This is achieved by radial approaches of road legs by trajectory deflection created by a central traffic island. It is then possible to go down to a 5.5 m roadway plus 2 m crown in urban areas. In interurban areas, Setra recommends a road width of 7 m and an area of 1.5 m that can be crossed for a small roundabout with a radius of 12-15 m.

■ Entries and exits

For safety reasons, entries and exits limited to a single lane are strongly recommended.

■ Is a cycle facility required?

On a small roundabout, cycle lane markings are of no use.

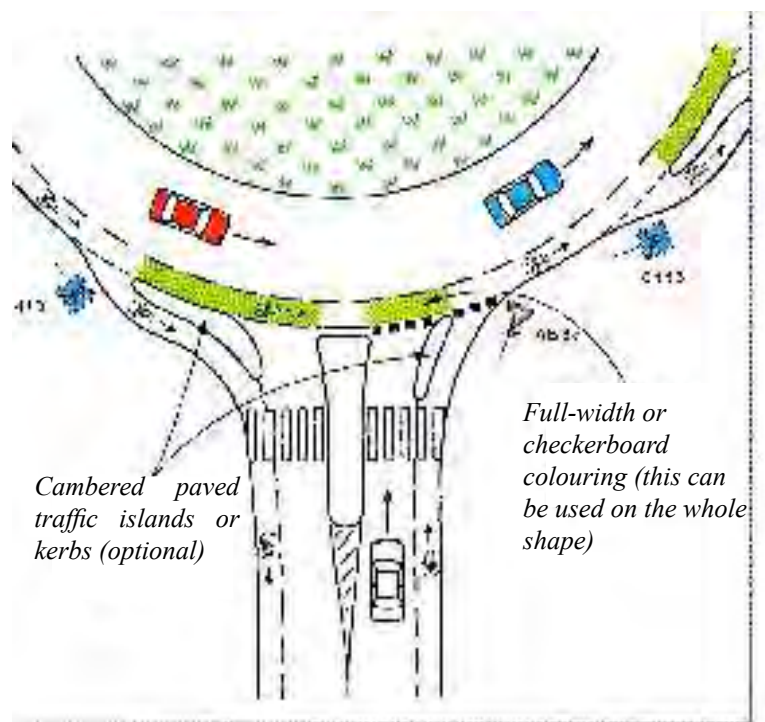
For a medium-sized roundabout (e.g. 12-22 m radius) where speeds are quite low, with a narrow circular road, safety levels are good for cyclists in mixed traffic without specific cycle facilities. Because cyclists' speeds on this type of roundabout are about the same as motorists' they can travel like them with the same trajectories and positioning: either at the centre of the circular roadway or more to the right when they are less experienced or approaching an exit, or to the left against the traffic island if they wish. By taking their place on the circular roadway, they avoid accidents where the exiting vehicle cuts across the cyclist's path. If there is no cycle lane on the access road, one is not then required on the circular road either. If one of the roads has a cycle lane, it may be kept on the circular road.

For very large roundabouts on a cycle route, cyclists and motorised traffic should be kept separate.

■ Cycle path on a roundabout

A cycle path on a roundabout is set a few metres away from the road and usually goes round the roundabout in one direction or, preferably, two-way. Crossing for cyclist for each branch of the roundabout would preferably be contiguous to the pedestrian crossing (without mixing both modes), cyclist giving the way.

■ Cycle facilities on large roundabout





Handling a large roundabout... but it is best to prioritise small roundabouts which are less dangerous for cyclists and pedestrians

■ Cycle lane on a roundabout

Cycle lane on the outside of a roundabout shows the possible route of cyclists when they enter and exit. This is on the condition that the lane is coloured, at least in danger areas. In any case, use of this cycle lane must be optional for cyclists. Improved safety for cycle lanes on roundabouts is achieved by positioning small cambered traffic island separators at entrances and exits between cyclists and motorised traffic. At entrances, the traffic island prevents cyclists being pinned against the roadside by entering motorists who move too far right. At exits, the traffic islands help motorists see if a cyclist riding to their right is leaving the roundabout.



Handling a large roundabout with cycle lane

■ Underpasses for one or more legs of a major roundabout

When traffic on one of the roads leading into a roundabout is very high and entries and even exits have a number of lanes, cyclists and pedestrians could use an underpass to cross them. These should have enough features to make them comfortable and safe for users.

5 Signage

5.1 General principles

Road signage is a communication tool requiring users to observe road rules in any language, a safety measure that must be used with credibility, a public service that must be designed with the interests of all in mind and a regulatory tool.

When signage is used, it is important to ask the following questions:

- what types of user does it address?
- is it there to allow, oblige, forbid, recommend, warn or inform?

According to article R 44, the road manager must decide on what signage to place and they must respect the various technical and legal regulations that control road signage to provide the very highest levels of quality and reliability. Prior to putting signs in place, the controlling authority must draw up a traffic restriction in the form of an order and define its scope.

Like any other communications tool, signage only works if it is well understood by the users it is addressing. Whether intended for cyclists or motorists, it must observe basic regulations:

- **uniformity** means non-regulatory signage may not be used,
- **homogeneity** requires that, in identical conditions, the user see signals with the same value and meaning used in the same set of rules,
- **simplicity** is attained by avoiding having too many signs,
- **continuity** in directions given beyond administrative limits is achieved by organising the necessary level of agreement on a local level.

5.1.1 Specifics

A moving cyclist usually has several specific features: they are wary of their environment, especially what's happening in front at road level and a height of around 1.5 m to avoid being caught, hit, destabilised and falling; and from this come a number of simple rules of application.

- **Prioritise road markings**

This is signage the cyclist is most aware of. Road markings cannot replace vertical signs but they complement them because they are constantly in the cyclist's field of vision. Cyclists can see a 2.3 m high sign from afar but not when they're in front of them.

The rules are considering only white marks, it is the compulsory marking. However green marks can, in some particular cases, reinforce the white marks. It is advisable to be aware of the problems of slippage that can be caused by white road markings or green colouring for all two-wheeled transport, especially motorbikes: the use of standardised products is imperative, which only exist for white road marking.

- **Limiting vertical signs to the essentials**

Cyclists and motorists in urban areas should not be distracted by too many signs. However, the presence of cyclists should be well signed to avoid any surprises.

- **Providing optimum visibility**

Regular checks should be made to ensure road signs are not hidden by objects placed permanently in front of them (advertising hoardings, branches of trees, etc.) or temporary obstacles such as parked cars. If possible, signs only concerning cycles should be at a height of 1 m, as long as they

5.2 Road markings

5.2.1 General rules

Summary chart of statutory road markings		
	Use of lines	Type of line
Longitudinal demarcation lines	One-way cycle paths	Nothing or T2 3u nearside lines (u = 3 cm) (normal section) waiver, u=5 or 6 cm for nearside lanes at mid-height
	Two-way cycle paths - centreline marking in normal section - centreline marking on bend, pre-intersection, poor visibility, etc.	T3 2u 2u (u=3 cm) continuous 3u (u=3 cm) continuous
	On-pavement cycle paths - cyclist/pedestrian separation marking	3u (u=3 cm) continuous
	Mid-height paths	3u (u=3 cm) continuous
	Cycle lanes - normal section/general case - normal section/specific case (fast-moving traffic, bend, poor visibility,...)	T3 5u (u = 5 or 6 cm depending on road) 3u continuous
Intersections	CROSSING bisecting road or carriageway - by priority cycle lane or cycle path - traffic light-controlled intersection and intersection with priority on the right - by non-priority cycle lane or cycle path	If the cycle lane or cycle path is priority, a stop line or give-way sign is shown on the other road. Continuation of T3 5u markings on crossing. Marking interrupted (by pictogram or nothing) No marking on crossing (only a few pictograms if marking really needed)
Transverse lines of cycle paths or cycle lanes	- stop - give way	50-cm continuous T'2 50 cm
	Other cases - start and end of cycle lanes or cycle paths - demarcation of safe waiting areas	T'2 25 cm bevelled or nothing T'2 15 cm traffic light stop lines

5.2.2 Cycle lane markings

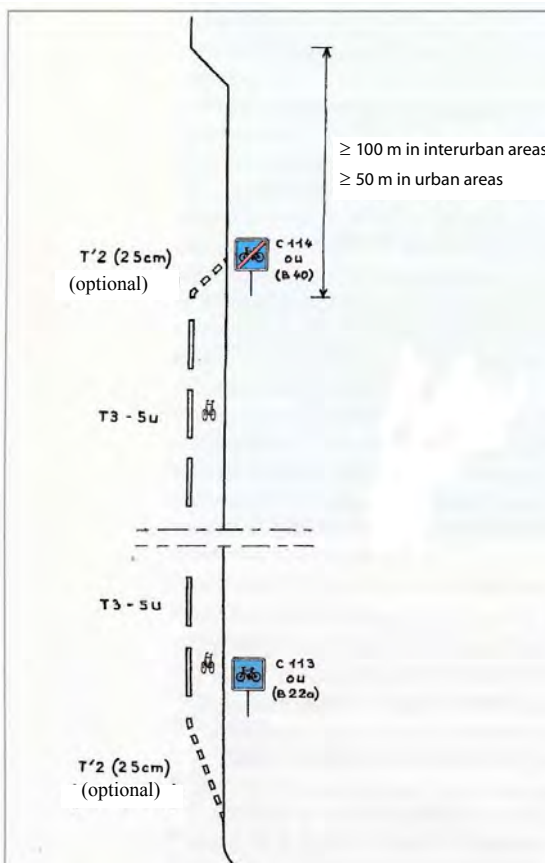
Separation between motorised traffic and the cycle lane is officially represented by a T3-5u discontinuous white line or exceptionally by a 3u continuous line. It is advisable to mark a white cycle pictogram on the road at regular intervals (e.g. 100 m in open countryside and 50 m in town). For the

ends of cycle lanes, markings can start in the on road markings starts and ends in bevels. However, it is preferable to end markings without a bevelled edge, especially on the roadway. The cycle lane should not be stopped before danger areas or in narrowed areas and rather motorised traffic routes should be narrowed. Where it is unavoidable, the cycle lane should be ended at least 50 m before the

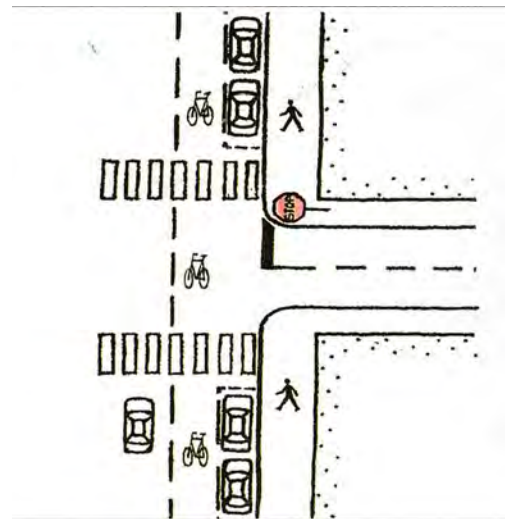
narrowed road; in interurban areas, this should be at least 100 m.



Horizontal signage at a junction
The cycle route keeps priority



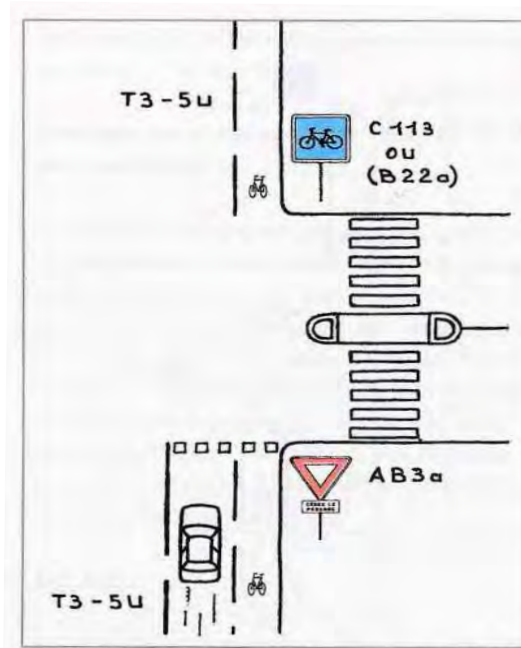
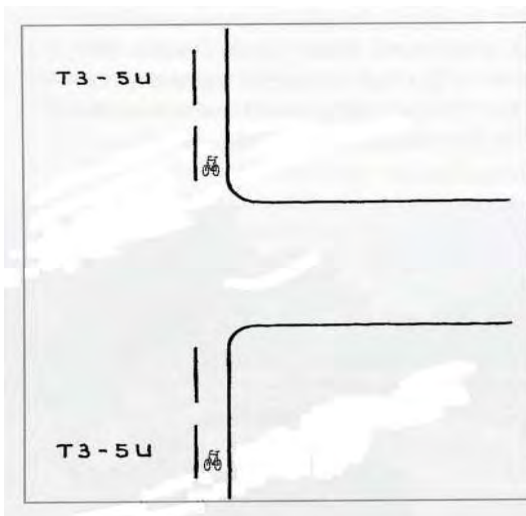
Start and end of a cycle lane



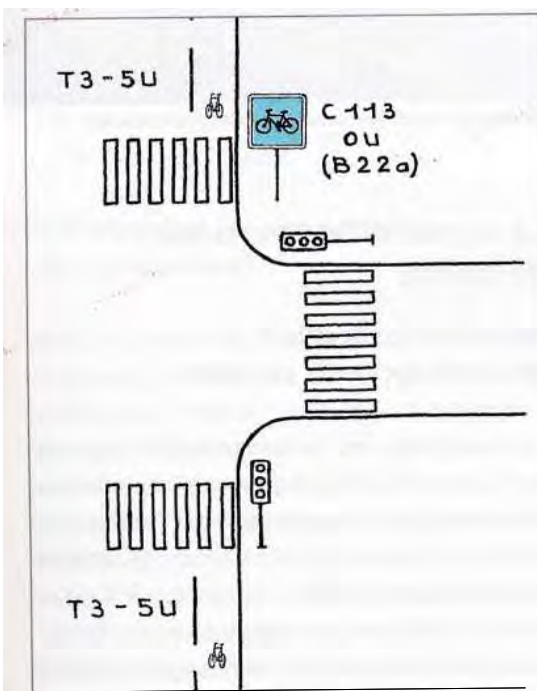
When crossing a road, the DSCR has approved removal of the 50 cm T'2 50 that used to be difficult to see with a «give way». If required, pictograms may be used to show a route.

When the cycle lane has priority, T3 5u markings should continue across a junction as for other routes.

When the cycle lane does not have priority T3 5u marking is interrupted when crossing the junction.



Road markings at a junction: interruption of the T3-5u when the cycle route does not have priority



Road markings at a junction
The cycle route loses priority

5.2.3 Cycle path markings

The T2 3u nearside line is not always necessary. However, the 3u continuous line that marks the separation between an on-pavement cycle path and the part for pedestrians is very important for meeting statutory requirements: differentiation by using just colouring or different material is not enough.

As for cycle lanes, it is possible to end the markings without bevelling, running parallel to the roadway.



Start and end of a cycle path

5.2.4 Crossing markings alongside pedestrian crossings

It is necessary to separate pedestrian and cyclists when crossing a street. Cyclist route should be marked with white cyclist pictogram, as shown on the photo. Cyclists must dismount and wheel their cycles across the pedestrian crossing.



In the event of roadworks, mark out an alternative route

5.2.5 Roadwork markings

Where there is a facility, it must be maintained wherever possible. If there are roadworks, the space given to cars should be reduced rather than that given to others. If this is not possible, a diversion that is as direct and short as possible should be proposed to cyclists.



In case of roadworks, it is necessary to propose another route

5.3 Police vertical signs

It is important for sections as for intersections

5.3.1 The optional nature of the usage cycle facilities

Article R 431-9 of the highway code, modified by the decree of 14 September 1998, does not oblige cyclists to use cycle facilities. These new conditions mean that «recommended usage routes» need to be regulated: this concept is intended to give cyclists more flexible usage but because it does not have a highway bylaw attached, it is no longer justified since the decree of 14 September 1998

A sign showing the optional cycle facility is the C 113 (blue square). It shows a reservation for cycles and therefore forbids entrance to any motorised vehicle, including mopeds.

«In normal sections, placed at the entrance to the cycle path or cycle lane, sign C 113 reserves access to two or three-wheeled bicycles and notifies drivers of other vehicles that they do not have the right to use this facility nor to stop there. At intersections, a cycle facility must be marked on the roadway by sign A21.

Sign C 113 can be used as an advance warning.. Each sign must be accompanied by an M 1 tab sign giving the distance between it and the start of the relevant cycle facility. This advanced sign does not dispense with the need for position signage. Sign C 114 «end of cycle path or cycle lane» indicates the end of the change or regulation that justified sign C 113.

When the authority holding police powers wishes to make a cycle facility obligatory, it refers to article R 190 of the highway code and uses sign B 22a(beginning) and B40 (end). The advice of the «Prefet» is necessary.

5.3.2 Authorising mopeds to use cyclist facilities

It is possible to supplement signs C 113 and B 22a with tab sign M 4d2 showing a moped user where the cycle facility is also open to mopeds. These must be exceptional and should be avoided:

- for two-way cycle paths (head-on collisions),
- for on-pavement one-way cycle paths (collisions with pedestrians),
- for cycle paths between parked cars and the pavement (too fast at junctions, pedestrians crossing the cycle path, etc.).

This authorisation is only for widths of more than 1.7 m.

5.3.3 Streets where one direction is for cyclists only

Minimal signage is made up of sign B 1 (no entry) with the tab sign «except cyclists» and, in the other direction, blue square sign C 24a telling motorists that they will find cyclists coming in the other direction (see table on following page). This should be repeated at each junction. Intersections should be signaled by B2a or B2b signs (vorbiden to turn left or right sign) with M9z sign (except cyclist) or with C24c sign (particular traffic rules for the road at the section).

5.3.4 Buses lanes opened to cyclist

Bimodal sharing is indicated by the addition of sign B 27 and tab sign M 4d1.













On the road, cycle pictograms and «Bus» indications should be marked in the middle of the lane so tyres less quickly erase them.

5.3.5 Reserved lane cycle paths

At entries and exits, depending on the situation, sign C 113 forbids access to all users other than cyclists (motor vehicles but also pedestrians, rollerbladers, etc.) and sign B 22a (generaly C113) To inform car drivers usually presign A21 will be used.

5.3.6 Reserved lane cycle paths

C115 «green ways» and «C116 end of green way» are used

Scheme and number	Definition	Comments
 A21	Cyclists emerging from the right or left.	<ul style="list-style-type: none"> – Intended for motorists, – placed as advanced warning (A 21) – can be used with tab sign M9z «cycle crossing».
 C113  C114	Indication of the beginning and end of the cycle path or lane, reserved for cycles.	The cycle facility is optional for cyclists and reserved for them, other traffic is forbidden.
 B22b  B40	Indication of the beginning and end of the compulsory cycle path.	The cycle facility is compulsory for cyclists and reserved for them, other traffic is forbidden.
 B91	No access for bicycles.	Mopeds are authorised.
 B91	No access for mopeds.	Cycles are authorised.
 B9a	Cycle facility where mopeds are authorised.	Tab sign that can be placed under a C 113 or B 22 sign.
 M42	Facility where cycles are authorised	– Placed under a sign (e.g. bus lane, under a B 27),
 M1d1	No access to any vehicles except bicycles.	Placed at the end of a two-way street with one lane reserved for cyclists.
 SAUF CYCLISTES B1	Cyclists in contra-flow lane	Placed at the other end of the road to indicate the presence of cyclists riding against the traffic flow.
 C24a2	Greenways are facilities reserved exclusively for non-motorised means of travel. They are intended for pedestrians, cyclists, rollerbladers, people with reduced mobility and horse riders, for a variety of purposes, including tourism, leisure and daily travel by the local population.	Indication of the beginning and end of a greenway

5.4 Signposting

Overall, signposting is an essential part of a town's traffic planning. It is clear that taking cycles into account as a mode of transport should be accompanied by the creation of a continuous, safe and correctly signed network. For a common destination, the route taken by a cyclist is very likely to be different than that for a motorist. To date, a few towns and departments have adopted such signage by copying French or foreign initiatives. By capitalising on these experiences, national regulations are also changing. This chapter explains the advances seen at the date of publication of this guide. Overall, these advances concern:

- the need for a master plan to define coherent, continuous and maintained links between given points;
- national identification of messages for cyclists (Dvwhite signs, green lettering, logos SC2). It seems essential that operational services that are involved in cycle signposting take into account the general principles below and inform Certu of any difficulties they have in applying them. This information will be examined as part of overall future improvements in this area.

5.4.1 Objectives

In town, bicycles must be considered as a means of transport in their own right. Cyclists need to have a proper network available to them.

In interurban areas, the network must allow all cyclists freedom to move around safe and comfortable route whether they are alone or with their families, riding for sport or fun. They have to be pointed towards these routes and they should be able to find their way round easily once they are on them.

■ What needs signposting?

In urban and interurban areas, signposting must take into account specific attractive points for cyclists. In urban areas, it is important to identify cycle parking, public transport stops and the **main hubs** that generate cycle traffic such as schools, cultural centres, administration and sports centres. Once all these hubs have been identified on a geographical area, they need to be linked by a **continuous network**. Signposting must clearly present information regarding the network and these hubs. As for road signposting, it is not advisable and even impossible to signpost everything: legibility and continuity rules mean that signposts need to be limited. Signposting should be for the best routes for cycles to use.

In urban and interurban areas, these itineraries must have the following minimum features:

- either good shared use between modes of transport, which implies considerable traffic moderation such as 30 km/h zones or cycle routes (see chapter 2.2.5) in interurban areas or complete segregation of modes of transport where cycle/car shared use is difficult or impossible;
- careful arrangement of junctions;
- network continuity that is legible and understandable.

Such a network does not cover all routes in an area, of course. It is therefore important to **encourage** cyclists towards this network in the clearest and most efficient way possible.

All these principles should form part of a **cycle master plan** that includes the standard stages below.

• Scope of research

The area being studied and the relative network need to be defined; links and networks on the edge of this area must be taken into account,

especially unambiguous continuity of interurban routes that cross a built-up area.

- **Study of hubs that generate cycle traffic**

This study must include a summary of all signage requirements for the different types of cyclist. It should be conducted together with user associations.

- **Study of the network connecting these hubs**

The network must have the aforementioned fundamental features. Once the network has been defined, signage at junctions must be decided upon in keeping with the rules of legibility and continuity. As an indication, four mentions by direction at a junction seem to be the absolute maximum.

- **Study of feeders towards the cycle network**

The main network points in the built-up area or town should be identified and these points should be connected to the cycle network by using slow traffic roads.

A map of links and feeder routes over the geographical area must be drawn up.

It is useful and important to introduce a consultation stage to validate it and allow others the chance to embrace the proposed scheme: these routes will appear in the shape of unambiguous signs for cyclists. In the case of indications for other road users on a part of the route used by cyclists, it is usually best to keep both signage systems.

- **How to signpost**

For obvious reasons of legibility and visibility for French or foreign cyclists using our networks, the Road Safety and Traffic Department has adopted the following principles:

- unambiguous markings for motorised vehicles. This excludes the use of existing colour coding;
- coherence with signs already in use for cycle routes (green paint on a cycle path or lane, idea of a «greenway», master plan for a national green cycle network, etc.). As a consequence of the previous two points, the following colour codes should be used on mixed sites where signs for cyclists Dv can be seen by other users: a white background with letters, bands and arrows in green; a cycle pictogram (silhouette of a cyclist SC2) in white is placed in a square on a green background. N sign with a green background should be placed on these mixed sites. The shape should be adapted to cyclists' speed.

In reserved lanes, there is no ambiguity but the same cyclists can use mixed and reserved lanes. It is important in terms of homogeneity and legibility to use signposting that is coherent with that used on a mixed road, and preferably the same.

5.4.2 Composition of combinations

Several signposting charters were examined. Signs defined by interministerial instruction No.82.31 on directional signposting have the advantage of being visible and legible. These signs would appear to be ideal for interurban areas and reserved lanes with wide enough hardstrips for placing them there. The downside of visibility and legibility is their considerable size. In towns where pavements are already crowded with street furniture, some project owners have chosen other types of sign that seem to be satisfactory.

Given these various elements, national rules for Dv signs recommendations are as follows:

- sign with green letters, signs and borders on a white background;
- green square with white cycle pictogram SC2

on each sign, the height of the logo being 1.5 times that of the letters (otherwise 2,5). This solution appears to be best because it means signs can be placed on general directional signage, each sign keeping the entire message intended for cyclists (cycle logo with one or two mentions).

■ Type and height of characters used

Several ground experiments have been analysed. They lead us to the following recommendation:

— character height to match cycle speed so use of minimum character height L 4 either 30mn, 40 mm or 50 mm (3lines maximum).

■ Height

The cyclist's reduced field of vision, which is usually at mid-height due to their position on the cycle, favours adapted positioning of signs on poles.

In reserved lanes and where there is nothing blocking the view, positioning at 1 m seems optimal. On a mixed site, there is a greater risk of obstructed view. A positioning height of 2.3 m appears preferable. Wherever possible, existing direction sign poles should be used: indications for cyclists are placed on the lower part of the pole.

■ Choice between «position» and «advanced warning/confirmation»

Because of cycle speeds, it is not necessary to use positioning and advanced warning signs at the same time. There are two possible strategies, each with its own pros and cons.

- **Use of position sign only**, type Dv 20 (cf. Instruction No.82.31).

Advantages: as long as it is carefully placed a single sign gives cyclists indications in a given direction for all legs approaching the junction.

Disadvantages: this sign is close to the junction on the kerb and can obstruct visibility at certain angles and should therefore be at a height of 2.3 metres, which is not ideal for cyclists; furthermore, this sign concerns only cyclists but is seen by all users.

Conclusion: better for a mixed road or on junctions with very short visibility triangles.

- **Use of advanced warnings/confirmations**, type Dv 40 and Dv 60.

Advantages: the Dv 40 advanced warning sign on a reserved lane 10 or 15 m before the junction is only visible by cyclists on the reserved lane. It gives all the information required prior to the junction. The Dv 60 confirmation sign placed 10-15 m down from the junction is perfectly visible for a cyclist coming off the adjoining route. It fulfils the function of the Dv 20 without being seen by other road users who may be travelling faster (certain vehicles, HGVs, etc.).

6 Road surfaces and carriageway structure

Cycling facility improvements are generally carried out using conventional roadbuilding techniques (see bibliography reference n°23). However, three specific parameters demand particular attention: the quality of the surface or wearing course, the bearing capacity and type of road foundation material.

6.1 The wearing course

The choice of wearing course is of great importance for the safety and comfort of cyclists. They are very sensitive to its integrity, uniformity defects, spalling cracks due to breaks between structures and defective road surface joints, swelling caused by tree roots (poplars, aspen, willow, acacia, etc.), and water seepage, rutting, potholes and various inclusions: gully gratings, rails, etc. Furthermore, the bumpiness of the road surface must allow proper grip without altering ride comfort and without being aggressive in the event of a fall. It can be useful to visually differentiate the cycle path from lanes for motorists or pedestrians. For pedestrian/cycle routes, road surface must be of equal comfort.

The wearing course must be impervious, uniform, with no profile or surface unevenness over time. That calls for care in designing the surface and also drainage, collection and removal of run-off water and the surrounding vegetation (species with creeping roots should be banned) for each project. It should be remembered that water spray during rainy weather, is a cycling hazard.

Given these requirements, we propose the following criteria of choice: travelling comfort, road-holding, optical differentiation, ability to withstand occasional vehicle traffic on condition that the road surface allows, ease of maintenance and cleaning. The adjacent chart gives an estimate

of the existing materials on the basis of these criteria.

Nonetheless, we have some comments concerning the various products.

- **bitumen-based materials**, in particular bituminous concretes, are traditionally used and more flexible. Bituminous concretes, cold-poured bituminous concretes and asphalts can be easily tinted to differentiate space allocation optically to the various users. Creep can make asphalt slippery in the first months after application.

- **surface coatings** are unpopular with town and sports cyclists for reasons of comfort and safety (loose chippings).

- **Modular materials**, such as paving blocks or slabs, can be used for surfacing work, wide joints and a uniform that make them uncomfortable in urban areas.

- **Cement concrete** that comprises both the road foundation and the wearing course; different surface treatments are available and they are easy to tint; ride comfort is highly dependent on how well the expansion joints are made.

- **Mechanically or hydraulic binder-stabilised soils** are prone to rain damage and occasional heavy traffic can form ruts.

- **Resin-based slurries and mortars** call for smooth, water-resistant substrates and are generally complicated to apply

Comparison of different materials						
	Comfort	Road-holding	Differentiation	Resistance to occasional traffic	Cleaning	Ease of repair
Bituminous concretes (1)	++	++	Black – Coloured ++	++	Black + Coloured +	Black + Coloured -
Cold-poured bituminous concretes (2)	+	++		+	+	+
Asphalt	+++	- Studded ++	Black – Coloured ++	+	Black + Coloured +	Black + Coloured -
Fine coating (0 /6-0 /10 max)	-	+	+	+	-	+
Concrete paving stones	-	+	++	-	-	++
Stone paving	--	-	++	-	+	++
Terracotta paving	-	+	++	-	-	++
Concrete slabs	-	+	+	-	+	++
Stone slabs	-	-	++	-	+	++
Cement concrete (3)	Smooth ++ Grooved + Deactivate +	Smooth -- Grooved + Deactivate ++	Smooth + Grooved ++ Deactivate ++	++ ++ ++	Smooth ++ Grooved + Deactivate -	-- -- --
Stabilised soils (0 /6-0 /10 max)	-	-	++	-	--	+
Resin-based slurries and mortars	+	Smooth -- Grooved + Studded ++	++	+	Smooth ++ Grooved + Studded -	+ + +

(1) Bituminous concretes for roads with low traffic levels: BBS1 or BBS2 granulometry 0/10 compliant with standard NF P 98-136.

(2) Cold-poured bituminous concretes with granulometry 0/10 compliant with standard NF P 98-139.

(3) Cement concretes 0/10 or 0/14 at least class 3 (B 25) compliant with standard NF P 98-170.

6.2 The carriageway structure

The car route and cycle lane have exactly the same structure. While the creation of cycle lanes calls for road widening, effort should be made to extend the existing structure to avoid creating a weak point at the edge, especially on narrow carriageways that take heavy HGV traffic (more than 10% of daily traffic).

Car drivers and even HGV drivers tend, by definition, to park their vehicles on stabilised shoulders. As a result, the cycle route does not need a new structure but a light upgrade can be carried out (scraping off the surface, levelling with

untreated aggregate and compacting) before laying the wearing course.

The first parameter to establish for creating dirt tracks is the type of bearing capacity comprising the supporting soil and any improved subgrade that will accommodate the track.

6.2.1 The platform

PF1 bearing capacity (dynamic module 20-50 MPa or deflection >150/100 mm) is insufficient for laying a road foundation. In this case, it is advisable to provide in situ treatment involving the addition of materials or hydraulic binder treatment, or use a

thick enough sub-grade layer (> 30 cm) possibly laid on geotextile.

PF4 bearing capacity (dynamic module >200 MPa or deflection <50/100 mm often found on disused railway lines) is generally enough to dispense with the road foundation. The wearing course can therefore be laid directly onto the sub-grade once the profile has been cleaned and made good with a 5-10 cm thick layer of untreated aggregate leveller. The sub-grade will be 0.6 m wider than the lane width (+0.3 m either side of it).

6.2.2 The road foundation

Road foundation geometry and type must withstand the stresses engendered by special heavy wearing course-laying plant (materials transport, grader traffic) and also regular maintenance and cleaning vehicles without undergoing irreversible damage.

6.2.3 Materials

The following materials are most frequently used for the road foundation layer:

- Class B, Category 2 untreated aggregate (GNT): maximum particle size 20 mm (French standard NF P 98-129) and minimum layer thickness 15 cm;
- materials treated with hydraulic binders described in French standard NF P 98, namely cement sand-gravel aggregate, gravel-slag mixture, fly-ash and lime, hydraulic ash mixed with sand-gravel, sand-gravel with special road-grade binder. Their compulsory mechanical strength must be class G1 or G2;
- class 1 or 2 or NF P 98-138-grade sand-gravel mixed with bitumen: minimum layer thickness 7-9 cm;
- cement concrete of minimum compliance

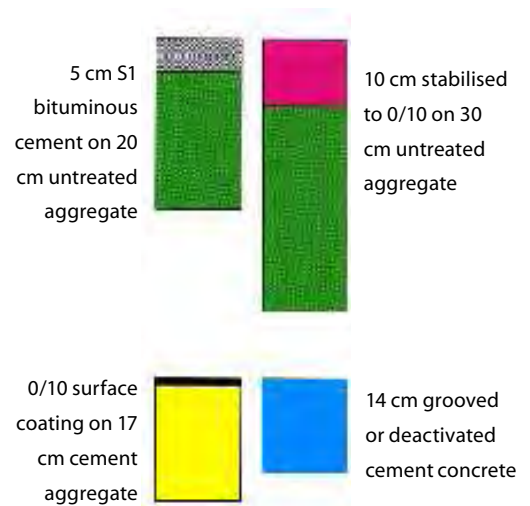
with class 3 of French standard NF P 98-170 with minimum layer thickness of 12 cm.

6.2.4 Maintenance

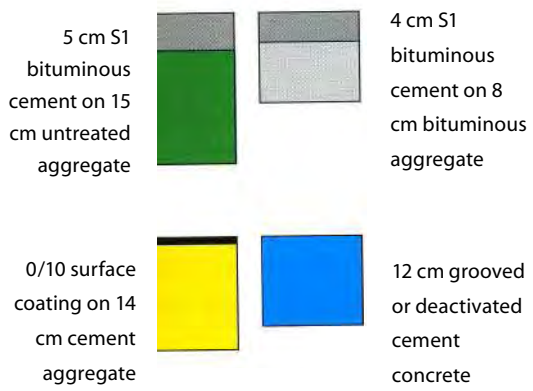
This involves maintaining and improving the level of service of facilities by regular maintenance: frequent inspections, mechanised intervention using appropriate equipment (brushes, washers) for the lane width, trimming and mowing operations; and occasional emergency maintenance after heavy rainfall.

6.2.5 Examples of facilities

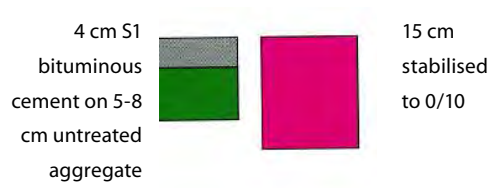
On PF2 sub-grade



On PF3 sub-grade



On PF4 sub-grade



7 Lighting

7.1 General requirements

In France, lighting of infrastructures is optional. It is up to the road manager to decide whether lighting is necessary to improve user safety.

In urban areas, the public lighting system must allow cyclists to follow their route in safety, regardless of the time of day or the season. Two levels of lighting need to be considered:

- horizontal lighting that shows up road markings and allows cyclists to see any obstacles on the road; this is measured at road level;
- vertical lighting for direction signs and that makes other users visible: drivers, cyclists and pedestrians; it is measured at a height of 1 m above the roadway.

On normal section, it is best to create levels of lighting similar to those on the road for cycle paths and lanes. At intersections, cyclists' exit onto the lit route must also be lit up over at least 25 m to avoid any «black hole» effects.

In the open countryside, roads are not lit so cycle facilities cannot be. However, lighting tunnels is highly recommended.

7.2 European recommendations

The European Committee for Standardisation has established a European standardisation project for public lighting that takes into account the possible presence of cycle facilities (N 231 F and N 232 F *Sélection des classes d'éclairage et prescription de performance / Selection of Lighting Categories and Performance Conditions* September 1997). This standard provides classification of lighting situations dependent on:

- users: motorists, slow vehicles, cyclists or pedestrians;

- traffic levels (below or above 7,000 vehicles per day for both directions);
- the number of intersections per kilometre (less than 3 is open countryside, more than three is urban area);
- the speed of the main user (speed generally noted *V 85*, not the legal limit): above 60 km/h, 30-60 km/h and 5-30 km/h;
- the presence or absence of parking and traffic calming devices.

Horizontal lighting: for a cycle route along a road or in the open countryside, the standardisation project gives lighting levels depending on whether the light levels on the site itself are low, medium or high, with averages of 2-5 Lux. Parking, traffic calming devices or high traffic volumes justify high values of around 7.5 Lux.

Vertical lighting: minimum lighting values are less than 7.5 Lux but can be higher to increase the feeling of safety for cyclists in some areas.

7.3 Location of light sources

Streetlamps must not be dangerous obstacles for cyclists and must be as far away as possible from the side of the cycle route.

8 Parking and theft

Theft is one of the main factors discouraging the use of the cycle. It may occur when the cycle is parked on a public road, in the basement of a block of flats, in the schoolyard, etc. Solving the problem of cycle parking is one of the main issues to be taken into account when the cycling policy is being created.

8.1 Requirements

For any cycle parking development the following requirements must be met:

- proximity,
- accessibility for the user,
- correct measures for protection against theft,
- safety of persons, especially at night (lighting),
- adequate information provided,
- protection against the weather,
- suitability of the equipment/system for the place and use,
- arrangements made for motorised two-wheel vehicles.

To reduce the risk of theft on the public highway and in the cycle parks of flats and offices, the location must be as visible as possible to people using the corridors and streets. A location hidden below a staircase, in a recess or a garage that is difficult to access and poorly lit is very tempting for thieves and provides an easy opportunity to get away with their crime.

Five cycles attached to a rack are no more of an eyesore than five cars and above all occupy less public space since at least 6 cycles can be parked in a single car parking lot.

8.2 Locality

It is always beneficial to decide on the locality in consultation with the leaders of user associations,

educational establishments, local traders and any others involved in the local context. The parties involved must be flexible and prepared to adapt otherwise it may later emerge that some locations are overused while others are totally unused.

The first step is to count the number of cycles parked in non-designated areas at various times of the day and to assess realistically the number that could be parked in a given location if safe equipment were installed. The first concern is to find a parking area as visible as possible to customers inside shops (such as chemists shops, bookshops and hairdressers with wide shop windows giving potential thieves the feeling of being watched) or within view of people carrying out their work (a cinema cashier or hypermarket attendant for example) or in front of places open late in the evening such as restaurants, cafés, automatic laundries, police stations, service stations, etc.



A well sized bike park in the immediate vicinity of the station

In the town centre, small, well-spread units for 4 or 6 cycles are preferable to cycle parks designed more particularly for less dense urban areas, public transport terminuses, etc.

Use of the facilities must be monitored so that they can be adapted as the demand develops.

8.3 General principles

The decision-maker must always be guided by two rules: visibility and proximity.

8.3.1 Protection against theft

To protect cycles against easy theft, it is essential to attach the frame and wheels to a point firmly secured to the ground or a wall. This attachment point must be strong enough to resist breakage and sawing but also thin enough (roughly 4 mm in diameter) to allow any type of good-quality anti-theft device, especially U-locks, to be attached.

8.3.2. Simplicity and economy

Experience and observations suggest that the best theft protection is provided by cycle stands or single racks of stands consisting of high hoops, inverted U-shaped bars, or other equipment allowing the frame and wheels to be secured and providing good support. High hoops or rings secured to a wall or bollard are far preferable to clamp, slot or bracket devices supporting the cycle by a single wheel, as these may buckle the wheel and do not allow the frame to be secured. This equipment can be painted in colours that blend easily with the surroundings and can display the municipal logo, educational messages or advertising.

This is the least expensive system. It is basic equipment which, at additional expense, can be produced in other forms and from other materials to provide greater convenience and a more attractive appearance. Metal hoops made from 4 cm tubing, 80 cm high and roughly 1 m to 1.50 m long must be laid out 70 cm apart. If this distance is greater, the cycle park is likely to be monopolised by motorcycles. It is preferable to provide separate

facilities for motorised two-wheel vehicles. Hoops are less of an obstacle for the blind and visually challenged as they are easily detected and have a safer shape. In some cases, these securing systems may have other functions such as enclosing an area or preventing access by motorised vehicles. This avoids the expense and clutter of additional non-functional urban furniture.

8.3.3 Information and route signing

The location of major cycle parks must be signposted. In addition, it can be included in the general route signing plan of the cycle network and on town plans. Information about the existence of cycle parks and the installation of cycle parking facilities around the town should be given suitable advertising as part of campaigns to develop daily use of the cycle. During local events such as fairs, etc. mobile parking units should be set up. It is very important to inform the public so that visitors are encouraged to arrive by bicycle rather than by car.

8.4 Locations and equipment for various needs

There are several levels of parking demand:

- very short stay occasional parking - during a 15-minute errand for example,
- short- and medium-stay parking for the cinema, supermarket, visits to friends, etc.
- long-stay parking: a half-day or more, in or close to work places, schools, stations, etc.
- parking at home (collective housing).

Solutions need to be found on a case-by-case basis on the public highway or in private areas.

8.4.1 Parking in public areas

The need for parking areas is highlighted by the fact that, for want of anything better, cyclists often attach their cycle to a traffic sign on the pavement. This need increases in proximity to the town or city centre.

In addition to locations where there is a clearly identified need, parking areas for 5 to 10 cycles should be installed every 50 m or so in urban areas and even less in the town centre and busy shopping streets, using either a car parking lot or the pavement if it is wide enough.

- **Parking on roads**

The advantages of street parking are that it does not encroach on pedestrian areas, can be adapted to meet the demand in any one street and above all affirms the place of the cycle in town.

It involves setting up cycle stands at regular intervals along the road in place of car parking lots. These stands must be visible to parking motorists. If the cycle parking area replaces a car parking lot immediately before a pedestrian crossing, it has the additional advantages of improving pedestrians' visibility as they prepare to cross and making the crossing more easily identified by drivers on the road. It requires a system such as a wheel stop to prevent cars backing into the cycles.

- **Parking in public squares or courtyards**

Cycle parks set up on a public square or courtyard must allow for pedestrian movements, access for local residents and the fire service, deliveries and the existing urban furniture.

If possible they should be combined or grouped with other facilities such as bus shelters or telephone kiosks to prevent theft and avoid excessive urban furniture in areas normally set aside for walking. The cycle parks can be designed to improve the quality of public spaces. A cycle park is certainly no worse a sight than of a row of parked cars, but this is no reason why it should not be given an attractive design. Depending on the site, it may be visually improved by a small wall using the same material as the ground covering, flower tubs, a hedge, etc. In sensitive areas, close to historic monuments, in the old quarters of the town, close to public gardens, and so on, any number of solutions may be imagined for choosing a location and material matching the other urban furniture in a totally justified effort to integrate it into the site. These solutions include, for example, rings firmly secured to a wall.

8.4.2 Parking at work places, parks, educational establishments, etc.

As with the other cases, the objective is to meet a foreseeable medium- or long-stay parking demand (several hours) at specific sites such as work places, school and university sites, close to leisure and sports areas, in front of railway stations, close to public transport terminuses, at park-and-ride facilities, etc.

The important factor in every situation is to ensure that walking is reduced to a minimum and that locations reserved for cycles are close to the entrance and not relegated to the furthest corner of a car park.

The cycle parks must always be covered, or better still, enclosed in a shelter. Protection such as a roof and/or side panels providing shelter against wind and rain is an additional encouragement to use of

There are two important requirements: firstly, these shelters must be attractive and produced from durable, high-quality materials, and secondly, they must in no way hide the parked cycles which, to deter thieves, must remain visible from the ground floor of surrounding buildings.

In the special case of park-and-ride schemes using public transport, specific buildings and outdoor covered areas with anti-theft systems must be provided. The required level of protection may be obtained by setting up individual cycle lockers for example.



Cycle lockers in Strasbourg

Cycle parking areas, whether they are outdoor or indoor, must always be well lit, correctly signposted and easily accessible.

At school and university sites and work places, it is desirable to provide cloakrooms and key-operated lockers for clothes and accessories.

8.4.3 Attended parking

Parking charges are only possible and justifiable for long-stay attended parking or cycle lockers at

special sites such as railway stations, swimming pools, etc. In the case of park-and-ride schemes, a combined charge for parking and use of public transports provides a good incentive. Attendant services can be usefully combined with cycle hire facilities and small repair services, especially close to railway stations.

As a half-way measure between attended and non-attended parking, some local authorities (in Lyon for example) are experimenting with a few free cycle stands next to the ticket booth of municipal charge-paying car parks.

The Netherlands: a proactive policy

Although the cycle is used for 28% of daily journeys in the Netherlands, the car, used for 46% of journeys, is still predominant. By the year 2000, the Netherlands hopes to increase the number of cyclists significantly, especially in urban areas, through a 3-point action: extending the cycling network, improving existing facilities and preventing theft which is a major factor dissuading potential cycle users.

In the large cities and tourist sites of the Netherlands, two-wheel vehicle users can use short or long-stay (08.00 to 18.30) attended parking services for a very small charge. These cycle parks, usually in the open air, but fenced in and with permanent attendance, are spread across several strategic points of the city: the administrative district, the business centre, busy shopping streets, cultural buildings, etc. The amount that the user has to pay is deliberately kept low and the operation, which provides jobs for low-skilled workers, relies on financial support from the state and local authorities as well as sponsorship by companies.

8.4.4 Parking at residential sites

Several factors are strongly dissuasive for anyone thinking of acquiring or making daily use of a cycle: stairs, a long series of doors to open and close, cycle rooms open to all-comers (or non-existent), cycle locations correctly equipped but hidden behind rows of dustbins, and so on.

There are many solutions:

- a garage, preferably with railings, or covered and easily accessible shelter with a system for securing the cycles against theft (wire rope secured to the wall 1 m from the ground);



Parking, cycle hire and small repair services at The Hague station.

For occasional or short-stay parking (for visitors), a few individual outside locations (hoop stands) can be provided in front of the building.

- covered car parks in blocks of flats, cycle lockers or easily accessible anti-theft cycle stands with good lighting (to ensure that the user feels safe). Preference should be given to small garages for 5 to 10 cycles (corresponding to a small number of flats or a staircase) that can be locked by key and are safer than large, anonymous cycle garages prone to vandalism. In this type of garage, lockers could also be installed for storing equipment (small repair and maintenance equipment, helmet, etc.).

8.5 Summary: cycle parking requirements in various contexts

	Objectives	Necessary	Useful
Blocks of flats	Meet the needs of residents and their visitors (provisions made at construction stage)	Cover Accessibility Anti-theft systems	Short-stay outdoor parking Equipment storage area
Schools (preferably on the school premises)	Increase the use of cycles Prevent parking in non-designated areas	Safe access Anti-theft systems Cover Visible	Close to entrance Equipment storage area
Offices	Reduce users' costs Reduce companies' costs	Cover Anti-theft systems Proximity	Cloakroom Shower
Leisure	Attract users Prevent parking in non-designated areas	Anti-theft systems Safe access Proximity	Emergency measures Visible (cover)
Town centre shops	Prevent parking in non-designated areas Attract users Increase the use of cycles Reduce motorised traffic	Network Proximity Anti-theft systems	Visual appeal/integration Emergency measures Non-obstructing
Public building	Accessibility Prevent parking in non-designated areas	Proximity Visible Anti-theft systems	(Cover)
Railway station	Develop use of public transport Improve town centre access Organised feeder system Prevent non-designated parking	Anti-theft systems Easy access to public transport	Safety of persons Visible Adaptable to use Cover Lockers Cycle hire

8.6 Article 12 of Land Use Plans

As already stated in Chapter 1, a land use plan may require parking spaces to be reserved for cycles as well as cars, depending on the number and size of housing units. This has already been achieved in some French towns.

The figures below are taken from an enquiry conducted by technicians from Grenoble in ten other French towns

Car parking

Use of building	Minimum	Maximum	Majority
Housing	0.8 space per 1 one-bedroomed flat	2 spaces per 60 m ²	1 space per housing unit
Offices	1 space per 300 m ²	1 space per 33 m ²	1 space per 60 m ²
Shops	1 space per 300 m ²	1 space per 40 m ²	1 space per 40-50 m ²

Cycle parking

Use of building	Majority
Housing	1 m ² per housing unit
Offices	1 m ² per 50m ²
Educational establishment	30 to 60m ² / 100 pupils/students

The following detailed figures apply to the standards adopted by Strasbourg Municipal Council in its urban areas for a cycle garage of 3 m² minimum.

- collective housing: 1 to 1.5 m² per housing unit,
- offices: 2 spaces or 2 m² per 100 m² non-constructed surface area,
- primary school: 2 spaces or 2 m² per class,
- secondary or technical school: 10 spaces or 10 m² per class,
- higher education or research: 7 spaces or 7 m² per 100 m²,
- industrial or craft activity: 1 space per 3 jobs,
- shops: depending on their particular needs.

These ratios have to be adapted and extended to suit the local context.

For example, other regulations include:

- swimming pool: 1 space per 3 users (peak time),
- cinema: 1 space per 5 seats,
- shops: 2 spaces per 100 m² of shopping area,
- pedestrian zone: 5 to 10 spaces every 50 to 100 m,
- sports, cultural, social amenities, etc.: 1 space per 20 (or 30) persons attending.

8.7 Comparisons of the main cycle parking systems

8.7.1 Single wheel holders

These stands are sold in racks of several units and are very widely available from the various urban furniture manufacturers.

Advantages:

- low cost,
- easy to install and integrate,
- very low space requirement.

Disadvantages:

- very poor protection against theft,
- inadequate support of the cycle,

- difficult to clean and maintain,
- buckling of the front wheel.

Conclusion:

This system should be ruled out as it generally only allows the front wheel to be secured, and at most the front wheel plus frame, which is inadequate (the rear wheel is the most difficult to replace in the event of theft!).

8.7.2 Cycle hoops, individual or in racks of several units

Necessary:

- a strong hoop firmly secured in the ground,
- size compatible with anti-theft U-locks,
- spacing of roughly 70 cm,
- installed in an area with lighting.

Desirable:

- transparent awning-type cover.

Advantages:

- low cost for the user and local authority,
- very easily integrated into the site,
- very easy to maintain and use,
- provides good support for the cycle.

Disadvantages:

- possibility of stealing cycle parts,
- no protection against bad weather and vandalism.

Conclusion:

Very good «quality-price» ratio, to be given preference for short-stay parking and well-frequented or attended areas.

8.7.3 Individual cycle lockers

Necessary:

- outer covering suiting the site.

Advantages:

- very good protection against theft,
- mobile system,
- good support for cycle and convenient to use,
- possibility of long-term hire,
- protection against bad weather.

Disadvantages:

- difficult to integrate,
- bulky,
- expensive (user and local authority, investment and operation),
- difficult to maintain and clean inside,
- risk of appropriation by user keeping the key.

Conclusion:

Individual cycle lockers are suitable for low-demand long-stay parking in an institutional context (company, educational establishment, etc.)

8.7.4 Collective lockup garages*Advantages:*

- protection against theft,
- good support of the cycle,
- protection against bad weather,
- limited number of users,
- possibility of long-term hire.

Disadvantages:

- difficult to integrate,
- large number of keys,
- expensive (for user and establishment).

Conclusion:

Suitable for long-stay parking, especially if they are planned for this purpose from the outset in places such as suburban stations or satellite districts.

8.7.5 Attended premises*Advantages:*

- excellent protection against theft,
- low cost for user (long-term hire),
- very convenient for the cyclist,
- protection against bad weather,
- job creation.

Disadvantages:

- expensive for the establishment,
- requires suitable premises,
- requires very careful selection of the sites to be equipped.

Conclusion:

This solution makes optimum use of the space. It is suitable for high demand and may be advantageously combined with a hire / repair / accessory sales service.

9 Combination of means

The cycle is a suitable means of transport for short daily journeys, without inclines and generally less than five kilometres. However, some towns have many inclines and a difference in altitude between the centre and outskirts. The car has made it possible to spread housing and activities over a wide area. The suburbs are made up of juxtaposed islands of industrial or small business zones, shopping zones and individual or collective housing zones which are totally dependent on mechanised means of transport. The private car is by far the most used means of transport. Developing the combined use of the cycle and public transport is of particular interest for these suburban areas where it can reduce travelling time and slow down the increasing trend in the use of private cars.

The use of the cycle over longer distances must therefore be encouraged by integrating it into a transport chain. This combination of several means of transport is known as modal integration. It increases the catchment area for public transport in the suburbs through the simple logic that in the 15 minutes or so required to walk to a bus stop or station more than 1 km away – a factor that persuades potential public transport users to take the car – a cyclist can cover a distance three to six times greater. There are several ways of organising modal integration including the creation of park-and-ride facilities, and transportation or hire of cycles.

9.1 Park-and-ride facilities

The simplest method consists in creating protected cycle parks close to bus and tramway stations, especially those used for shopping areas, university campuses and major public sites or situated in front of suburban stations and at line terminuses. These parking areas, known as feeder parks or

park-and-ride facilities, are less expensive for the local authority and above all occupy less space than feeder parks for private cars. In some cases they may include extra services such as attendants, hire and/or maintenance of cycles, sale of accessories, etc.

To provide good interconnections, there must be a cycle network converging on this modal integration hub. The route may be twinned with a pedestrian route, use 20 mph speed limit areas, cross pedestrianised areas or follow standard amenities such as cycle lanes or tracks. This route must be very carefully signposted by a series of signs leading from each selection point through to the interior of stations and transport terminals (bus stations, airport terminal stations, boarding platforms for trains, ferries, sea buses, etc.). Equipment such as lifts, wide gates and ramps along staircases make access easier for cyclists as well as pushchair users and travellers carrying heavy luggage.



Cycle park with night lighting in close vicinity to the platforms (Redon station)

Enquiries and counts need to be conducted in order to adapt the parking offer to the needs, target potential users' expectations more accurately and choose the best location. The occupancy rate of cycle parks is linked to their location: those that are set up away from public transport stops or in places that are not easily seen, poorly lit or without shelter are not successful since the cyclist wastes time and the risk of theft is increased, leading to parking in non-designated areas. Most cycle parks consist of a few hoops anchored in the ground, used free of charge but without an attendant. Some stations, especially in the outskirts of large cities, are equipped with individual or collective cycle lockers. They are generally managed and maintained by the highways department of the municipal council concerned. Sometimes they are managed by the network operator (SNCF (French national railway operator), RATP (Paris transport operator), the municipal transport corporation of some towns such as Montpellier, etc.). It is important to choose systems that can be adapted to changes in demand. There are an increasing number of examples of services provided at stations: the «cycle park-and-ride» service well suited to large stations is spreading rapidly. It provides attended parking on 150 to 200 m² together with small maintenance or hire services.

9.2 Transportation of cycles

Transportation of cycles is still a localised solution because public transport can only provide a limited capacity. However, the development of cycling for local journeys or leisure is forcing transport operators to improve this service. It requires easy loading and unloading of the cycle in a specifically designed part of the vehicle. These access requirements depend on the vehicle and its equipment and impose a low access step (dropped floor), wide opening and easily recognised logo on

the carriage reserved for cycle access. Operation of the system must take into account varying capacity requirements during the day and the week (peak times, weekends and bank holidays). In the Paris region cycle access facilities are available on public transport and trains except during peak times from Monday to Friday in the direction of the peak flow (from the suburbs to Paris in the morning from 06.30 to 09.00 and from Paris to the suburbs in the evening between 16.30 and 19.00). This also applies in other regions for the «Regional Express Trains» equipped with cycle areas. Cycles are transported free of charge as hand luggage, and are loaded into the carriage or reserved area by the cyclists themselves. New rolling stock for the TGV (high speed train) and «Corail» (intercity train) will also be equipped with multi-service carriages.



The area reserved for cycles is marked with a logo

Tramways accept cycles at the weekend and outside peak times (at Nantes, Strasbourg, etc.). The cycles are held by cyclists on the tram platforms. The SNCF is developing a large number of tram-train projects. For example, the Saarbrück (Germany) to Sarreguemines (France) line will have a specially equipped dropped platform. The service is free in Nantes and Sarreguemines and costs one ticket in Strasbourg, except on Sundays



Hook system in a regional express train

An experiment in taking cycles on board buses is being conducted in the Rouen district on a line linking the university campus to Hauts de Rouen, via the station and town centre, which has been equipped with a prototype vehicle allowing cycles to be taken on board. In France, the system cannot be accepted until it is approved by the DRIRE (Regional Directorate for Industry, Research and the Environment). The requirements for this service were: no dangerous points, cycles separated as far as possible from the pedestrian flow and instructions displayed close to the rack. In compliance with these requirements a rack capable of holding two cycles was installed. Other devices are due to be tested in order to find a better adapted system to be built into the design of future rolling stock. The demand is currently highest

at the weekend when cyclists leave the town to pursue leisure cycling activities in the countryside. In the suburban context, there are two examples of buses equipped for cyclists: «bus et VTT» (bus and mountain biking) in Annecy, with on-board facilities for 10 cycles and «bus et vélo familial» (bus and family cycling) in Versailles, with facilities for 4 adult's cycles and 10 children's cycles.

9.3 Cycle hire

Many local authorities have realised that a cycle hire system has considerable potential as a means to discovering or rediscovering cycling.



Many towns are experimenting with cycle hire schemes

As early as 1993, Strasbourg municipal council (see Bibliography, Reference 37) opened a cycle hire point with 200 cycles. Over the months and years this experiment has developed into a full-scale public service now imitated by several French towns. Operated at major public transport stations or in the town centre, this hire service may be offered together with other activities linked to the use of the cycle such as maintenance and repair services, sale of accessories, cycle attendance, etc. It operates well during the summer as a leisure activity for discovering a region or town, and is gradually developing for functional travel.



Cycle self-service experiment in Rennes

Example of the Rennes district

Since June 1998, the inhabitants of the Rennes district have had free access to 200 cycles. Selected applicants (showing an identity card and certificate of residence), receive a free magnetic card allowing them 2 hours' use of a cycle borrowed from one of the 25 lending stations set up in various neighbourhoods of Rennes, in the town centre, close to the university, etc. The user can return the cycle to any station from 6 o'clock in the morning until late at night. These immediately recognisable cycles have reinforced tyres, protected lights, anti-theft padlocks and saddle covers. For permanent stock management, the stations are linked to a central unit via an Itinérís network. A van is loaded regularly to redistribute the cycles.

As a conclusion to this chapter, we should highlight the breakthrough made by the signing of an agreement between the SNCF and the «club des Villes Cyclables» (Club of Cycling Towns) during the Anancy congress. Since this event, regular meetings also involving the institutional partners and users' federations, have resulted in a considerable widening of cycle transportation possibilities in trains, an increase in the number of sheltered and protected cycle parking compounds in stations and improved information to cyclists using these facilities.

1998-2001 partnership agreement between the SNCF and the «Club des Villes Cyclables»

Given the ever greater problems encountered by French towns and cities as a result of the motor car, causing risks to public health, disturbance to the inhabitants and large economic costs for society, Given that the development of public transport and use of the cycle both have a part to play in absorbing these problems,

Given that modal integration facilities between the public railway service and the cycle can increase the efficiency of each of these means taken individual and therefore contribute to more congruent and enjoyable development of our urban environment,

The «Club des Villes Cyclables» (Club of Cycling Towns) and the SNCF have decided to sign a partnership agreement especially to develop the following activities, in liaison with the organising bodies concerned:

- extending municipal cycle routes to SNCF stations;
- setting up cycle parks and making them safe;
- providing access to SNCF stations for cyclists;
- developing cyclists' access to certain trains;
- setting up cycle hire and maintenance services on SNCF premises;
- developing approaches to the premises and disused tracks for the benefit of the cycle;
- studying special train + cycle price packages.

10 Promoting the use of the cycle

Gradually more and more towns are adopting a cycling charter, ratifying a master plan, setting up 20 mph speed limit zones, creating cycle lanes, routes and parks, etc. Everything seems set to receive large numbers of cyclists or, as the technical jargon puts it, «significantly increase the proportion of human-powered modes of travel». And yet the players strongly involved in this initiative are disappointed: the increase is sometimes no more than a slight tremor of interest noticeable especially during fine weather or transport strikes. Is there a missing step in the initiative, a «recipe» that this guide - or any other - may have omitted? It takes a long time to change habits acquired over decades. Promotion and information campaigns targeting potential users (young people, students, sports enthusiasts, etc.), regular reports in local papers, cycle fairs, «car free» days and other festive events are essential to convince people of the many advantages of travelling by bicycle: the time saved over short distances, the money saved by households, the improvement of the environment, and therefore health, especially for children who suffer more easily than adults from the effects of atmospheric pollution.

Leaflets listing cycle circuits and town or city plans indicating cycle facilities must be widely distributed by tourist offices. Some French départements are already successfully distributing documents with maps and information identifying the routes and sometimes promoting places of interest to tourists in the regions crossed. This information must include SNCF stations, accommodation and food facilities, sites to be visited with their opening times, etc.

Town and cities renowned for their large number of cyclists, such as Groningen in the Netherlands, where 43% of the inhabitants are cycle users, or Copenhagen in Denmark, with 30%, put a lot of effort into the communication aspect of their policies. We should also add that the national taxation and urban planning policies of these countries dissuade the use of the car through heavy taxes on petrol and the purchase of motorised vehicles, harsh restrictions on private vehicle parking in the town centre (small number of parking lots, very dissuasive hourly parking charges). Urban planning master plans strictly limit the use of space and reinforce existing centres along major public transport routes, according to the «compact town» principle, in order to limit urban spread. Italian towns also apply strict rules for car parking in «limited traffic areas».

It is therefore clear that to develop the use of the cycle, consistent policies need to be implemented in various fields: the creation of cycle routes and infrastructures is only one step on a long journey towards better traffic conditions in the future.

Quality of life, protection of the environment and sustainable development are not just passing fashions: they are factors that will determine our future urban environment. Demographic and economic forecasts do not propose them: they impose them across the whole of Europe.

Conclusion

In town and country alike, we must totally revise our notions of traffic networks and means of travel. In doing so, we must change our mentality and concepts before transforming our roads and countryside. Commending the use of «human powered» means of travel and taking measures to reduce speed imply a different relationship to time and space and a different understanding of their extent. It is not a question of returning to older means of transport, but rather of clearly identifying how the cycle can become a credible alternative to the private car. Decongestion efforts based solely on developing public transport fall upon a stumbling block: residential areas are becoming increasingly scattered, and door-to-door service is impossible. The solution therefore lies in the use of a transport chain in which the cycle can play an important role. For any road development, all means of transport must be considered, especially the cycle when roads are narrowed as a speed reduction measure. Similarly, there should be no hesitation in allowing wide rights of way when road reservations are made on the land use plan or widening is planned.

This guide takes stock of current regulations and describes the most commonly encountered developments on a cycle route. However many projects are underway at national level to promote cycling: preparation of new amendments to the highway code in favour of cycles, a project for cycle identification cards, work groups on road signs and regulations for crossroads with traffic lights, proposals for better cycle parking provisions in blocks of flats, preparation of data sheets for the creation of a network of cycle routes of national interest, and so on. This far from complete list shows that this document belongs to a context of on-going work involving partnership, exchange and assessment which will inevitably result in the other publications such as technical data, study reports and dossiers.

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Fact file **1 town & bike**

The cycle network

From the cycle scheme...

... to the cycle route master plan

From data to maps

From data to maps

Cycle routes and greenways sheet 1

Cycle stations on cycle routes and greenways

Cycle stations on cycle routes and greenways

Certu Interface Urban planning Mobility

Cycle parking in private spaces

Cycle parking in private spaces: an essential part of cycling, even if the two types of parking – in private and public spaces – are essential and complementary.

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