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STRATEGIC DIRECTION SESSION ST2
Roads and quality of life

As from the year 2000 planning for transport infrastructure in general in Spain, and specifically for State-run infrastructure, is governed by the so-called 2000/2007 Infrastructure Plan (Horizon 2010). This is a Government approved master plan covering all action relating to port, airport, rail and road infrastructure planned to be built by the 2010 horizon.

The section on roads lists the high capacity interurban highways consisting of 5610 km of expressways and 769 km of toll motorways. The new expressways are designed to meet the territorial target of interlinking all provincial capitals by this type of highway in a deliberate attempt to break away from the excessively radial pattern of highways based on Madrid that currently exists (Map 1). The toll motorways planned are essentially in the form of access routes to cities that have expressways but that are already congested and where the high traffic demand existing warrants private funding for the new accesses and may even warrant construction of a new bypass under the same concession agreement but which is toll free for local traffic.

In addition to the territorial target of providing a grid pattern for the high capacity network, the Plan endeavours to meet two other main aims - increasing safety and improving quality of service with the latter including the environmental variable, deemed to be responsible for average cost increases of 10% in the new roadwork planned, and the public information processes that lengthen the time required for commissioning the new roads, even though these processes achieve a greater social acceptance and better environmental integration for them.

The White Paper on Transport Policy To 2010 proposes to intervene in policies designed to disassociate economic growth from transport demand, in an attempt to moderate economic growth in the road mode in favour of transport modes causing lower environmental impact. One of transport's most important overall effects is the emission of greenhouse gases, which is why the National Climate Commission in Spain evaluated the effects of the new roads covered by the Infrastructure Plan in respect of CO₂ emission. It estimated that by the year 2010 road transport would be responsible for 90% of total emissions by the transport sector and that pollution from heavy commercial vehicles would double. As a result, it recommended eliminating congested sections and replanting or planting new areas along roads as a means of counteracting the problem, in addition to promoting high speed rail services as an alternative mode.

All the roadwork covered by the Infrastructure Plan is evaluated in information studies, which compare different layout alternatives on a scale of 1:5000, broken down into stretches varying in length between 50 and 200 km, applying a multicriterion method that takes into account economic, functional, environmental and territorial factors.

These information studies are outsourced to private consulting firms employing experts on their multidisciplinary teams composed of civil engineers, urban planners, biologists, etc., who are responsible for the different sections in each study, under the direction of the Civil Engineer who signs the Study and a government representative from the Directorate General for Roads (Study Head) who is responsible for its administrative management and coordination with other government authorities.

The Spanish Parliament schedules infrastructure work in its annual Budget Acts that include the investment to be made in the year covered by the Budget and in the two following years.

These studies are carried out in three stages. Stage 1 characterises the land involved from the physical, environmental, territorial and cultural aspects, in order to determine the geographical bands (corridors) that are compatible with the main constraints. Thus, from the territorial point of view, urban planning in cities is taken into account to prevent current or future urban sites being affected; from the environmental point of view all the special protection areas and the greatest green value or most fragile areas are marked and where possible avoided.

With the environmental and corridor-related constraints proposed for implementing layouts, a process is begun whereby institutional and green groups are consulted to ascertain the degree of initial acceptance for the particular project or other possible alternatives.

Stage 2 introduces layouts on a scale of 1:5000 for each of the corridors selected in the preceding stage and these are quantitatively characterised from the following points of view:

- ✓ economic (investment and return)
- ✓ functional (traffic draw, safety, layout, etc.)
- ✓ environmental (residual impacts of the alternatives subsequent to the preventive and corrective measures proposed)
- ✓ territorial (relationship with spatial planning, town planning, use of land and other infrastructure).

A multicriterion analysis is then carried out using the four preceding groups of criteria, weighting the indicators and running weak point and strong point analyses on the changing values involved until one of the alternatives studied can finally be recommended.

A similar weighting tends to be given to the four groups of criteria for the alternative recommended (in the region of 25%), but it must be remembered that all the alternatives being compared avoid the areas of greatest conflict in both environmental and town planning terms and, furthermore, they include preventive, corrective and even counteracting measures in some cases.

The study is then submitted to the public information process whereby interested parties - institutions and private individuals - can lodge protests referring to any aspect of the study, ranging from layout to environmental or town planning related issues, or propose that the recommended alternative be swapped for another. A file is drawn up, based on all the protests alleged and the replies to them by the Study Head, and this is submitted to the Environmental Agency for preparation of the Environmental Impact Statement (EIS), which is mandatory before final approval can be given the Study. The EIS determines the environmental viability of the alternative recommended or of any of the other alternatives studied, and states certain constraints for subsequent implementation of the projects in their design and construction phases.

When the EIS changes the alternative recommended by the Study, stating that another of the alternatives studied is more environmentally viable, the Spanish Ministry for Development is entitled to reject the EIS by the Environmental Agency of the Ministry for the Environment and take the matter up with the Council of Ministers if it deems that the alternative reported as more environmentally viable involves significant disadvantages in other aspects such as substantial cost increases, poor functional level or problems related to land use issues that are not counteracted by the environmental advantages stated.

Finally, the Ministry for Development must issue definitive approval for the layout that is environmentally viable, adding to the constraints laid down in the EIS all the issues proving to be acceptable that came to light during the public information process. These are defined and rated in the third and final stage of the information study.

The public participation of private individuals during the information stage of the studies carried out in recent years has shown that the main groups opposing the roadwork planned are farmers and environmentalists in respect of interurban projects, and owners of neighbouring land in respect of urban projects. Farmers are chiefly concerned about land occupation and the transverse permeability for high capacity roads so that there is no increase in trips to properties on opposing sides of expressways. Impacts on the biotic community and landscape are what concern environmentalists whereas roadside residents are worried about noise and pollution levels. The differing interests of the three groups frequently contradict each other as environmentalists attempt to achieve layouts running through the areas most altered by humans and the other two groups are opposed to this. Consequently it is not easy to reach a final decision on which alternative should actually be designed and built, particularly if institutional constraints are also involved.

Institutional participation is concentrated on Local Corporations, that defend their town planning and land use interests, especially in respect of the degree of proximity of the layouts and their accesses, and on Regional Government (known as Autonomous Communities in Spain) empowered to make decisions concerning land use planning and the declaration of areas of environmental protection, and which are concerned about connections to the networks of roads and other infrastructure they manage.

The cost increase caused by introducing the environmental evaluation and participation process into the actions carried out in recent years has been calculated at around 10% of the project budget for the alternative recommended by the multicriterion method of the information study, broken down as follows:

- cost of the environmental impact study 0.1% of the budget
- cost of the EIS choice of better environmental alternatives than the one recommended by the information study's multicriterion method..... 4.0% of the budget
- cost of environmental impact preventive, corrective and counteracting measures 2.5% of the budget
- cost of the environmental stipulations of the EIS 3.5% of the budget.

The aim of improving the quality of environmental impact studies has recently been responsible for putting up their cost as it demands the participation of experts who can guarantee the reliability of the field data taken and the effectiveness of any corrective measures proposed.

The budgets for construction projects cover all the environmental constraints and contain an environmental analysis appendix that includes all the preventive and corrective measures in respect of the impact, involving an average cost of 2.8% of the budget (similar to the 2.5% of the information studies).

For site enforcement of the environmental precautions it is becoming increasingly the case that the budget includes a person in charge of environmental matters, accountable to the Site Manager, as part of the Quality Assurance Plan. The Integral Maintenance contracted during the operation stage includes monitoring and control of the corrective measures such as cleaning out of settling basins, drains and planted areas, etc.

A perfect example of the effect of all the above factors is the planning, design and construction by private funding - under a tolling scheme - of the new radial access motorways to Madrid and a new beltway - the fourth, known as the M 50 - which links up all the access routes and is toll free for local traffic (Map 2).

The new motorways and especially the new M 50 had to be coordinated with the road projects run by the Madrid Regional Government, the town planning projects by the Local Corporations affected, the layouts for high speed rail lines and respect for the environmentally protected areas in the form of special bird sanctuary zones (ZEPA) in addition to catering for the thousands of protests alleged by private individuals and neighbourhood associations.

The existence of environmentally protected areas meant that the M 50 has had to join up with another ringroad planned by the Regional Authority (the M 45), albeit with a larger number of traffic lanes, on its way through one of these areas. In addition, the elevation has had to be lowered and artificial tunnels built in several sections to increase transverse permeability and drop noise levels.

In the special bird sanctuary zones counteracting measures were analysed and defined by the Spanish Ornithological Society (SEO-Birdlife). They chiefly consisted of installing bird protectors on power lines, encouraging public access and watching activities, monitoring by green patrols on the lookout for abandoned dogs and poachers, recovery of riverbank habitats and courses targeted at farmers and designed to persuade them to use environmentally friendly farming methods.

The investment made in counteracting measures on the R 2 Radial Motorway alone amounted to 2 million euros out of a total budget of 25.56 million euros (8%).

Corrective measures have been introduced, in addition to the counteracting measures, to control erosive processes and water quality, preserve transverse permeability for humans and animals, archaeological control campaigns have been run, landscape integration implemented and noise screens erected, all of which amounted to a 1 million euro investment (4%).

One example of the battle between opposing interests facing all public participation and decision making processes is the demand made by a real estate development around whose perimeter runs a radial motorway at a distance of 200 m along the fringe of a protected zone. They petitioned for the motorway to be moved to a distance of 400 m meaning it would invade the protected zone so that residents would have to support lower noise levels, basing their argument on the fact that "humans are more important than animals". The final decision taken was to lower the elevation of the motorway and build an artificial tunnel to reconcile both interests, but this added a further 10 million euros onto the project cost.