



Style Guide for Catalan Roads

General design criteria
for developing
the road network
of the Generalitat de Catalunya



Generalitat de Catalunya
**Departament de Política Territorial
i Obres Públiques**



GISA
Gestió d'Infraestructures S.A.U.

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3000.Presentation

The Government of Catalonia wishes the greatest care and exquisite sensitivity to be applied to all aspects of public services. The Government of Catalonia wants all the networks of services and equipment to excel in and be identified by rigour, of quality, of efficiency and of coherence parameters that are immediately apparent. The visual identification of signs of quality, an insistence on the highest standards in design, in presentation, in image and in how things appear at first sight seem essential if we are to overcome previous states of inertia or conformism.

With this in mind, the Government of Catalonia has prepared landscaping guidance materials for the economic activity sector of designing materials for integrating infrastructures into the landscape.

The goal is to start addressing the impact of civil work on the land with a well-defined and respectful personality.

In the past it has often been the case that the infrastructures have been considered by themselves and have been presented physically as items emerging from the landscape, eyesores with no possibility of integration, challenging rather than accompanying the countryside. Thus, all too often the materials, the colours, the signage and the structures, have been an insertion – necessary but painful – that has caused irreparable damage. The infrastructure itself has led to degradation of the environment, interstitial spaces, no-man's land, untidy verges, spaces abandoned to negligence and waste, true borders between nature and the infrastructure, with no possibility of delicate integration, with no plant life, with no analysis of what came before and no possibility of maintaining and conserving the sense of tidiness and order inherited from the past.

Now we seek to overturn the relationship between the infrastructure and its immediate setting. We are taking up the challenge that has often been raised of an integrated and coherent way of handling roadside areas, seeking out the most appropriate and least aggressive materials, integrating colours and landscape, minimising land use, reconstructing the indigenous, spontaneous plant life, and in short giving the roads a value of integration, communication, safety, sustainability as well as making them physically and visually agreeable.

The work remaining is huge, the steps taken so far, albeit significant, are merely the beginning and the corresponding goals are increasingly shared by many people, both experts and users. The expectations are great. It is like a watchword of civilisation, cleanness, inspiration and regard for the infrastructure, which has at the same time been respectful. Pragmatism is combined with a utopian vision, common sense and sensibility. We seek a comprehensible discourse, able to follow the courses of the urban and rural spaces, forests and agricultural land, that are revealed to us by our road network while at the same time providing the necessary safety and the feeling of intimate pride in having infrastructures that stand out for their delicate attention to the smallest details.

We are taking the first step now and many more will follow. This style guide should be rapidly overtaken by events. It is an indication providing guidance and assistance and meant to stimulate cleaning up our roads, eliminating eyesores and achieving the greatest possible fusion between the road network and the country as a whole.

I have often said that I would like roads to be little more than a subtle knife-cut in a sponge cake. The knife cuts, but the subtlety of the cut lets one feel that the separated parts remain united. This is the fusion that we want to see between roads, service, safety, users, landscape and country.

Joaquim Nadal i Farreras
Minister of Town and Country Planning and Public Works

3021.Introduction

1. Introduction

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Roads are infrastructures that are well established in the country because of their linear nature. The purpose of this style guide is to reach an understanding between roads and countryside. It is a document aimed at planners of roads and in general at everyone involved in the technical processes of road construction, management and operation.

The aim is to identify road items from the point of view of the people who use them. In this sense, roadway items can be classified in four blocks: linear perception items, individual perception items, singular items and landscape items.

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The same perception is used to organise the book clearly and simply. Even so, it must be remembered that perception is a global concept, so that in order to increase the user's visual comfort, roads must be understood as an assembly of items that relate linearly with different environments and have to adapt to them.

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The preparation of this book has involved a process of analysing the current roads, thereby revealing all the things that can be improved. Finally, there was a series of proposals, documentary aspects, standards and regulations that could be of great assistance to the planner or engineer. This style book is meant to be a design guide to make Catalan roads stand out in the good treatment of their items.

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This book is written not to give instructions but to help in identifying proposals for items, documentation and standards and regulations. As regards the relationship with the countryside, one of its chapters deals with cultural signage and it is made clear how the Catalan trunk roads give strength and form to the country, thereby creating a link between users of the different roads and their cultural environment.

2. Linear perception items

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Containment systems

The need to assure the safety of road users has increased in recent years. Containment systems are devices installed on a road meant to provide a certain level of containment for a vehicle that is out of control and to limit the damage that it could cause. These systems have to meet three objectives: containing the vehicle, redirecting it and reducing the seriousness of the impact.

The choice of one of the standardised safety systems depends on the seriousness of the accident that might occur in absence of such a system. Some of these devices could have a great impact in the linear perception of the roads, so it is convenient to analyse the fitting of barriers and not to use them indiscriminately, and to consider the possibility of introducing barriers that integrate better with the countryside.

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The aims are:

To integrate the containment systems in the road's surroundings, to improve the user's linear perception so that the journey is more pleasant, to guarantee user safety and to introduce new containment systems in sections where they are required for integration with the landscape.

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Types of barriers

The containment systems currently available to planners are:

Containment systems on platforms (1)

Containment systems on structures (2)

Urban and interurban structures must be differentiated. Bridges open to pedestrians separate the roadway from the pedestrian walkway with a containment system, protecting pedestrian laterally by a metal safety barrier. Bridges that do not accept pedestrians or in which they are present only occasionally require only a parapet.

Protection for motorcyclists is recommendable in accident black spots.

1. Double metal strip

1. Corrugated sheet metal safety barrier

1. Safety barrier with protection for motorcyclists

1. Concrete barrier. Can be double or single.

1. Approved wood barrier, not recognised in the recommendations for containment systems. Provides the same level of containment as a single metal barrier.

2. Bridge with pedestrian use. Metal safety barrier.

2. Metal parapet

2. Concrete parapet with railing. Can be prefabricated or made on-site, convex or flat.

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General criteria

Indiscriminate placement of barriers should be avoided:

The object is to install barriers as and when necessary, without using them indiscriminately, as they are items with a strong linear impact.

To improve the implementation of changes in barrier types:

Abrupt changes in the barriers should be avoided, making the transition as smooth as possible.

To improve integration with the surroundings:

There are new proposals for types and new proposals for the planner.

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Starting from these, the idea should be to avoid signage becoming an obstacle such that barriers have to be placed around them.

A sufficient safety distance should be ensured, in accordance with the recommendations, to avoid placing barriers. For the same reason, it would be good to avoid deep gutters or protruding drainage items.

Here the barrier is used to protect the user from the sign. Whenever possible, and provided that visibility conditions are assured, the proposal is to move the sign laterally to a safe distance that does not require a barrier to be fitted.

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It would be desirable to avoid placing bridge pillars adjacent to the roadway.

In cases where this cannot be avoided, it is proposed to provide a concrete protection outside the roadway with the minimum recommended length. This will improve the quality of the project and the execution of the structural item, as the protection will be integrated in the structure.

This picture shows the change in perception by introducing the proposal in a real structure.

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As regards abrupt changes in barriers, it is recommended not to change the barrier over short lengths as the project quality and the execution of the structural item will suffer.

Above all, safety must be ensured at all times so structural mechanisms should be sought that offer a safe solution that is better integrated with the landscape, while also avoiding discontinuity of materials when possible.

This real example shows how successive changes in type lead to irrational solutions.

The first photograph shows the abrupt change, both in type and in colour. For this reason, it is proposed to combine. The painted metal parapet with a colour that matches the landscape and the metal safety barrier.

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In certain cases, driving between barriers can create a wall effect for the user.

To provide a more pleasant relation between the road user and the environment it is worth considering the use of other materials with the same level of containment but greater transparency. The use of a new type of containment would require prior approval.

This example proposes replacing the metal safety barrier with additional protection for motorcyclists by a perforated metal plate barrier. This leads to a uniform overall appreciation of the landscape.

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On scenic roads, and to improve integration in the environment, it is proposed to replace the safety barrier with an approved wood barrier, which provides the same level of containment and has a visual result that is much more pleasant for the user.

Comparative example showing the metal barrier replaced by one made of wood, providing a solution that is much better adapted to the surroundings.

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In some cases, it might be a good idea to increase the land compulsorily purchased so as to reduce the slope of the bank, avoiding the need to fit a barrier.

Example of reduction of slope. The recommended safety would have to be guaranteed.

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There are many cases where the barrier could be removed, as it is unnecessary.

This comparison proposes an alternative solution to the corrugated safety barrier: widening the road and placing an accessible verge with marker posts guarantees the user's safety. In this example it is thought that the distance to the tress is safe enough. If the recommendations are not met, the trees could provide a protection component.

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Horizontal signage

Horizontal signage consists of in lines or figures painted on the road surface that gives drivers warning, regulation, guidance and informative messages.

To ensure that the message is properly received and understood, the signage should have a universal design that is easily understood, and have good visibility in all circumstances.

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The aims are

To make driving safer and more comfortable, as well as improving the user's perception and guaranteeing good visibility in all circumstances, at night and in rain, by means of strong reflectance and strict maintenance.

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General criteria

Horizontal signage is one of the most significant items on the roads for the user's visual perception. For this reason, the maintenance of this kind of signage is very important and a proper reflectance and colour should be assured.

The perception of the horizontal signage shows very clear differences between the first and second photographs.

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Regulatory aspects

On roads with two-way traffic, advance warning of the start of a passing lane can be shown by a broken line with the unpainted interval shorter (M-1.9 line) or by a return arrow (M-5.5 mark). For safety reasons the signage should always be with return arrows, mainly on high-speed roads.

Examples of continuous line warnings.

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The joining lanes (acceleration lanes) are differentiated with the separation line (M-1.6 and M-1.7). Because of the great lengths of these lanes, it is convenient to indicate their approaching end by lane-end arrows (M-5.4).

Comparative example of treatment of a joining lane.

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Proposals

Sometimes, the conditions in which bends are laid out increase the risk of accidents.

As a safety measure it is proposed to double the continuous line and introduce an intermediate red line along the bend, increasing the extra width if necessary.

Comparative example of treatment of a dangerous bend.

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In sections approaching access roads, bus stops or lay-bys it is proposed to treat the roadway with marking M-7.1 (hatching), to increase the perception of the approaching access.

Example of road markings before an access.

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In France and Italy, for example, the road space is used for placing horizontal marks that show the recommended safety distance.

Generally, this distance corresponds to two marks, but it can be increased depending on weather conditions.

Examples of roads where markings of this kind are currently used.

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Road surfaces

The road surface is regarded as the basic item of the roads, for which reason its maintenance must be assured.

The road surface has an impact on the visual perception, on the texture and, therefore, on safety.

The state of the road surface strongly influences perception by users who drive on the road. The first photograph shows a road surface in bad condition. The second photograph shows a road surface in good condition.

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The aims are:

To introduce criteria of sustainability, to minimise the impact on the environment and to increase safety.

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General criteria

To study the possibility of using road surfaces with recycled material: recycling of old road surfaces and recycling rubber.

To encourage the use of noise-reducing road surface.

Currently, noise-reducing road surfaces based on M-10 discontinuous mixes or similar are widely used in roads with high traffic intensity, basically with a safety criterion.

The sound-reducing characteristics of these road surfaces should be used to extend them to other kinds of roads, especially in built-up areas.

It would be good to introduce colour criteria in special roads and high-friction treatment with the aim of improving safety in places where necessary.

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Treatment

The use of colour in special roadways such as left-turn lanes or the approaches to a stop noticeably increases the visual perception and safety of these roads.

The colour means that the driver can be warned of a conflict point on the roads. The colour can be obtained with paint or by using coloured resins of the same colour as the aggregate.

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The use of high-friction surfaces is regulated in leading countries in such as the UK (High Friction Surfaces).

Their use is obligatory in high ADIhv (average daily intensity of heavy vehicles) and difficult places (small radii, steep slopes, etc.) They are starting to be applied on the Catalan roads in specific cases with satisfactory results.

Examples of treatment of anti-skid surfaces on Catalan roads. This consists in applying a polyurethane resin on the road surface and then an aggregate. They are spread cold. These coats can reduce the number of accidents, or rather reduce the speed of the impact, because surfaces of this kind have a high transverse friction coefficient (TFC), which allows braking distances to be reduced.

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In very dangerous areas, it is possible to combine the anti-skid road surfaces with the colour based on pigmentation of the aggregate or of the binder (general polyurethane resin).

When the anti-skid system is coloured, the aggregate will be made from calcined bauxite and later dyed with a pigmented resin, which will have the same colour as the aggregate. Paints must not be used.

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Longitudinal drainage items

The drainage discussed in this book refers only to longitudinal drainage, that is to say, systems for evacuating run-off water that falls on the platform and the adjacent land.

The calculations that determine the size of the drainage items should refer to a return period of twenty-five years and a downpour of ten minutes.

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The objectives are:

To evacuate run-off water as fast as possible, to alter the initial environmental hydraulic conditions as little as possible, to ensure that the drainage items do not represent a safety risk to traffic and do not deteriorate the landscape.

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Items to deal with

From the point of view of the visual perception of the roads, i.e. the user's point of view, a distinction will be made between the linear drainage items and the individual drainage items.

Linear items are: platform gutters, gutters at the tops of cuts, gutters at the bottom of a sloping bank, sewers and gutter overpasses.

Individual items are: downflows in cuts, of collectors and manholes and drainage outlets.

The drainage of a road forms part of a global system meant to obtain the maximum effectiveness.

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Linear items

Platform gutters:

They should be clad and transitable to ensure safety. In sections where the hydraulic capacity is exceeded, they should drain into a longitudinal or transversal sewer.

Gutters at the tops of cuts:

The initial and final sections might not fulfil the project and executive quality. It would be good in these sections to provide cladding with stone and shrubbery for connexion with the landscape.

These pictures show the visual impact of the concrete on the crown of the cut. The stone treatment achieves a solution that is much better integrated with the landscape.

Deep gutters should be avoided, instead using gutters that can be crossed.

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Individual items

Gutter overpasses

Use of pipes for these should be avoided. These overpasses should be concrete fords. Wherever possible, a minimum length of 8 m. should be guaranteed. It is also proposed to place standardised marker posts, and to put marks on the roadway, as it is an access.

Comparative example of treatment of gutter overpasses.

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Downflows in cuts

They have a strong visual impact because of their size and the stepped shape necessary to prevent water falling. In very steep rock banks it is proposed to make them with light stone blocks.

Concrete downflows with strong visual impact.

Downflow with a better landscape treatment.

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Drainage outlets

At the drainage outlet of a transverse sewer it is appropriate to widen the embankment extending the berm to a minimum of 2m. To increase the safety of any pedestrians.

Guaranteeing a sufficient distance from the roadway can help in safety and visual perception.

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New proposals

Sustainable drainage systems (SUDS) are meant to minimise the waterproof surface to prevent the concentration of large volumes of water in one place. The purpose is to improve water quality, prevent flooding, improve road safety, and allow filling of aquifers.

Infiltration ditches and wells

These are shallow ditches and wells (1 to 3 m) filled with draining material. They are infiltration structures capable of totally absorbing the design run-off.

Filtering drains

These are shallow drains covered with geotextile mesh and filled with gravel, with or without lower conduit, in which circulates water that comes directly from the drainage surfaces or from a supply pipe. They allow infiltration and lamination.

Replacement of concrete-clad gutter by a sustainable drainage system.

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Green gutters

These are channels planted with grass that lead the run-off water from the drainage surfaces to a storage system or a sewer connection. They are wider, and as well as transporting the water they provide temporary storage, which allows filtration, infiltration, evaporation and evapotranspiration.

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They have a wide base (>0.5 m), broad slopes ($< 1V:3H$) and accept slow speeds ($< 1-2$ m/s).
Infiltration tanks:

Depressions in the land with plant life designed for storing and gradually infiltrating the run-off generated on contiguous surfaces. As the aim is to return the water to the land, these tanks can be installed close to the roads.

Holding tanks:

Surface tanks designed to store the run-off volumes generated upstream, thereby evening out heavy flows.

Real example of application in road CV-50, Valencia province.

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The use of a of sustainable drainage system requires a multidisciplinary planning and design: A geotechnical study of the base must be made to ensure infiltration, as the conditions are not always right for a sustainable drainage system.

The sides must be waterproofed to avoid contamination of the pavement, as surface layers are very sensitive to moisture.

There should be a good system of execution and maintenance to prevent clogging.

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The alternative technologies of the sustainable drainage systems have not yet been consolidated in Spain. Torrential rainfalls with high intensities and short duration have raised questions about their efficiency. But in the USA and Australia, with similar conditions, these techniques are widespread.

Spain has mainly employed retention and/or lamination tanks. The use of filtering drains for longitudinal gutters is also growing. They have been installed on roads under the authority of the autonomous governments (CV-50 in the municipality of Alzira, Valencia) and the central government (north-east motorway A6).

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Land-containment items

Often, because of their height or because of the effects on third parties, topographic conditions are such that differences in height cannot be resolved by means of banks and it becomes necessary to use containment items. These items generally have a striking appearance and therefore a very careful design is needed to reduce their impact as much as possible.

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The aims are:

To improve integration in the immediate surroundings and to improve the quality of the project and of execution of the structural item.

Examples of stone walls that blend in better with the landscape.

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General criteria

It is advisable to use of natural materials in building support walls whenever possible.

Preference should be given to building walls of stone blocks or gabions over other types such as prefabricated walls, whether made on-site or prefabricated.

Special care should be taken with the finishing and the execution. Graffiti should be prevented.

The finishing of the structural item should be studied to minimise its visual impact.

Concrete walls have great visual impact and constitute ideal surfaces for graffiti.

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Walls of natural items

Stone blocks, gabions or stone cladding

The use of stone in the containment items improves the quality of the project and of execution of the structural item.

For walls of moderate height (3-4 m) the use of stone blocks or gabions is always recommendable. For walls of greater height, good integration is achieved with stone cladding on the concrete surface. The use of stone is recommended whenever the setting so requires.

The use of stone blocks or gabions in walls of cuts is always a more integrating solution. When geometric conditions require a very high wall, integration should be achieved with stone cladding.

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Concrete walls made on-site or prefabricated

Vertical surfaces with textures based on horizontal lines help to reduce the perception of height. Vertical surfaces with textures based on vertical lines help to break the monotony of a long wall and reduce the effect of linearity.

To lessen their visual impact, prefabricated walls can be used when dealing with great lengths and moderate heights. On the other hand, with short, high walls the impact could be minimised using concrete walls made on-site.

Sketches of horizontality and verticality perception.

Comparative example of texture use.

Example of handling verticality to break the monotony.

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Handling integration

In conspicuous high surfaces, good integration can be achieved by placing trees and vegetation and a more integrating effect is achieved by concrete with colour or texture treatments.

Nevertheless, care must be taken because often the result is an item that is very artificial and hard to integrate.

Concrete wall with vegetation that helps to improve perception and integrate the wall into the environment.
Surface treatment on on-site concrete wall.

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Acoustic screens

The growing concern for the environment requires considering the acoustic impact caused by infrastructures. The noise generated by modern society in the course of its activities annoys residents and users of the public highway. The desire to live in a pleasant environment where the noise level is moderate is therefore increased.

There is a difference between the measures that can be taken with regard to the emitter and those for the recipient. There are three possible options for reducing noise on the road: lessening the noise of wheels, insulating homes and installing screens.

Acoustic screens often lead to great visual impact because they break the continuity of the environment and enclose the user in the road.

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The aims are:

To reduce the acoustic impact of a road, to reduce the exposure to noise of the buildings close to the infrastructures and to guarantee the quality of the project and execution of the screens.

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General criteria

To improve the quality of the project and execution of the acoustic screens, the general criterion will be:

To try to avoid placing screens from the project phase and to think of the user.

When screens are really necessary, the criteria will be:

To try to avoid a tunnel effect.

To ensure the maximum transparency.

To break away from linearity.

To ensure the maximum integration in the surroundings.

The photographs show the great impact caused by the screens, which do not meet the above-mentioned criteria. However, their transparency should be appreciated. The incorporation of vegetation into the screens is a good technique for achieving better integration.

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Proposals for lessening noise

It must be remembered that roads on slopes produce a greater sound effect. The use of porous road surfaces can reduce it by up to 3 dB(A) and the use of high-adherence surfaces can raise it by up to 3 dB(A).

In general conditions, an earth bank provides a 1-3 dB(A) reduction. Plants can offer up to 10 dB(A) attenuation in 15 metres of thickness. Thus, the possible measures for lessening sound at the point of emission are: raising a longitudinal bank, natural screens, draining pavement or artificial screens.

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Types of screens

Transparent module screens

The air noise sound insulation index can be more than 25 dB(A). There is little interference with the surroundings. They reflect sound to the other side. Their light reflection must be controlled as it can be dangerous. They need maintenance and have a short and specific lifespan.

Use: bridges, locations near isolated dwellings with no homes on the opposite side, high parts of other types of screens.

Concrete module screens

The absorption index can reach 4-5 dB(A). Special designs can be created.

Good insulation, easy maintenance, long-lasting. Visual blockage.

Use: areas of great stability in soil/foundations, a requirement for long lifespan.

Metal module screens

The acoustic absorption index can reach 13 to 14 dB(A).

Little reflection. Light and easy to maintain. Panels can be supplied in the different colours of the RAL range. Visual blockage.

Use: bridges, tops of banks, locations close to traffic lanes with no homes on the opposite side, high screens.

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Wood module screens

The acoustic absorption index can exceed 8 dB(A). High absorption.

Great landscape integration. Costly to maintain; fire hazard.

Use: areas of specific integration into the surroundings.

Plant-tub screens

Low level of acoustic absorption. Items prefabricated in concrete, ceramic or wood with spaces for putting earth or gravel, and plants.

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Ecological screens

The acoustic absorption index can reach 4 dB(A). They do not need maintenance.

Types: absorbent board made of textile products and rubber. Green screen of reinforced earth.

Absorbent treatment

Cladding, made of modular metal panels or compressed gravel, highly absorbent and prevent the sound level rising.

The acoustic absorption index can reach 13 to 14 dB(A).

Use: when the reflections of the sound waves on the surfaces of reflecting walls cause a great rise in the sound level.

3. Individual perception items

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Legibility of pictograms

Pictograms constitute an alternative language to words, especially in information with international scope. Care should be taken with this language, in increasingly widespread use, because the road network of the Generalitat de Catalunya is used by an increasingly large number of tourists who are not familiar or do not understand sufficiently well our language.

The design of the pictograms should be clear and legible, expressive and symbolic. The samples illustrated on these pages belong to different styles and are only shown as examples:

1, cultural symbol; 2, tourist symbol; 3, industrial symbol.

At the same time, the repertoire is hard to resolve and thought should be given to the possibility of employing the most capable design and illustration professionals on each occasion.

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Proposals for signage

In the design of signage and information of routes, the following main criteria should be followed:

1. Communicative efficiency
2. Reduction of environmental impact.

Both characteristics can be formalised with the greatest potential for graphic innovation, though innovation should be not only in the forms, but especially in the contents.

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Typography

Without changing the upright type established by international convention, the typeface could progressively tend towards Helvetica, currently the most recognised typeface, as can be seen in some new signs, particularly in the Barcelona ring roads.

In presenting the information, the choice is between upper and lower case (large and small letters), also recognised internationally for these requirements, emphasising functionality and efficacy, gradually removing signs in upper case (capital) letters, as they are clearly worse in terms of legibility, which should be the overriding argument in highway information.

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There is also the possibility of assessing the characteristic typographical versions of the recommended typeface family (45, 55, 65, 75), using the natural thickness of each version to express the distance of message from the driver, visually reinforcing the closest exit.

In this order, the version Ultra Light (45) would be appropriate for more distant signs and, obviously, the version Black (75) for the closer ones. Between them, the successive distances would still have, Light, Roman(55), Medium(65) and Bold versions of the Helvetica typeface.

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For the general typeface the Roman version (which is in fact used in the Barcelona ring roads) would be good; it is very easy to read in negative and has light visual weight, which is a great help in reading alphabetic signs. Certain information (for example, locations at great distance from each other) might make it strategically preferable.

In any event, it would be good to take advantage of the typographic logic which, for more than half a century, has established different thicknesses and consequently differing visual weights to highlight or reduce the presence of information or wording of variable importance.

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The repeated presence of direction arrows leads again to the impeccable logical history of typography. Each version of a letter has a corresponding set of typographic accessories (among which are the arrows), made with exactly the same outline and the same thickness as the typographic signs of the font. This is illustrated with examples of Helvetica Roman (55) and Medium (65).

In this way, clear and easy reading of all the information would acquire absolute coherence and allow smooth reading, at a glance which is how a text is usually approached: taking from one to three words at the same time, and two or three lines at once. In fact, the luminous arrows that indicate speed at tunnel mouths already have a fine outline very similar to what is proposed in the Style Guide.

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Another important question in making reading of the written information on the roads clear, fast and efficient is to set an optimum lay-out of the wording on the support.

This example shows an elementary principle of composition. In wording consisting of two lines, the line spacing must always be less than the top, bottom and side margins. Otherwise the wording is choked by the edges of the support and each line of text tends to separate from the other, identifying itself with what is closest: in these extreme cases, the edges of the sign.

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The colour of the supports on the road network

Colour is the third language of visual communication, along with typography and pictography (or image, in a more general sense), and should play a double role: aesthetic and informative.

Simply in terms of effective reading, and more so with two different simultaneous languages, pictography and typography, it would be best for the colour always to be the same for both forms of information to avoid visual jolts and shocks for readers' eyes. This colour can be white, for example.

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On the conventional earth colour, on which this kind of standardised cultural or tourist information is presented in most of Europe, it is clear that white is much more visible and makes a bet-

ter contrast than black.

As a suggestion, whenever one item must be separated from another (written information from pictographic information, or vice versa), rather than showing the difference with colour it can be done with size. These examples show that this can establish very clear differences.

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Supports on the road network

Clear, fast, non-hierarchical reading can be perfectly achieved in view of these examples: the pictograms occupy the same height as the alphabetic signs, and also have the same colour, and yet they are not only not confused but can be read fluidly, one after the other, as it should be. The immense morphological difference between the two languages (pictographic and typographic) is enough to mark the differences.

They are different languages, different codes, and different icons. The reader knows this without being aware of it, by force of habit.

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“Whenever possible, left-justify”

This piece of advice included in a booklet published by designer Enric Jardí, with another twenty-two good ideas, should be the rule in highways information.

In the West we have been brought up to read from left to right and from top to bottom since the age of three or four. This means that when sight is directed to a particular support to decode its content, it goes first of all to the top left, in both side and high panels. So, in order to stimulate the efficacy of road information, the advice on the composition of wording could not be more basic: “Whenever possible, left-justify”.

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Supports for reading at ground level

The repertoire of supports can perfectly well be completed with a kind of advertising poster with an exceptionally vertical format.

Designed to be attached to the ground (here we refer only to the panel), the posters allow a relaxed and longer reading provided, that they are placed in the traditional recreational or waiting areas such as rest areas, public transport stops and service stations.

120 x 180 cm. panel.

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These kinds of support are perfect for providing tourist and cultural information as and when necessary, with the typefaces, pictograms and colours common to the other signage. In fact, there are already some common elements in the earth colour, the coloured strip at the top showing the route or land, the Helvetica font and any necessary complementary pictograms.

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Kilometre markers

A simple identity scheme for new kilometre markers would propose, as the first and perhaps only distinction, the detail of painting almost all the marker in the colour of the category of the roads in question (motorway, basic network, district and local).

Typographic and chromatic unity, as well as left-justified composition, would provide a good cohesion in identity with the other road signage.

3163. Individual perception items

PAGE 87

As this sample shows, the different colour is enough to distinguish the categories clearly. If, in addition the composition of the typeface were grouped in a single bloc and only bodies differentiated the wordings, the identity would be highlighted naturally, with no loss at all of internal coherence.

PAGE 88

In fact, everything seems to indicate that the kilometre markers could be the principal characterising feature of the Catalan road network.

The pictures that illustrate the possibility of action in this regard are, however, only suggestions. Naturally, another distinctive point could be the design of the item. A design that could, with very little effort improve the current standards, which are used in the road network in all of Spain.

PAGE 89

The use of two colour shades is justified in this example simply because the yellow allocated to the local road network would be too light for the white of the letters to work properly. So, in the same way that a reasonable solution can be found for integrating this local marker with the rest, the opposite can be done: the other markers can have two colours instead of one.

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PAGE 93

Overpasses

Overpasses are structures that allow passage over another transport or communication route. These structures have great visual impact, so it is necessary to set out the design criteria that will minimise this effect.

An overpass should generally integrate into its surroundings and its shape should inspire tranquillity from an aesthetic and static point of view. Except in most unusual cases, the shape and colour of the structure should avoid prominence in its environment.

PAGE 94

The aims are:

To minimise the visual impact by lightening the structure, achieving better quality of project and of execution of the structural element and to guarantee aesthetic and static quality.

PAGE 95

Perception of the work as a whole. General criteria

Maximum lightness of the structure.

The sensation of lightness of the structure is set by the ratio between the edge height (h) and the vertical drop (H).

It is recommendable to use a ratio of $h/H < 0.20$ from the point of view of aesthetic proportions.

It is recommended to consider the convenience of including several spans to reduce the edge.

PAGE 96

1. The structure has been made with a single span so the edge is excessive.
2. Planning a three-span structure reduces the edge and gives an appearance of lightness.

PAGE 97

Maximum transparency

Seeking the maximum transparency always helps to reduce the impact of the Work and eases its integration into its surroundings. Taking this point into account, whenever possible structures with open supports should be used as they are more transparent.

So: Area of opening in work with open support.

St: Area of opening in work with closed support.

So = 1.8 St

PAGE 98

1. The closed concrete support has a great impact and does not meet the criterion of transparency.
2. This three-span bridge achieves greater transparency.

PAGE 99

Maximum integration with the environment

The maximum degree of integration with the environment can be achieved in two ways: the colour and the shape of the elements (pillars, supports etc.) The bridge must not be conceived separately from its immediate surroundings.

Absolutely non-integrated work. The shapes of the pillars have no relationship with the immediate surroundings. bridge well integrated to the surroundings. The colour is not overwhelming and the structure stands out for its shape.

PAGE 100

Structural types

According to these criteria, the following recommendations are made:

Structural types in building overpasses should be continuous girders of 2, 3 or 4 sections and the spans should be made of isostatic sections.

1. The spans of prefabricated girders sometimes need edges too far apart.
2. The girders, with their camber, make it hard to adapt to the ground level.
3. A continuous span allows much smaller edges.

PAGE 101

In principle, it is preferable for overpasses to be built with continuous spans as, among other reasons, they have the following advantages:

They are lighter, because the edge can be made smaller; simplification of the pillars, and greater capacity for adapting to the route in ground plan and elevation.

1. Girders often require heavy pillars.
2. A continuous span adapts better to the route.
3. Continuous spans allow simpler pillars and making them lighter and more transparent.

PAGE 102

Distribution of pillars

As far as possible, central positioning of pillars should be avoided as they often decrease visibility. Good matching of an overpass structure is achieved with a continuous three-part span, open supports and a ratio of openings between the central and side section close to 1.5.

The central pillar can be avoided with a continuous structure.

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PAGE 103

In four-lane dual carriageways (two in each direction) and a small central reservation, it is easy to have a central opening with a light structure. In three-lane carriageways spans that are too slender are often used, and there is no solution other than placing a pillar in the centre.

1. A two-section structure, probably with the same edge, would avoid the visibility problem.
2. Very well resolved structure. The excessive drop is used to give more edge and make a single-section structure.
3. Well resolved structure. The great width in the centre makes a normal structure with a central section impossible.

PAGE 104

Colours

Three types of colours are considered:

Neutral colours: they can be used in any landscape because they are integrating colours.

Mimetic colours: these are colours that allow the structure to pass unnoticed by blending in.

Identifying colours: these stand out from the others for their brilliance and confer special prominence on the work.

It would be preferable for metallic items to be painted with neutral or mimetic colours.

In this chapter the planner will find proposals for colour selection.

Neutral colours

NCS-S-0500-N white

NCS-S-1000- N brut white

NCS-S-1500-N light grey

NCS-S-3502-B -mid grey

NCS-S-4502-B dark grey

PAGE 105

Mimetic colours

NCS-S-4020-Y10R greenish beige

NCS-S-5030-Y50R terracotta

NCS-S-5010-G50Y moss green

Identifying colours

NCS-S-5020-G10Y green NCS-S-3030-R80B blue

NCS-S-4050-Y90R red

NCS-S-6030-Y70R reddish brown

PAGE 106

Barriers

Improved safety in the containment systems has led to the design of increasingly powerful items on bridges.

The current trend, especially in divided roads or those with high traffic load, is not to protect a possible pedestrian who crosses a bridge and only has a footway next to the railing. On urban or semi-urban bridges a space should be reserved for the pedestrian and a double system of barriers created.

This photograph shows how the bulging concrete parapet gives the bridge an unappealing shape.

The straight concrete parapet seriously damages the impact and visual continuity.

The second and third photographs show how a finishing with two faces and well-sloped end gives a much better-integrated solution.

PAGE 107

The parapets that are marketed (bulging or flat concrete parapets or metal parapets) always give a feeling of a heavier span and do not meet the aforementioned design criteria.

The metal parapet offers a lower level of containment and gives a lighter sensation, though it is still a visually potent barrier.

PAGE 108

Barriers, new proposals

As alternative proposals to improve the integration of barriers on bridges, it is proposed to: Build a wider span and push the barrier back to highlight the edge of the slab and give texture to the barrier.

This example shows two different mouldings that help to give texture to the barrier and improve its appearance.

PAGE 109

Overpasses: lighting, new proposals

In long bridges it can be difficult to place lamp posts because they can break the continuity of the barrier. It is proposed to integrate the lighting into the barrier along the span at a distance of approximately 6 m.

These pictures show perception at night with the new proposal for illumination.

PAGE 110

Vertical faces on walls

Very often, geometric conditions require planning of closed supports with vertical walls with a strong visual impact. In such cases, care should be taken with the finishing of the structural finishing which often help to minimise this impact. There are criteria on the treatment of the wing walls and of the concrete finishing, which can help to improve the quality of the project and the execution of the structural item.

These photographs show the strong visual impact of the walls.

PAGE 111

Positioning of wing walls

Positioning wing walls at right angles often produces least impact. The different orientation of the two concrete planes minimises the visible surface. The arrangement of the wing walls prolonging the support wall is often the worst; it increases the wall effect, and also the exposed concrete surface.

This example shows how the right-angle wings minimise the impact.

PAGE 112

Concrete finishing

The finishing of the concrete is a fundamental item, especially with closed supports where there is a large seen surface vista. Special care should be taken with the quality of the moulding. On seen surfaces, the project should define the type of moulding, the quality, the lay-out, etc.

Examples of different concrete finishing that help to integrate the support.

PAGE 113

Waterproofing the extrados:

Good waterproofing and good drainage of the extrados would prevent seepage to the seen face. Arrangement of selvedges:

In high walls, the horizontal arrangement of the selvedge softens the visual impact.

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PAGE 114

Underpasses

When a local path or road passes under a more important road, the solution often adopted is to build a narrow structure called an underpass, which is longer than it is wide.

However, there is always the problem of facing the entrance with walls that are usually of concrete, whether made on-site or prefabricated. If not properly treated, this item can devalue the quality of the underpass.

Building underpasses sometimes creates dark, narrow places where a tunnel sensation predominates.

PAGE 115

The aims are:

To make the underpass feel more open and set guidelines for underpasses to improve their quality of project and execution, and also to make them more pleasant for the user.

Long underpass with natural light.

PAGE 116

General criteria

Take steps to maximise openness and the entrance of natural light; improve the structure's integration into the surroundings, and set guidelines for choosing the best type.

PAGE 117

Treatment

Underpasses under divided carriageways are often long. In these cases, it is good to leave a little light in the middle and provide comfortable passageways for pedestrians.

Underpasses under double carriageways are often more than 30 m. long. If the central reservation is wide enough, natural light should always be allowed to enter.

In longer underpasses, a space should be reserved for pedestrians. A good solution is to raise this space above the roadway.

PAGE 118

When the underpass has a certain importance or the geometrical conditions so advise, it is quite acceptable for the structure to be more airy and to use a continuous three-section girder.

Example of a good outcome in obtaining more openness by using a continuous girder.

PAGE 119

If the earth cover is very great, vaulted structures could be used, which are mechanically more appropriate and also more visually attractive.

Underpass with vaulted concrete prefabricated structure, offering a better integrated solution.

PAGE 120

In concrete underpasses, the springer is fundamental item that gives coherence to the whole (wings and frame) while helping to conserve the upper parts of the walls.

Examples of underpasses where the springer does not do its job and where the wings are also unprotected. The result is an aesthetically displeasing image, where water can be seen seeping through the concrete.

PAGE 121

Examples of good treatment of the springer, with a much more aesthetically pleasing image.

PAGE 122

With architectural treatment of the vertical faces of the underpass and by using more natural materials such as stone, the structure can be made to seem airy with a reduced visual impact.

Examples of good architectural treatment. It can be seen that the visual result is much more attractive and the structure integrates better into its surroundings.

PAGE 123

When the span is made of prefabricated girders an overhang should always be left after the last girder to give the structure lightness. The edge of the compression slab should never be next to the wing of the girder.

Comparative example. In the first photograph no overhang has been left after the last girder, making an underpass with an unpleasant appearance. In the second photograph the use of an overhang added to the springer gives a much more agreeable outcome.

PAGE 124

Roundabouts

Resolving the problem of traffic management at the intersection of different roads by using a roundabout alters the road's linear layout.

The design characteristics are wide open for the planner, which leads to a lack of uniformity of the built items. In these intersections in the Catalan roads, one finds many different roundabouts, along with unresolved problems that affect safety, visibility (by day and by night), dazzling, as well as formal issues such as a common identity.

PAGE 125

The aims are:

To have uniform building criteria, improve perception and improve safety.

PAGE 126

Global conception

The criteria to follow in the global conception of roundabouts are:

Trying to achieve regular geometries:

The roundabouts should form part of a single plan.

Trying to rationalise the treatment of vegetation, especially in the central island.

Trying to improve the treatment of lighting.

The slope must not be greater than 3-4%.

PAGE 127

Treatment of the items

Central zone

Elevation above the roadway: a height should be ensured that that is slightly above the line of view from the vehicle to prevent dazzling and improve perception.

The height should not block tangential lines of view, ensuring instead continuity of circulation.

PAGE 128

Central zone

Internal treatment: low-maintenance green treatment is recommend.

If there are trees priority should be given to indigenous species.

Special treatments: consideration should be given to special items such as sculptures or inclu-

3224.Single items

sion of a special design in this space. In such cases, a pre-project would be necessary to resolve the proposed formal solution, which would have to be approved by a competent commission of experts appointed for the purpose by the DPTOP.

Roundabouts $\varnothing < 40$ m. In small-diameter roundabouts there must be an internal ring and apron.

PAGE 129

Perimeter ring

This is the ring surrounding the inner perimeter of the passable zone of the roundabout, with a slight slope. It is regarded as a highly identifying item.

The transition with the apron should be smooth. It is recommended for it to incorporate a system of marker posts. The construction material is left to the planner's choice.

An example showing the following proposal:

The dimensions of the inner ring should be proportional to the diameter of the roundabout.

Roundabouts $\varnothing > 40$ m.

In large roundabouts there is no need for an accessible zone, so there would be a verge and a ring.

PAGE 130

Apron and deflector islands

The apron is all of the verge and road surface accessible from the internal perimeter of the roundabout. The apron and deflector islands should be treated with the same road surface and with a differentiating colour. The apron should meet the minimum standards for width, and the deflector islands should have the maximum surface to allow placing of vertical signs.

Example of treatment of roundabout, apron, islands, ring, and vegetation.

Signs should not be placed directly on the roadway.

PAGE 131

External zone

The external zone is the outer perimeter of the roundabout. An extra width (berm) of at least 1.5 m. should be ensured so that the roundabout gains in presence and safety is increased for any possible pedestrian.

Proposed materials are those that avoid uncontrolled growth of vegetation.

PAGE 132

Lighting

The general criterion to be followed for lighting of roundabouts should be the installation of perimeter lighting.

This leaves the central zone free, makes the roundabout simpler with indirect marking and lower lamp posts. The internal lighting should be ornamental and always in accordance with the criteria of the Environmental Management Law for external lighting for the protection of the night-time environment.

The internal lighting of the ring will be ornamental and can be used to highlight the plant life or sculptures.

PAGE 133

Example of treatment

With the treatments described above, an example is shown of the overall appearance of the roundabout with the treatment of each of the items:

Plan of the items.
Daytime approach to the roundabout.
Night-time approach to the roundabout.

PAGE 134

Bus stops

Along the Catalan roads there are bus stops with unresolved relations with the road. They are often unsafe for the public transport and the road user. The space for the bus stop should be comfortable and the access should be resolved safely and with good view.

Actual examples of bus stops. They show the lack of comfort and poor view.

PAGE 135

The aims are

To offer a comfortable space with a minimum of equipment, to improve the perception of the stop and to provide safe access routes for pedestrians.

PAGE 136

General criteria

To dignify the place:

This means providing a place that is pleasant and comfortable for the user.

All stops should have shelters and pole stops should be eliminated.

Increasing short and long-distance perception:

This means introducing signage items such that the user can see the road, thereby ensuring safety.

Studying the routes of transport users and guaranteeing safe access:

This means that pedestrians approaching the stop should walk as little as possible on the road or the verges and preventing them from doing so in conditions of poor visibility.

PAGE 137

Treatment

The treatment under these criteria requires acting on the road surface, the access verges, the vegetation and the furniture.

The access verges could be painted with zebra striping for about 20 m. to increase their perception. The area of the stop should be asphalted and the place should be pleasant for the user.

PAGE 138

The planning of a bus stop should include an access study for pedestrians and cyclists from the closest built-up area. It is recommendable for the route to be segregated and protected.

PAGE 139

Lay-bys

Lay-bys are the areas that road users find while driving.

They add to the comfort of the road, and also the comfort of driving and stopping. The user can use them as a safety area in an emergency, for resting and for short stops. Moreover, lay-bys in certain places allow the user to appreciate the cultural, landscape or geographic interest of the journey.

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PAGE 140

The aims are:

To enhance user comfort during the journey by making it easier to stop, offering a comfortable space with a minimum of equipment and improving the perception of the stopping places.

PAGE 141

General criteria

Providing the possibility of placing lay-bys:

The idea is for the user to find a place to stop every few kilometres, on both the primary and secondary networks. This chapter will not deal with stopping places on dual carriageways.

To dignify the place:

This means providing a place that is pleasant and comfortable for the user.

Increasing short and long-distance perception:

This means introducing signage items to enhance perception on the part of the road user, thereby increasing safety.

PAGE 142

Treatment

This chapter will deal with stopping places for short stays.

The items to consider in the treatment to meet the design criteria should be: horizontal signage, road surface, furniture, road separator and vegetation. The approach roads to the lay-by could be treated with road marking M- 7.1 for a length of approximately 20 m.

Comparative example showing the treatment.

Acceleration and deceleration lanes should be provided to the extent that this is possible.

PAGE 143

Treatment of short-stay stopping areas

Short-stay stopping areas are places where the user stops for a moment because of some incident, to read a map, to rest and so on. They should be placed quite frequently.

There should be space for two cars to park, indigenous vegetation placed at the back of the area, parallel to the line of the roadway and with a signpost. There is no need for lay-bys on the secondary network to have acceleration and deceleration lanes; it is advisable that those on the primary network have them. The area should be separated from the roadway by a 15-cm. white line.

Virtual plan of the elements to include in a short-stay lay-by.

PAGE 144

Access roads

The Catalan roads have many junctions with access roads to private property or roads that join the main road abruptly. Safe access to the general road is not usually well resolved and for that reason it is thought that the entry of these accesses should be resolved constructively, and that they should form part of the highways project.

PAGE 145

The aims are:

To integrate the accesses to the main roads progressively, making them safe and pleasant for the user; to increase their signage in order to enhance their level of protection, and to improve the night-time perception of the access.

PAGE 146

General criteria

To dignify the access road

This means giving the access road a certain presence in its connection with the road.

Increasing short and long-distance perception of the access.

This means introducing signage items to enhance the user's perception of the main road, enhancing the sense of safety.

An access road should not be a foreign item, disconnected from the road; instead, it should form part of it. The signage and the road surface dignify the access, while increasing its perception.

PAGE 147

Treatment

The treatment of the access road under these criteria is as follows:

Marker posts

It is recommended to place marker posts that delimit the entry to the access road and increase its short-distance perception.

Approved reflecting posts should be used.

Plant life

Trees planted along the access road could help to increase its long-distance perception.

PAGE 148

With the established criteria to increase safety whenever possible, the entry points to access roads should be asphalted for about 15 m. as a continuation of the main road.

PAGE 149

The approach to the access road could be painted with road mark M-7.1 for 20 m.

This is an example of complete treatment of an access road marker posts, asphaltting, road markings and vegetation.

PAGE 150

Tunnel mouths

The mouth is the only part of the tunnel that is seen from outside.

Building it often involves important vertical cuts in the land. Because of the impact that such cuts can cause, the planning of a tunnel should allow for the treatment of the mouth such that it is integrated naturally into the countryside.

The aims are: to improve the integration of the entrance into its surroundings and improve the external perception of the tunnel.

Example of tunnel mouths.

PAGE 151

General criteria

Whenever possible, the tunnel should be made to extend artificially beyond its natural mouth so as to restore the original slope.

If this is not possible, there should be a special treatment of the mouth with regard to its potential visual impact.

The artificial extension of the tunnel allows original hillside to be restored.

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PAGE 152

Treatment

The slope above the artificial section of the tunnel should be 3H:2V to ensure stability and allow planting of indigenous species.

If the upper slope is steeper, treatment with natural items such as stone blocks can be applied.

A good stone to lessen the slope of the mouth.
Explanatory diagram of the treatment.

PAGE 153

In any event, nothing should be left visible of the original excavation made to prepare the attack front.

Extreme cases are those in which the artificial tunnel section is not built.

In these cases it may be that there is a rock massif and the attack front is prepared naturally, or that some kind of building is made that affects the entry to the tunnel. Generally, this solution is adopted for special tunnels.

The mountainside has been partially restored.

PAGE 154

The mouth of the tunnel should be integrated with its surroundings, provided that topography permits this. Plant life could be used for integration or a mouth structure could be designed that allows for integration of these external items.

This example shows how the mouth is very well integrated.

PAGE 155

Proposed treatment

Ground plan.
Longitudinal sections.
Cross sections.

5. Landscape items

PAGE 159

Landscape items

The technical conditions of the roads impose rules on the land that they cross. At the same time, they generate their own topography superimposed on the natural relief. This topographical adaptation can have a great impact, but can also offer a new approach to the landscape. The roads not only provide access; they are ways of getting to know the land and of appreciating the countryside.

PAGE 160

Landscape items to be considered in the project

In the roadways project it would be of interest to include landscape studies to find out which items form the landscape, identify the items of interest and enhance the best views, the landmarks and the relevant corrections.

The landscape items to be considered in the project would be:

The landscape as an additional design condition in planning the route and the elevation, the geometry of the slopes and the vegetation as an item that can aid integration.

The integrative conception of the roads and the environment should not be limited to roads that cross special areas, it should apply to all roads.

PAGE 161

The landscape: a project item

The landscape should be regarded as a quality objective of road design and should follow a natural line, giving rhythmical continuity to people driving through it.

This is possible if natural contours are followed, using gradual vertical and horizontal links and integrating the external items into the road. Irregular, curving shapes are more compatible with the countryside. Thus, successful design requires designers to be capable of evaluating their proposals as well as cost and functionality. The natural qualities of the landscape must be reflected in the alignment.

PAGE 162

The aims are:

To improve the quality of the project and the execution of the structural item, to conserve the properties of the environment, to follow the natural contours, to fit in with the topography and to achieve good co-ordination between vertical and horizontal alignments.

PAGE 163

A large number of cuts or embankments or steep slopes should be avoided, and the road should not cut valleys, with successive crossings of river beds, to avoid breaking the harmony between road and landscape.

The alignment characteristics should be chosen such that the road is forms part of the landscape as much as possible. Bends can accentuate sightlines provided that safety is assured.

Passing near natural items while respecting ecological values such as forests or rock formations can enhance the feeling of insertion.

The alignment can give prominence to structures, bridges for example, thanks to sightlines.

PAGE 164

Choosing a good route can minimise the environmental impact of the road.

As far as possible, the road should not stand out in the horizon. But if routing it over a dividing line avoids towns and villages in neighbouring valleys, it may be beneficial.

The valley is totally cut in two by the road.

The road does not divide the valley and is partly hidden.

PAGE 165

Route and elevation

Some of the criteria for good design are: bringing vertical and horizontal together in length and maximum and minimum points, avoiding successive vertical curves in straight alignments and planning enough separation between consecutive curves.

Considering ground plan and side view separately makes road planning easier, but can lead to perception problems for drivers. The planned route should be easy to drive without disorienting the driver.

Example of ideal co-ordination with the landscape.

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Examples

Examples of poor co-ordination between plan and elevation

Single ground alignment that has a short concave or convex vertical link.

Loss of sightline.

Side view of alignments showing two concave or convex links simultaneously.

Other examples of poor co-ordination.

PAGE 167

In the elevation, the transition between the roadway and the existing landscape shapes ought to be as smooth as possible.

In cuts and embankments the parabolic shapes lend continuity to the landscape, avoiding sharp angles and turns.

A sloping transition can help to round off banks and integrate them in the contours. In dual carriageways, treating them as independent items can be useful in minimising their impact and adapting better to the terrain.

Treatment of separate carriageways.

Rounding of bank with sloping transition.

PAGE 168

Examples of adaptation to the terrain

These comparative examples show in image 1 a shorter route but with more cutting, whereas image 2 shows how a shorter route with less work adapts better to the landscape. Images 3 and 4 show how increased excavation (4) can enhance adaptation to the pre-existing environment.

PAGE 169

Geometry of slopes

The planning of a new road can generate slopes in cuts and banks, especially in sections that pass through mountainous and steep areas. They can generate a greater impact on the landscape if their treatment does not allow the new forms to integrate into the existing topography. For that reason, steps will be taken to integrate slopes into the existing countryside and better adapt them to the terrain.

Consideration will be given to the option of building false or natural tunnels when the cuts for excavation and turning have a great impact on the landscape. Revegetation techniques can ensure a aesthetic and integrating function, while protecting the new surfaces.

PAGE 170

The aims are:

To improve transverse perception, to improve the aesthetic quality of the landscape, to control the effects of erosion, to adapt the elevation to the landscape, to stabilise, to protect cuts and banks, and to revegetate degraded areas.

PAGE 171

The slopes generated on the roads represent a discontinuity in the environment.

As far as possible, discontinuities should be eliminated and smooth transitions ensured. It would also be good to avoid creating slopes with large areas.

In short, this requires improving the quality of the project and of execution and thus represents

a technical problem of revegetation and stabilisation. The techniques can be consulted in the chapter on vegetation.

Very steep cuts that generate a great transversal discontinuity.
Large cut unprotected by vegetation.

PAGE 172

Criteria for reducing discontinuities

The criterion to be followed in the treatment of banks should be:

Reducing the slope whenever possible (ideal 2H:1V).

Advantages: less erosion and more practicable slopes for revegetation.

Drawbacks: more volume of land and more compulsory purchases.

Demands: revegetation whenever possible.

The berms on the tops of the banks increase the sensation of width.

PAGE 173

The criterion to be followed in the treatment of cuts should be:

Reducing the slope whenever possible (tending to 3H:2V).

If the slope cannot be reduced, it can be made smoother with walls at the base of the cut.

An attempt will be made to avoid perfect cuts that clash with the natural forms.

An attempt will be made to avoid creating large surfaces.

Large cut without treatment.

Treatment of the large cut with revegetation techniques.

PAGE 174

Walls at the foot of the cut reduce its apparent height, allowing the slope to be less steep, so that the banks are more practicable and offer control of slipping.

Building materials: stone blocks, gabions or green gabions.

Treatment with green gabions during execution and in the first phase of plant growth.

PAGE 175

Walls at foot of cut

1 and 2. Treatment foot with stone block gabions during execution and in the first phase of growth.

3 and 4. Treatment with stone wall.

PAGE 176

In cuts with $H > 10$ m. the possibility of using berms will be studied.

The height of the berms will depend on the kind of land.

Advantages: less erosion, better drainage and possibility of planting the berms.

Drawbacks: more excavation.

PAGE 177

Other criteria could be:

Extending the berms at the foot of the cut to reduce the angle of observation with respect to the visual barrier represented by the vertical bank. This also represents an improvement in safety against possible slides.

Smoothing the overburdens of slopes in cuttings so as to allow a transition slope between the bank and the natural land.

Integrating ditches at the top of the slope and naturalising them.

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PAGE 178

When artificial tunnels are built, it is recommend to replace the natural land and not to generate new vertical banks over the cut, either transversal or longitudinal.

The tunnel mouths and the false tunnels represent a frontal view for the observer from the road. To avoid landscape impacts and ensure maximum safety from slips, it is recommend that the mouth can extend beyond the front surface, giving a smoother and more stable slope.

PAGE 179

Vegetation

The roads must be made in relation with their surroundings, and the technical requirements must be reconciled with the landscape. A linear, normally strictly parallel item is inserted in a set of flowing, open forms. Planting vegetation is a way of getting away from this solid conception and it allows the driver to read the road and have an idea of where he is and what awaits him. Thus, a link between road and landscape that increase the smoothness and interest of the journey.

PAGE 180

Highways projects should include a study that assesses the possibility of placing trees and bushes. This study should provide a specific analysis of the vegetation of the area, the different kinds of landscape, the surroundings environments with greater visibility and the built items with most impact. Indigenous or naturalised species will always be used. Plantations can be useful in giving continuity to natural plant masses, restoring the environment, showing landmarks, contrasts, screens, concealments etc.

PAGE 181

The aims are:

To orient the driver, to mark bends, to act as an acoustic screen, to protect from dazzling, to hide unpleasant views, to favour the perception of roundabouts, intersections, and overpasses and to treat bare surfaces.

PAGE 182

Plant items to consider in road planning are:

Arranging trees alongside the road:

To integrate the roads with the environment and as an identifying mechanism.

Revegetation and stabilisation of the bare surfaces generated by cuts and banks: to integrate the roads with the environment.

Longitudinal planting, making the journey more pleasant and hiding views.
The plants are included in the road, which penetrates into the environment.

PAGE 183

Criteria for placing trees

The regulatory criteria for placing trees along the roadside are:

The planting distances, the effect on the area from which they can be seen and requirement for containment systems.

Elevation: if the height of the esplanade is < 1.5 m., the proposal is to plant as in the picture.

PAGE 184

Elevation:

If the height of the esplanade is > 1.5 m, the esplanade could be made larger for the planting, as well as increasing compulsory purchase and varying steepness of the slope.

Decreasing the steepness of the slope.
Increasing the esplanade.

PAGE 185

On conventional roads, both straight and curving, if the distance from the road edge to the tree line is less than 4.5 m. it will be necessary to place a safety barrier.
In cases where it is considered appropriate, an approved wooden barrier could be used.

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Longitudinal section: the bends are marked by the trees planted on the outer radius.
The trees also act as a marker system. In straights, the plantations do not reinforce the parallelism of the road.

Example of landscape-integrated marking:

1. Current state, bend marked with vertical signs and corrugated safety barrier.
2. Intermediate step, placing wooden barrier.
3. Proposed state, bend marked by tree line and wooden barrier.

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Central arrangement of tree items

The vertical items arranged continually in the central reservations enclose the road in a tunnel.
The use of intermittent planting, in series of separate blocs and playing with the incline helps to give it plasticity.
In this way the horizontal sightlines are not obstructed and dazzling is avoided. If the width does not allow manipulation of inclines, a green wall with a continuous line will not be created.

Lay-out of trees on bends.

Central reservation diagram.

Arrangement of shrubs in the central reservations, incline and separation to avoid the barrier effect.

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Planting in individual items

Planting in rest areas, accesses, roundabouts, viewpoints etc. is important as a way of integration with the landscape and as an identifying item.
It is important to understand the road as a whole and approach the landscape.

Long-distance perception of access road because of the plantation.

PAGE 189

Revegetation of slopes

The factors that influence revegetation are:

Type of slope (cut or bank); incline; orientation / exposure of the slope; length; water availability, conditioned by precipitation levels; temperature / humidity; method and time of execution, and physiochemical characteristics.

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Techniques for revegetation and stabilisation of slopes:

The origin of the leaf mould should be indigenous, so as to provide seeds with the ecological conditions of the environment.

Where there is topsoil:

If the angle of the slope is practicable < 3H:2V:

Techniques for manual and motorised sowing.

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Techniques for planting clods / turf and bioengineering.

If the angle of the slope is not practicable > 3H:2V:

Techniques for sowing: hydrosowing and high-density water projection, air sowing and pneumosowing.

Where there is no topsoil:

If the angle of the slope is practicable < 3H:2V:

Supplying topsoil + sowing or planting method.

If the angle of the slope is not practicable > 3H:2V:

Sowing techniques: welded single filament systems, cellular confinement systems, metal structures, Guniverd Method.

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Slopes, plant cover and stabilisation

Techniques for covering

The aim is to control surface erosion and revegetation.

The geotechnical stability of the slope must always be assured before placing the plant cover.

The slope must first be treated and reshaped.

Techniques: sowing, hydrosowing, turfing, covering with curtains of branches, etc.

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Hydrosowing

Hydrosowing is one of the most widely used covering techniques. The hydrosowing machine is prepared with a mix of water, fertilisers, stabilisers, pH correctors, mulches and additives, which is projected under pressure onto the slope.

Very accurate projections can be made and great heights can be reached. It can be done on bare or prepared slopes with mixed techniques commercial species are used that go well with the land and there is a later sowing with indigenous species. A study must be made of the type of substrate and the heat and rainfall conditions for the application to be successful.

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Replanting slopes. Mixed coverage techniques

Live plant components are used in combination with organic components with natural or synthetic fibres and inorganic components.

The aim is to strengthen the structure and they have higher control of erosion. Techniques: geogrids, organic blankets, geocurtains, geocells, metal grids and projection, substrate with high organic content (Guniverd) and volumetric grids.

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Applicability of mixed coverage techniques

Organic geogrids:

Partial control of surface erosion, larger than sowing or hydrosowing, supplies organic material to the soil, strengthens the slope and supports hydrosowing.

Inorganic geogrids:

Surface control of erosion and control of landslips and support (less used) for hydrosowing.

Organic blankets:

Longer-lasting revegetation and protection from erosion and more resistant than seeds or geogrids, and increased capacity for infiltration into the land.

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Geocurtains

Poor-quality, sloping rocky land that needs land supply of the order of millimetres, permanent protection from lasting erosion and resistant.

Geocells

Poor-quality sloping rocky land that needs land supply of the order of centimetres, permanent protection from lasting erosion and resistant.

Volumetric grids

Decreased supply of topsoil necessary for the revegetation work on slopes and creation of soil in stony or loamy slopes, cuts etc.

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Guniverd method

This is a method for revegetating slopes where there is no potential of earth suitable for vegetation.

Vegetable gunite is projected over a mesh support with an average thickness of between 5 and 10 cm of the surface to be treated. The range of products is designed to support run-off, avoid landslides and allow germination of seeds for environmental recovery of degraded surfaces.

PAGE 197

Ageing method

Recent rock cuts and new concrete work change in colour with respect to their surroundings. Surface treatment with a layer of active material speeds up the ageing and improves the quality of execution.

Checks must always be made that the products used will not harm the environment. Applicability: rock cuts, sandy and loamy calcareous slopes, quarries, concrete constructions etc.

PAGE 198

Geomorphologic treatment

Geomorphologic treatment of slopes is a technique for obtaining maximum geotechnical stability. It consists in using the system of natural rock faults, so that the removal of material from the cut is in line with the pre-existing potential planes and slip lines.

On one hand, by using the natural fault, the resulting relief in the slope will be very similar to what would result from natural erosion, which would inevitably use this break-point in the rock. The depressions that are obtained are folds that allow restoration with vegetation. The resulting geological structure constitutes the morphology of the natural landscape.

6. The Catalan trunk roads as axes of communication

PAGE 203

This section analyses the complex interrelations of the Catalan roads and the land that they serve and that surrounds them through the cultural signage.

The object is to develop the idea of transforming the road from an object of transport and communication, a place to pass through, into an entranceway into a land that is wider and richer in content than the places that it connects.

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Aims

- 1) To show the inexhaustible amount of communication of which the roads and signage are capable.
- 2) To make the roads a true reflection of the cultural and social wealth of the lands in which they are placed, as the essential territorial element of the modern world that they are.
- 3) To represent current times because, like the country as a whole, the new signage should also be flexible and changing.

PAGE 205

General criteria

The first criterion was to identify structural trunk roads that are representative of Catalonia.

The second was to establish the basic variables that could furnish the new cultural signage contents.

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Working methodology

On one hand, the roads that come under the Generalitat de Catalunya were taken separately to establish the minimum coherent trunk routes necessary for the integration of the whole country and its road network. On the other, a database of local resources was set up to provide items suitable for signage in the most diversified, exhaustive and balanced way possible. The Llobregat route alone produced 2,422 entries.

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Selecting the routes

Although the main roads in Catalonia are the result of a very lengthy and discontinuous process, with decision-making centres always distant from Catalonia, it is possible to speak of a true road network.

The Catalan road network is defined by nodes, the cities and towns, and trunk routes determined by the land, with its complex organisation of river valleys, plains and mountain ranges.

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The first thing was to draw a map showing all the municipalities that are less than 5 and 10 km from any Catalan road. The result was not very significant as it came to show almost all of Catalonia. In this regard, places were sought with a minimum of historical and social coherence and the idea was selected of choosing trunk routes. Linear regions appeared, consisting of groups of districts along an axis and other regions less well-defined by the road but explained by their regional coherence.

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The basic information was collected through a dual and complementary process:

1. The systematic observation of field work performed during the professional careers of the team, updated and reorganised for this project in the areas selected to exemplify cultural signage.
2. The collection of qualitative local information in the general works published by the Enciclopèdia Catalana, complemented by the local information systems that had to be consulted for one of the selected axes, for example.

PAGE 210

Selecting the information

In this project, the information was selected from hierarchical criteria of importance established centrally by the work team, which are intended as stylistic guidelines.

For the practical implementation of cultural signage, however, these criteria and their application must be compared with the regional, district and local interests of each competent body and each historical moment.

PAGE 211

The main axes of catalan roads

One of the axioms for the implementation of cultural signs of the roads is to its territorial coherence. The roads are not just places by step, ever faster, for transportation of people and merchandise, they are real elements that backbone the territory. This structuring implies territorial conformation, more or less complete and rational, a few axioms that communication and relationships all individuals and communities, all the territories of Catalonia.

PAGE 212

The road network in Catalonia

Catalonia has a complex and contradictory road system from the point of view of management and use.

Of the total length, 16.5% of the network consists of roads managed by the Spanish Ministry of Infrastructure and Urban Planning, representing 41.4% of the traffic that passes through Catalonia.

On the other hand, roads for which the Generalitat de Catalunya are responsible represent 46.9% of the length and slightly more than 42% of the traffic. Local roads represent a much smaller percentage of both items.

PAGE 213

The trunk routes in Catalonia

Catalan trunk routes are those under the authority of the Generalitat de Catalunya, which, at a national level, articulate and connect most of the country and communicate it with the exterior. The most important rivers and evolution of the peopling of the plains constituted the channels that have defined these highways, now trunk routes.

PAGE 214

The Transversal Route

The Transversal Route, the first diagonal route in Catalonia superimposed on the dominant features of its geographical face, is perhaps the best known. Its transversal character indicates not only its dominant direction from east to west but also its independence of the Barcelona area, which until the late twentieth century almost monopolised Catalan land communications.

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The Western Route

Started as the Ebre route in the late twentieth century, its influence has spread much further, seeking out the river basins of its great tributaries, the Segre and the Cinca.

Far from all the areas of influence of the great cities of the coast, it serves the metropolitan area of Lleida and connects the Baix Ebre with the Pyrenees.

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The Metropolitan Coastal Route

The Metropolitan Coastal Route concentrates the greatest density of alternative roads, as corresponds to its greater density of human occupation in all senses.

Much of it does not come under the Generalitat de Catalunya, but its use makes it one of the most intensely used axes in the Catalan network.

The seasonality of the use of the roads of this axis marks the rhythm of everyday life of the inhabitants of the big cities of Barcelona and Tarragona, while it also channels the country's main tourist flows.

PAGE 217

The Ter Route

The route that connects the Barcelona region with the Pyrenees along the Congost and Ter valleys is a traditional communication route, one of those that defined the identity of Old Catalonia. While it does not follow a single river valley, its continuity is unarguable, to the extent that for many years the impossible capture of the Ter by the Mediterranean basin was conceived, illustrating the great significance of this river.

PAGE 218

The Llobregat Route

The Llobregat is another great trunk route of Old Catalonia in the predominant north-south direction. Its central position gives it importance, as does the actual history of the building of the road itself. The connection through the Cadí and Pimorent tunnels has now made it a new exit route towards Europe.

PAGE 219

Local and district roads

Because the purpose of roads is to connect places and, above all, people: The importance of the trunk routes must not in any way overshadow the existence a very dense district and local network.

These narrow paths and roads not only provide an essential local service, but they are often vital complements to the main network.

PAGE 220

The Llobregat Route: proposals for linear contents

The C-16, to use its official name, allows the application of signage designed for this road.

The predominant south-north direction of this route is an introduction to Old Catalonia, to the setting of many of the most significant events in Catalan history. A drive along this road in either direction should bring travellers in contact with key places and moments of the historical and present-day Catalonia.

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Recent demographic changes in the lands of the Route

Since the impact of the industrial crisis of the early seventies, the people who live along this axis have experienced great changes and a fairly general decline started that was only checked, and even reversed, in the first years of the new century.

The greatest growth is concentrated in the main towns, especially outside the influence of the city, affected by very diverse population movements. Recent growth has clearly been influenced by the arrival of immigrants from other countries. However, there is every indication that the direct influences of the trunk road have been more important for outsiders, especially from Manresa upwards.

PAGE 222

Recent economic change in the lands of the Route

The opening of the Cadí tunnel in 1984 coincided with the declining importance of the industrial activities that the corridor of the upper Llobregat had carried out in the previous hundred years. Agriculture followed the general trend in Catalonia and Europe, reducing its importance. Only construction, especially in municipalities affected by the promotion of second homes showed a positive dynamic. Thus, services have accounted for almost all the dynamism of the economic activities of the lands beside the Llobregat Route.

PAGE 223

Traffic intensities

The intensity of the traffic along the Llobregat axis has grown continually in recent years.

The increase in vehicles per has been greatest in the metropolitan sections, as far as Manresa, but growth has been proportionally much greater in other sections, especially between Berga and Cercs (elevenfold between 1980 and 2005) and also up to Cerdanya (seventy-sevenfold in the same period). The traffic becomes heavier closer to Barcelona, as roads and metropolitan traffic flows converge.

This route has 40,000 to 60,000 vehicles/day between Barcelona and Manresa, 20,000 to 30,000 between Manresa and Berga, 10,000 to 12,000 between Berga and Cercs, and 6,000 to Bellver de Cerdanya.

PAGE 224

The diversity of the country's resources

As is to be expected from a trunk route that connects different regions, the diversity of resources that can be signed along the Llobregat axis is very great.

From the Mediterranean coast, occupied now by the phenomenal expansion of metropolitan Barcelona, to the slopes of the Pyrenees, crossing all the central Catalan depression, landscapes and traditions, habits and customs change in just a few kilometres. The choice of what to choose at each time is necessarily complex and is likely to differ according to the local interests in play. Natural, human and social diversity are the principal factors allowing to make a selection based on criteria.

PAGE 225

The natural resources

Plains are a resource that is often unseen, hidden behind the grandeur of the mountains; in this case the route crosses the Bages plain, before reaching the plains district.

Plains are the privileged settlement of agriculture and determine the way of life of most of their

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population. Mountains obviously have the importance of their shapes (in this case Montserrat) or of their morphological and botanical significance (the Pre-Pyrenees and the Pyrenees are the high point of the Route). The river itself, moreover, is the natural path that the road follows and with which it has established rather intricate relations.

PAGE 226

The farming resources

The Llobregat valley has had a clear agricultural relevance, with irrigated crops in its surroundings and dry farming in the more distant interior areas or in the mountains. The traditional Mediterranean trio of wheat, vines and olives was predominant in the dry land. Vineyards have returned in the central sector, while barley has largely replaced wheat because of its use as fodder for cattle and, especially, pigs. Potatoes are grown in the upper valley. The irrigated crops are mainly fruit and vegetables, among which are the peaches of Pont de Vilomara and Sant Vicenç de Castellet.

PAGE 227

The industrial colonies

In the last third of the nineteenth century, agricultural legislation was used to build the famous riverside factories, called "colonies" because of their origin.

The motive power of the river was used by small canals and turbines that moved the looms. The factory was placed upstream, with the workers' homes generally downstream, overlooked by the house of the owner, who hardly ever lived there. The Llobregat axis, mostly its higher and central parts, still has thirty-six factories, though hardly any of them work as textile mills.

PAGE 228

Because almost all the Llobregat Route belongs to Old Catalonia, the number of buildings and monuments of historical or artistic interest is very important.

There is the Roman bridge in Martorell, known as the Devil's Bridge. The Visigothic churches of Terrassa are an almost unique example in Catalonia. Likewise, the monasteries of Sant Cugat del Vallès and Sant Benet de Bages are important both for their historical role and their artistic value. Castles and defensive towers fill the middle and high valley, while most towns conserve their modernist houses and shops.

PAGE 229

Museums

Since 1979 almost every municipality has created some kind of museum, some local in scope others more general and specialised. Particular mention must be made of the Martorell museum, which specialises in science, and the Catalan Museum of Science and Technology, in the former Vapor Aymerich, Amat i Jover mill, at the top of the rambla in Terrassa. On another level there is the open-air model of Catalonia in miniature, in Torrelles de Llobregat, or the Asland cement museum at Castellar de n'Hug, in the former Clot del Moro factory, designed by the Valencian architect Rafael Guastavino i Moreno (1842-1908).

PAGE 230

Local fairs and traditions

The length of the Llobregat axis covers a long series of local fairs and traditions, some of which have attained worldwide renown.

There is the Fira del Ram in Manresa or the mushroom fair in Pobla de Lillet. Important local traditions include the Patum in Berga, which was declared World Heritage by UNESCO in 2005 and the gathering at the Pi de les Tres Branques in Castellar del Riu, which has been held since

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1904. Or the international sheepdog trials in Castellar de n'Hug, which started in 1962. Finally, we must mention the famous passion plays that have been put on in Esparraguera since 1588, and in Olesa de Montserrat since the seventeenth century.

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In such a large area, the number of outstanding characters who were born or were active there is incalculable.

This wide range of characters includes: Joaquim Rubió i Ors, born in Cornellà de Llobregat in 1860; Margarida Xirgu, born in Molins de Rei in 1888; Josep Tarradellas i Joan, born in Cervelló in 1899; Pau Vila i Dinarés, born in Sabadell in 1881; Fèlix Torres i Amat and Antoni Maria Claret, born in Sallent in 1772 and 1807 respectively; Perot Rocaguinarda, born in Oristà in 1582, and Ramon Fraguell and Ramon Vinyes, born in Berga the 1769 and 1888 respectively.

PAGE 232

The Terres de l'Ebre: proposals for continuity

The Terres de l'Ebre is a territorial unit made up of a number of districts, all of which are in some way connected with the lower basin of the river.

The enclosed course of the river in the final spurs of the Serralada Prelitoral has not generated a land route. The Western Route, on the other hand, has generated a new way of connecting this area with the western lands of Catalonia.

PAGE 233

Recent demographic evolution of the Terres de l'Ebre

The general demographic trend in Terres de l'Ebre until the end of the twentieth century was one of stagnation and decline of the population, which hovered around 150,000 inhabitants.

But since 2000 the population has grown to almost 180,000 in 2006, representing an increase of almost 14%. The most important growth has been in the main towns of the districts and in some coastal towns.

PAGE 234

Recent economic evolution in Terres de l'Ebre

The economy of Terres de l'Ebre has followed the general growth trend in the construction sector and especially in services in general.

The most dynamic centres of the regional economy are along the coast and in the axis from Móra la Nova to Gandesa. There is also a farming sector, furniture manufacture and retail trade, as well as all activities connected with tourism.

PAGE 235

Traffic intensity in Terres of l'Ebre

Most traffic in the Terres de l'Ebre is channelled along the two big national cost roads: motorway and main road.

Traffic between Tortosa and Amposta varies between 10,000 and 20,000 vehicles/day. On the Western Route traffic density varies greatly, with an average of between 2,000 and 10,000 vehicles/day.

PAGE 236

The diversity of territorial resources

The river and its delta, the mountains and the plains, the interior and the coast make up a diverse mosaic of landscapes and resources in all of the Terres de l'Ebre.

The river allows sailing activities to be recovered, albeit for sporting and tourist purposes, and

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the mountains are open to forestry and hunting resources. The plains have been dedicated to agriculture since ancient times, while the coast has spas of national and international renown.

PAGE 237

The Terres de l'Ebre enjoy the great natural variety offered by the sea and the mountains. The River Ebre is the region's great natural resource. The meanders at the mouth of the most abundant river in the Iberian Peninsula make it a majestic waterway that opens into a great delta, which is a wetland reserve on a European scale and an area of great agricultural potential. The mountains of the Ports are the southern spur of the Serralada Prelitoral, with large forest and wildlife reserves, especially remarkable for their southern location.

PAGE 238

The farming resources

The Mediterranean trio of wheat, vines and olives has been the mainstay of agriculture in the Terres de l'Ebre. While cereal production has varied over time, wine and olives have remained in steady production and have improved in quality. New production has arisen in the fertile irrigated lands of the region, such as orange trees. Also, poultry production is almost a specialisation in many farms in the Terres of l'Ebre, and there is fishing on the coast.

PAGE 239

The cathedrals of wine

Linked with traditional wine production, in southern Catalonia and especially in the Terres of l'Ebre, the famous co-operative wineries came into being. As well as their economic value, which synthesises the complex relations between country and city, the co-operative wineries are true works of art, especially those built by the architect Cèsar Martinell (1888-1973), in Pinell de Brai and Gandesa for example.

PAGE 240

Buildings and monuments of historical and artistic interest

Most of the traditional works of the Terres de l'Ebre are connected with the river. The Xerta lock, of medieval Muslim origin, is one of the great works, together with the canal on the right of the river, which led in the eighteenth century to the founding of Sant Carles de la Ràpita, one of the most important examples of baroque urban development in Catalonia. Tortosa, under the protection of the Muslim Suda castle and the Gothic cathedral, is the most important grouping of urban monuments in the region, but many other towns have a heritage that must be preserved.

PAGE 241

Museums

The museums are mostly local in scope, except for the Archive Museum of Ebre in Tortosa, which is of great historical importance because of the role of the city and the status as an Episcopal see. Recently the recovery of the historical memory has led to the creation of a centre in Gandesa about the battle of the Ebro, an essential event of the Spanish Civil War.

PAGE 242

Fairs and local traditions

Fairs held with specific frequencies have been spreading through the towns and villages of the Terres de l'Ebre, in some cases acquiring certain importance in their districts and regions.

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The traditions are rich and varied. As well as a musical horizon in which the jota dance stands out, simple amateur bullfights are still celebrated. Alcanar is known for its five-yearly festivals of Our Lady of Remedies.

PAGE 243

Local characters and their works

At Terres de l'Ebre were born characters who have achieved fame in the history of Catalonia. Similarly, many illustrious people carried out part of their work in this area. Among the former are the writer Sebastià Juan i Arbó, born in Sant Carles de la Ràpita in 1902 (he died in Barcelona in 1984); Jesús Moncada (Mequinensa, 1941), and the poet Gerard Vergés, born in Tortosa in 1931. The latter include the painter Pablo Picasso, who did some of his early work in Horta de Sant Joan, in the Terra Alta.

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Proposals for signage

Two main criteria should be applied in signage and information on itineraries:

- 1) Communicative effectiveness.
- 2) Reducing the visual impact.

The colour must be in line with the international conventions on tourist signage, standardised in an earth colour. The range of colours makes the sign more decorative and less imperative than those of the highway code, with which they share sizes and material qualities.

Each route and situation must be shown on a general map of Catalonia.

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Individual signs to accompany the journey

To accompany the journey as pleasantly as possible, signs should be as few as possible in number, which explains the importance of gathering, analysing and selecting the information to be presented. None of this, however, must be to the detriment of the diversity and cultural wealth of Catalonia.

Individual signs should be large, with little text to read and with pictograms explaining the cultural content to which each one refers.

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Signs with monographic information, for stopping places

On the other hand, signs in stopping places (rest areas, petrol stations and others) can present the information in a more extensive and complex way. Therefore, they should be bigger and could use a smaller letter size, and even include maps, photographs and itineraries.

There could be two types of signs: on one hand, signs with texts explaining the Route or the countryside that it passes through and, on the other, cartographic signs showing the location of cultural and tourist landmarks and of other stopping places.

