

## 2. BARCELONA, SPAIN

### KEY SUCCESSES

- **Shorter trips and more walking and motorcycle/scooter use brought about by high urban densities and mixed land uses**
- **Average trip distance is a third lower than London**
- **Car use discouraged and managed with strictly enforced on-street parking controls and transport telematics**
- **Low fares on public transport and integrated ticketing forecast to increase ridership by 15%**
- **Low pedestrian accident rates, despite high pedestrian mode share**

### BACKGROUND

2.1 Barcelona is the capital of the Autonomous Community of Catalonia, located on the north-east corner of the Iberian Peninsula. The city is bounded by the Mediterranean Sea and a pre-coastal mountain system to the north and extends to the east and west along the coast.

2.2 The metropolitan area can be subdivided into three concentric rings as follows:



- the City of Barcelona itself with a total population of 1.5 million and an area of 99 square km;
- the extended urban area beyond the Ring Road, including 17 municipalities with a resident population of 900,000 over an area of 250 square km; and
- the outer metropolitan area with a resident population of 1.8 million covering an area of 3,000 square km.

Key Comparisons		
Indicator	Barcelona	London
Population <sup>1</sup> ('000s)	4,228	7,187
Area (Sq.km)	3,240	1,579
Average Density (Persons/Sq.km)	1,307	4,553
Central Area Density (Persons/Sq.km)	8,520	5,900
GDP/Capita (US\$)	18,124	22,363
Jobs in CBD (%)	20	36
Car Ownership (Cars/000 Pop)	410	332

<sup>1</sup> Figures cover recognised metropolitan area of Barcelona and Greater London Area.

- 2.3 Barcelona has centralised patterns of population and employment, however, in common with many other European urban areas, the city is experiencing a process of decentralisation. Between 1980 and 1991, the city's share of the total metropolitan population decreased from 65% to 35%, with growth directed to the secondary ring of cities within the extended urban area.
- 2.4 The core urbanised now has 8,520 people per square km, compared to 5,900 in London, with parts reaching up to 15,000 people per square km. Observation showed that employment and services are more dispersed across local neighbourhoods than in London and, coupled with the high densities, this has reduced the need for travel and encouraged more walking.
- 2.5 Recent planning policies have favoured the regeneration of inner city neighbourhoods within the established urban areas, for example, at the Vila Olimpica within Barcelona and the Eix Macia in Sabadell. Whilst often at slightly lower density than the older urban plans they replaced, these projects are mixed and well-located adjacent to public transport, compared to much recent development in London, and all have good provision for pedestrians and cyclists, traffic calmed public areas and easy access to public transport.

## **The Institutional & Planning Framework**

- 2.6 With the abolition of the Metropolitan Corporation of Barcelona (CMB) in 1987, there is no longer a single authority responsible for all transport provision, urban servicing and land use planning within the region. Significant autonomy has been granted by the Generalitat de Catalunya to the individual municipalities and various stakeholder groupings. A draft Territorial Metropolitan Plan for Barcelona and Intermodal Transport Plan was drafted in 1999, but has yet to be approved.
- 2.7 Transport planning, infrastructure and service implementation and management within the Barcelona Metropolitan Region is complex and split between a number of inter-related organisations as follows:
- **ATM (Metropolitan Transport Authority):** A consortium, created in 1997, of the City of Barcelona, the Metropolitan Entity of Transport (EMT), Generalitat de Catalunya and a number of central municipalities. ATM is responsible for planning public transport infrastructure and services across the Metropolitan Area and developing an integrated fares system. Membership is on a voluntary basis by which members delegate their responsibilities over planning and management of public transport to the consortium.
  - **EMT (Metropolitan Entity of Transport):** Created in 1987 as a group of municipalities responsible for the organisation and planning of urban and interurban (public) transport in the central urbanised area of Barcelona, covering the central 18 out of the 163 municipalities. EMT effectively acts as the equivalent of a Passenger Transport Authority for the central and inner Metropolitan Region, regulating and monitoring bus services provided by private sector operators, as well as publicly-owned Metro and urban bus services;
  - **Transports Metropolitans de Barcelona (TMB):** Owner and operator of Metro and bus services centred on the City of Barcelona and effectively equivalent to a Passenger Transport Executive for the central area;
  - **Municipal Authorities (including the City of Barcelona):** Responsible for local roads and traffic management, including pedestrianisation, cycle routes and parking policy;

- **Societat Municipal D'Apartment I Serveis SA (SMASSA):** A company formed by the City of Barcelona in 1982 to take over management and enforcement of parking in the urban area;
- **Generalitat de Catalunya:** Responsible for the interurban motorway network, interurban roads, the Ferrocarrils de la Generalitat de Catalunya (FGC – Catalan Regional Railways) and a number of inter-urban bus services within the Metropolitan Region; and
- **Spanish Government:** Responsible for funding and development of RENFE national rail services, including commuter and inter-regional services, and the key motorway routes.



2.8 This institutional framework necessitates partnership working to deliver integrated transport on the ground in the same way that London's Mayor will have to work with the Boroughs, Strategic Rail Authority and Central Government, amongst others, to deliver his Transport Strategy.

2.9 In addition to the ATM, there have been efforts to bring the various actors together in partnership. In July 1998, the City of Barcelona signed a Mobility Pact with 28 other organisations responsible for providing transport services within the metropolitan area as a framework for meeting the mobility needs of the city whilst also serving environmental and social goals.

## **TRANSPORT NETWORKS**

### **Overview**

2.10 Barcelona has a well-developed and relatively modern transport network covering all modes, including rail- and bus-based public transport and a network of motorways/expressways developed between the 1970s and early 1990s. The 1992 Olympics had a major impact on infrastructure provision within the central area. Over £3.5 billion was invested in urban renewal



along the harbour front and former industrial areas, including the relocation and renewal of rail links, extensions to the Metro and the completion of several highway projects including a new Ring Road.

2.11 Key attributes of the transport system include:

- toll motorways into and bypassing the urban area and the completion of a high-capacity Ring Road by the early 1990s;
- highway network management systems covering Variable Message Signing, tidal flow and effective on-street parking enforcement;
- five mainly radial Metro lines with a further line (Line 9) proposed;
- seven regional/commuter lines provided by FGC and RENFE, (both systems have been extensively modernised with new infrastructure and rolling stock since the late 1970s);
- modern intercity and inter-regional services provided by RENFE, with a new High-Speed Train (AVE) line under discussion between the French border and Madrid;
- modern bus network resulting from ongoing investment such that 60% of the fleet comprises low-floor accessible vehicles providing higher levels of quality and reliability;
- the development of a network of bus lanes in the central area with junction priority currently under development;
- the development of a network of cycle lanes in the central area;
- integrated fares and ticketing across all public transport modes from 2001.

2.12 The table overleaf shows annual investment in various transport activities based on data for the Metropolitan Area between 1996 and 2000. The bulk of investment continues to be made in the highway network, with substantial sums also being spent on the existing Metro and rail networks and a surprisingly high amount on facilities for pedestrians.

### Investment in Barcelona Transport System (000 Euros)

Components	Euros (000s)	%
Existing Road Network	15,000	18.1
Road Network Extensions	36,000	43.5
Road Transport Telematics	1,600	1.9
Existing Metro/Rail Infrastructure	16,000	19.3
New Metro/Rail Infrastructure	8,000	9.7
Existing and New Bus Infrastructure	180	0.2
Existing and New Pedestrian Infrastructure	5,920	7.2
Existing and New Cycle Infrastructure	30	0.1
<i>Total</i>	<i>82,730</i>	<i>100</i>

Source: ATM. Citizens Network Benchmarking Data (2001). Metro and Tram expenditure is expected to increase substantially through PDI

### Highways

2.13 The Ring Road and a number of substantial high-capacity radial routes were completed within the context of the 1992 Olympics and so now the provision of strategic and main roads in Barcelona is higher by area and by population than London.

Highway Networks		
Length of Route	Barcelona	London
Motorways (km)	128	70
Trunk and Principal Roads (km)	1,650	1,754
Minor Roads (km)	3,414	11,795
Total Road Network (km)	5,192	13,619
Motorway Density (m/sq. km)	416	40
Motorway Supply (m/1000 pop)	49	10

Source: Barcelona Regional (2000), ATM (2000), TfL (2001)

2.14 A key difference between the two cities has been the use of private capital; the first regional concession was granted in 1967 with 630 km of toll motorway being constructed in Catalonia between 1970 and 1980. More recently construction has been publicly financed and toll-free in light of political concerns and perceived inefficiencies created by interactions between the toll motorway network and toll-free routes. Negotiations are currently underway between the State/Regional Government and the private-sector concessionaires<sup>1</sup> to reduce toll levels or remove them altogether.

<sup>1</sup> Companies that construct, operate and maintain the toll roads

2.15 Parking supply in Barcelona is generally more constrained than in London, however, parking charges are lower. Despite increases of more than 50% since 1990, an hour in a public off-street car park in central Barcelona is just Euros 1.42 compared to charges in excess of Euros 6.00 per hour for some public car parks in London.



Flows on sections of the Ring Road exceed 100,000 vehicles a day, comparable with highly-trafficked roads in London such as the A3, A13, North Circular or sections of the M25.

**Public Transport**

2.16 The focus of public transport investment has been in developing an extensive **Metro** network covering the city and several adjacent municipalities. Whilst less extensive, the system is more modern and discussions with the operator suggests it is more reliable than the London Underground<sup>2</sup>.

Public Transport Densities		
	Barcelona	London
Metro Line m/sq. km	2.5	26.2
Rail Line m/sq.km	17.5	230.5
Bus Route m/sq. km	173.4	598.8
Metro Line m/100,000 Pop	192.9	576.0
Rail Line m/100,000 Pop	1,333	5064.7
Bus Route/100,000 Pop	13,214	13,151

Source: Barcelona Regional (2000), Atm (2000), Transport for London (2001)



<sup>2</sup> Latest monitoring for LUL shows a 7% lost train-kms due to cancellations and early terminations

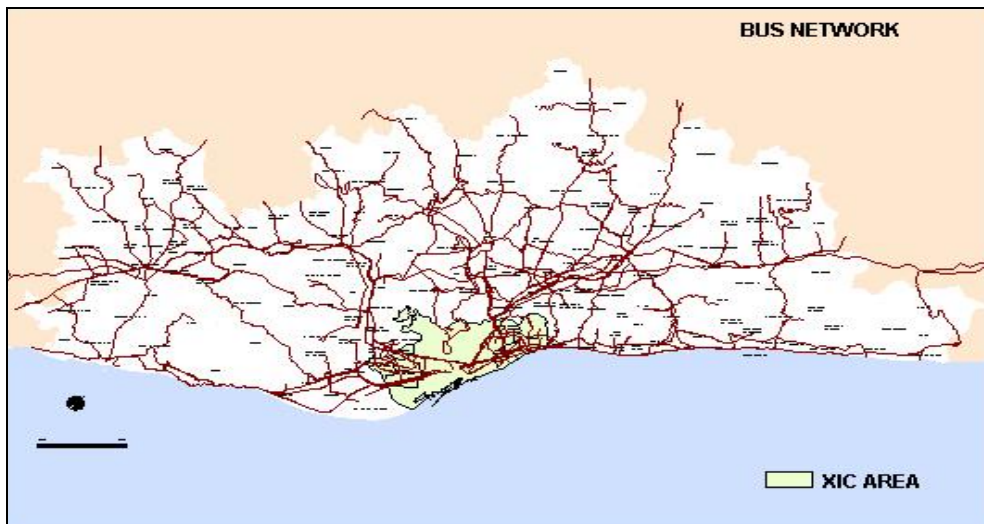
- 2.17 The Ferrocarrils de Catalunya (FGC) form an important **regional rail** connection for a number of corridors beyond the city boundary, connecting second ring centres such as Terrassa, Sabadell, Martorell and Manresa. The 143 km network was transferred to the Generalitat de Catalunya in 1979 and extensively modernised through the 1981-1990 General Plan with upgrading of track and station infrastructure and new rolling stock.
- 2.18 RENFE **national rail** services provide suburban and intercity connections to a number of locations in the metropolitan area as well as other cities in Spain and mainland Europe. The total network length within the Metropolitan Area is 426 km, centred on Barcelona Sants Station. Like FGC, RENFE services have been extensively modernised in recent years in terms of infrastructure and rolling stock. Both FGC and RENFE networks are wholly-publicly owned with no plans to sell either infrastructure or operations to the private sector, as occurred with the former Network South East rail operations providing services in and around London.



Barcelona FGC and RENFE Networks

- 2.19 **Bus services** carry as many passengers across the metropolitan area as the Metro. Bus priority measures are limited to the central area (especially the Eixample) with only 75 km of bus lanes across the city, compared to 240 km in London. Real-time passenger information and junction priority planned for roll-out in the near future.





**Barcelona Bus Network**

2.20 Whilst TMB bus services are wholly public-owned and operated, those EMT and Generalitat services outside the City of Barcelona are operated by private operators under contract, monitored in terms of reliability, punctuality and customer satisfaction. The latter system is not dissimilar to the London situation, where private operators such as Stagecoach, Arriva and First Group run services to tender to London Buses, now part of Transport for London.



Services are frequent, comfortable and via modern vehicles for most of the TMB/EMT area.

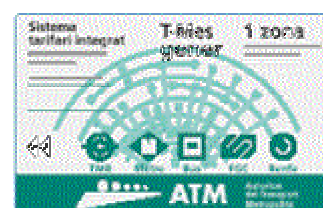
2.21 Barcelona has just started construction of the 16 km Diagonal-Baix Llobregat **tramway**, linking the city centre with the north-western suburbs. The scheme is being progressed as a public-private partnership with a private consortium responsible for construction, maintenance and operation. Fares will be integrated with other public transport modes in the city.

### *Fares*

- 2.22 Public transport fares are substantially lower in Barcelona. The average adult single is Euros 0.87 with major savings for weekly and monthly tickets. This compares to a minimum fare of Euro 2.23 for a single ticket on the London Underground and Euro 1.12 for the equivalent London bus fare.
- 2.23 Fares in Barcelona have increased only slightly (16%) over the last decade, ATM and EMT are prepared to operate public transport at substantial deficits to achieve social objectives, compared to far greater focus on financial efficiency in the London context.
- 2.24 Farebox revenue covers about 80% of operating costs with Euro 20 million of operating subsidy injected into services each year. Recovery rates vary between modes; fares typically account for two-thirds of bus operating costs, rising to around 80% for FGC rail services and 100% of Metro costs. In contrast, public transport in London runs at an operating surplus for both bus and Underground modes, with fare increases of 28% and 30% respectively since 1989.

### *Integrating Public Transport*

- 2.25 The creation of EMT and more recently ATM has led to a more integrated and accessible public transport system, including:
- plans to enhance public transport interchanges, for example at Placa de Catalunya and Arc de Triomf;
  - more accessible new infrastructure and rolling stock;
  - park and ride at outlying FGC and RENFE stations. A pilot site has also been established on the Metro at Placa de les Glories linked to an integrated ticket for parking and public transport use; and
  - the common promotion and marketing of public transport services through TMB, EMT and ATM.
- 2.26 The most significant recent development has been the introduction of an integrated fares and ticketing structure based on zones and sectors covering the whole of the metropolitan area. There are a range of tickets available for multi-modal travel, including one-day travelcards, 30-



day travelcards and 50-trip multi-cards. The new structure is estimated to offer an average discount of around 17% per journey, costs operators Euros 11 million per annum.

2.27 However, the transport system also exhibits a number of weaknesses, as follows:

- a lack of inter-connections between the different modes of public transport with some Metro and railway lines passing near to each other, but failing to connect, or requiring long walks between platforms (e.g. Placa de Catalunya);
- many Metro and railway stations and trains remain inaccessible to those with mobility difficulties, although this is gradually changing (e.g. Metro Line 2); and
- deficiencies in timetabling between the different public transport operators, especially outside of the central area.

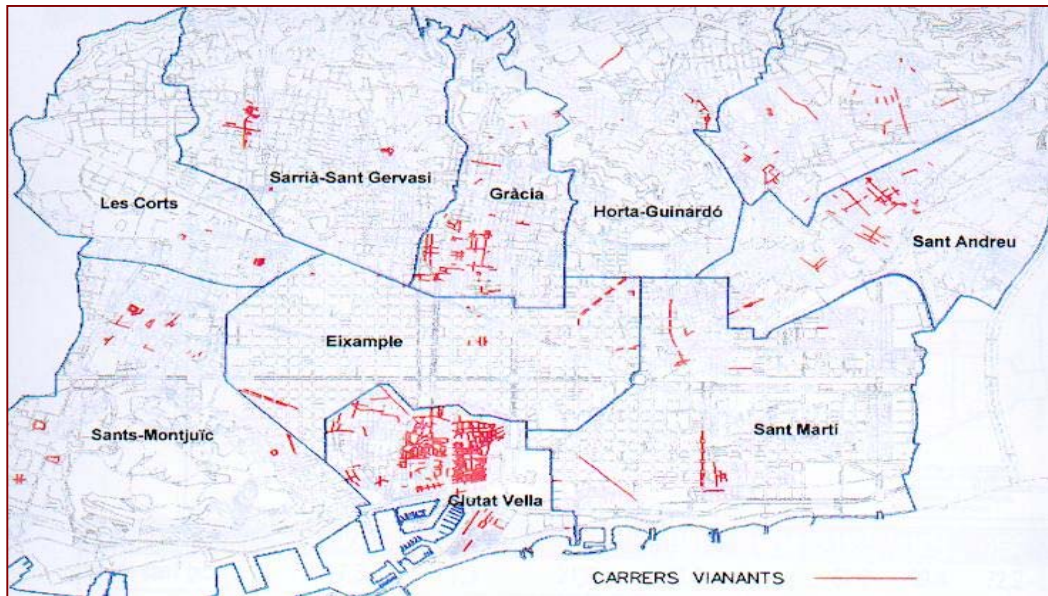


### **Cycling and Walking**

2.28 Few trips are made by bike and there are just 110 km of cycle lanes in Barcelona with limited lengths in the rest of the metropolitan area.

2.29 Motorcycle and scooter use is amongst the highest in Europe, with up to 65 powered two-wheelers per 1,000 population compared to just 9 for London, and within the city they make up over 4% of the traffic flow. The key advantages are cheaper running costs, greater ease of parking and the ability to weave in and out of traffic. Motorcycles and scooters also receive greater investment from the local authorities with 10,000 parking spaces provided across the metropolitan area, compared to only 1,600 cycle parking spaces.

2.30 Planning and investment policies have strongly favoured pedestrians in the allocation of street space. For instance, up to 50% of the available street width in many parts of the Eixample are given over to footways, whilst across the metropolitan area, there are over 1 million square metres of pedestrianised squares and 105 km of pedestrianised/pedestrian priority roads.



**Pedestrian Priority Areas in Central Barcelona**

### **Transport Telematics and Travel Information**

2.31 With the highway network becoming more congested, Barcelona like London is investing in Advanced Transport Telematics and Travel Information to enhance network efficiencies. Political commitment and technical innovation is strong within the context of EU Research Framework Projects with recent examples including INTERCEPT, CONCERT, SMILE, ANTARES and GAUDI.

2.32 Key aspects of Barcelona's investment in telematics include:

- the ATM Transmet Information Centre which is connected to 18 radio stations with an average 40 broadcasts a day;
- Variable Message Signs (VMS) for route and car parking guidance, aimed at reducing the amount of parking search traffic in the Central Area and reducing delays on the network in the event of incidents;



- the Rondes traffic control system, linking cameras, data collection stations and VMS of differing types to inform drivers, display the enforced speed limit and re-route drivers where necessary. Ramp metering is under development;
- trials of automatic vehicle identification, based on digital cameras;
- smartcard technology for selective vehicle access;
- real-time public transport information on Metro, rail and bus networks, although examples such as the Countdown system for London Buses and DLR DAISY system appear more advanced than facilities currently on offer in Barcelona; and
- travel information via the Internet with Barcelona offering regularly-updated road camera images on the Web and both cities providing public transport routing information electronically and via phone hotlines.

### **Parking Policy and Demand Management**

- 2.33 Narrow streets limit on-street parking provision and many apartment blocks constructed in the 1950s and 1960s were built without on-site parking. This constrains car trips to the central area, providing motivation to use public transport, walk or use motor scooters.
- 2.34 Barcelona has around 310 spaces per 1,000 inhabitants, compared to 950 in London. The City Council is tightening on-street parking controls (by duration of stay and/or price) and introducing only limited increases in public capacity. This is being undertaken in tandem with providing spaces for new residential developments and strict enforcement. In addition, traffic management and enforcement schemes have been introduced to tightly control service traffic and deter through-traffic from sensitive areas.
- 2.35 Other policies and initiatives to control car use include:
- **motorway tolling:** though the motivation behind this is financial, and negotiations between Government and the private concessionaires are aiming to reduce tolls as part of a more comprehensive mobility strategy for the urban area;

- **extension of pedestrian priority areas:** for example, in Las Ramblas and many streets of the old medieval core of the central area;
- **restricted access:** with a number of areas gated to through-traffic and accessible only by authorised users (see panel);

#### **SELECTIVE ACCESS CONTROL (SICAV)**

Barcelona city council has implemented a system of restricted access zones in a number of environmentally sensitive areas within the city centre including La Ribera and Barnacentre. These zones are controlled by a network of control gates, physically enforced by retractable bollards, to limit access to authorised vehicles only, which are equipped with smartcard or in-vehicle transponders. The initial La Ribera zone was introduced in 1995 and has now been extended to 4 other areas, supported by a number of European research projects, including GAUDI and CONCERT.

Surveys conducted in La Ribera demonstrate that traffic entering the zone has been reduced by 78%, with travel times across it being reduced by 18%. The level of residents' acceptance of the scheme has been high (in excess of 70%) and impacts on the local economy generally positive. However, the evidence does show a change in business type within the zones to those less dependent on car-based custom.



- **development of park and ride:** for example, at outlying RENFE and FGC railway stations.

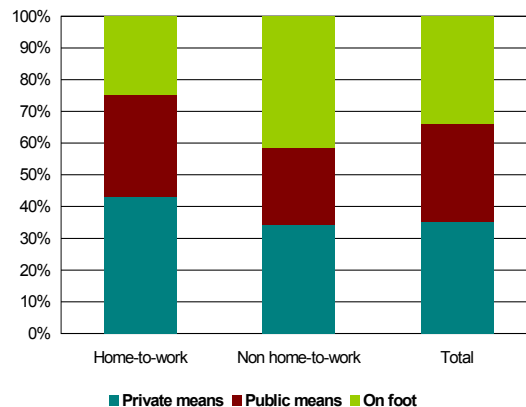
2.36 Proposals for urban road charging in Barcelona remain at the study stage only.

## PERFORMANCE AGAINST KEY OUTCOMES

### Mode Share

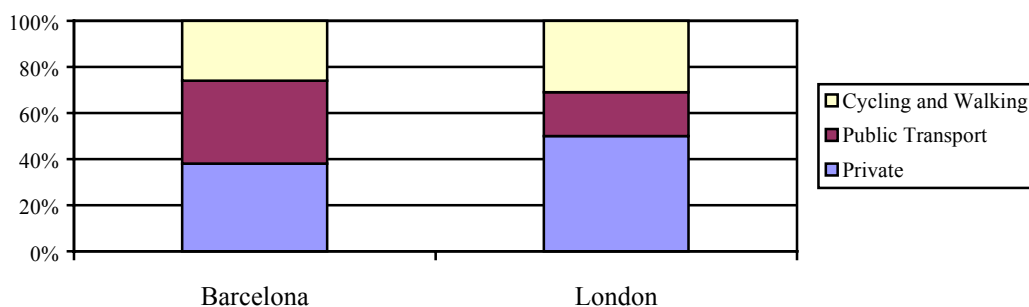
2.37 The public transport mode share within the city is high – 36% compared to just 19% in London - reflecting the coverage of the Metro system and the good level of accessibility afforded to most neighbourhoods. The mode share for walking is also significant<sup>3</sup> because of:

- high densities;
- mix of land uses within the urban area;
- provision for pedestrians within the streetscape; and
- the constraints on car parking.



2.38 The outer areas of Barcelona display substantially higher levels of car use and dependency. The RENFE and FGC rail networks, whilst modernised, do not provide such dense coverage as the Metro in the central area or cater for orbital trips between municipalities. Furthermore, the bus network is sparser and more seriously affected by traffic congestion on the highway network and therefore unable to offer an attractive alternative to the private car.

### Mode Share for Barcelona and London

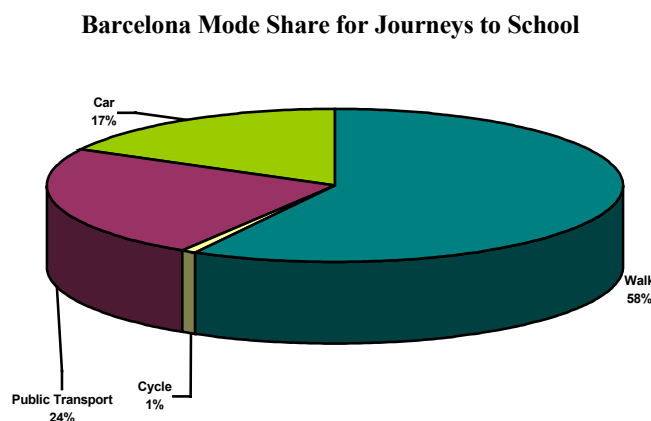


Source: Area de Mobilitat, Transport i Circulacio, Ajuntament de Barcelona, 2001. NTS 1998-2000. Note different source and year to Stage 1 report.

<sup>3</sup> Part of the difference in walking mode share may be attributable to the greater accuracy of the National Travel Survey

### *School Travel*

2.39 Compared to London, a far higher proportion of children walk or use public transport rather than the car to get to school in Barcelona. This appears to be due to differences in land use densities and mix (with influences on school catchments), relatively low public transport fares and the fact that many schools lay on dedicated student buses for those living beyond a certain distance.



### **Congestion**

2.40 Comparisons show that:

- car ownership is around a quarter higher in Barcelona when compared to London, however, the use of the car and mode share for private motorised modes appears to be lower;
- traffic speeds across the metropolitan area are generally higher in Barcelona, particularly in the off-peak period; and
- the average trip length is around a third lower in Barcelona.

2.41 Barcelona is similar to London in displaying a pattern of differential traffic growth across the urban area, with static or declining volumes in the central area and continuing increases on the approach and bypass routes. Whilst the main factor behind this appears to be saturation of the central network for large parts of the day, various network and traffic management changes (see panel overleaf) have played a role in both cities:

- within London, traffic counts of vehicles crossing the central cordon decreased by 11% between 1989 and 1997, with static volumes around the inner cordon and increases in the region of 2-3% per annum in Outer London; and



- in Barcelona, traffic in central streets decreased by around 7.5% in the 1990s (static after 1995) with growth of 2-4% per annum on the key bypass and approach routes to the city.
- Across the whole metropolitan area, distance travelled by car increased by 25% between 1990 and 2000, a far higher rate of increase than London and reflecting completion of a number of highway schemes and continued counter-urbanisation.

2.42 Traffic growth and the social and environmental impacts of congestion are high-profile topics for political debate in Barcelona. Investment has moved away from extensive provision of additional highway capacity and now centres on tackling congestion, air quality and noise. Data from municipal surveys show that congestion and pollution are top of citizens' concerns and public policy is moving towards maximising the efficiency of the existing network through traffic management, transport telematics and encouraging car drivers to shift mode.

#### STREET MANAGEMENT IMPROVEMENTS FOR LOADING/UNLOADING

Through the EU SMILE project, Barcelona city council has piloted a combined-use lane along Balmes Street in the Sant Gervasi district, a four-lane arterial route on the primary road network. The new lane has enabled the use of limited road space to be optimised using VMS signs which promote traffic regulations according to time period.

- During peak hours, the lane is subject to no stopping regulation reserving the space for traffic circulation;
- Between 10:00 and 15:00 the lane is limited to loading/unloading stops of 30 minutes; and after 22:00 and at weekends, the lane is available for on-street parking.

The measures, backed up by enforcement activity, have virtually eliminated the incidence of illegal parking and double parking by delivery vehicles. Route capacity along Balmes Street has been increased and as a result traffic circulation is improved. The trial has now been extended to nearby Muntaner Street in the same district.



## Road Safety

- 2.43 In 2000, there were 395 fatalities across the metropolitan area - an increase of 12% on the figures for 1990 - and 2,700 serious injuries. This compares to 264 killed in London for 1999, with a reduction of over 50% since the mid-1980s, although the number seriously injured is substantially higher.
- 2.44 The casualty rates are therefore 9.4 **fatalities** per 100,000 population, compared to 3.7 for London, and 64.7 **serious injuries** per 100,000 population, compared to 74.5 for London.

**Table 2.1 - Road Accident Casualties**

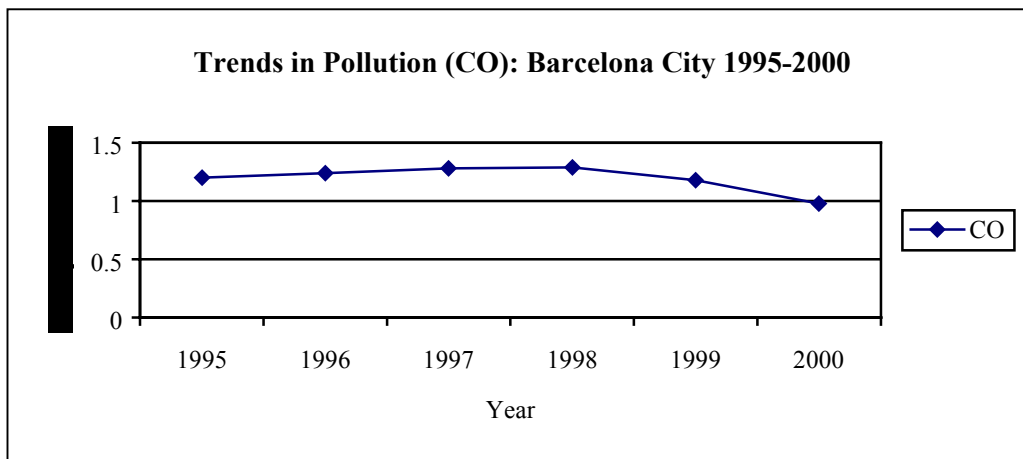
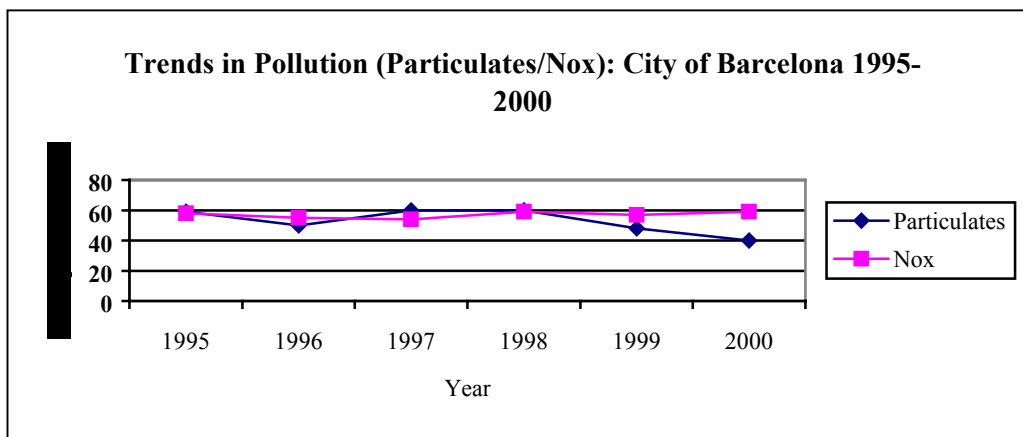
Killed	Barcelona 2000	London 1999
Car Drivers/Passengers	248 (62.8%)	59 (22.3%)
Motorcyclists	69 (17.5%)	51 (19.3%)
Cyclists	20 (5.1%)	10 (3.8%)
Pedestrians	53 (13.4%)	134 (50.8%)
<b>Seriously Injured</b>		
Car Drivers/Passengers	1,715 (63.1%)	2,135 (39.8%)
Motorcyclists	399 (14.7%)	1,014 (18.9%)
Cyclists	110 (4.0%)	483 (9.1%)
Pedestrians	494 (18.2%)	1,727 (32.2%)

- 2.45 The majority of those killed and injured on Barcelona's roads are car drivers and passengers, largely because of poor driving practices, frequent accesses on to high speed roads through the urban area (e.g. Ring Road) and through-traffic using more local roads to avoid the toll motorways.
- 2.46 Despite a higher proportion of trips by foot, walking in Barcelona appears to be a relatively safe means of travel with the pedestrian fatality rate being only two-thirds that of London. The trend for pedestrian accidents within the City of Barcelona itself has been downwards since 1996.

## Environment

### Air quality

- 2.47 Air quality is currently good in Barcelona, though continued improvements in emission levels are being made through the replacement of older, polluting vehicles with newer stock rather than the implementation of integrated transport policies per se. Levels of carbon monoxide and particulates show a decrease since 1995, although the level of nitrogen oxides has remained fairly steady.

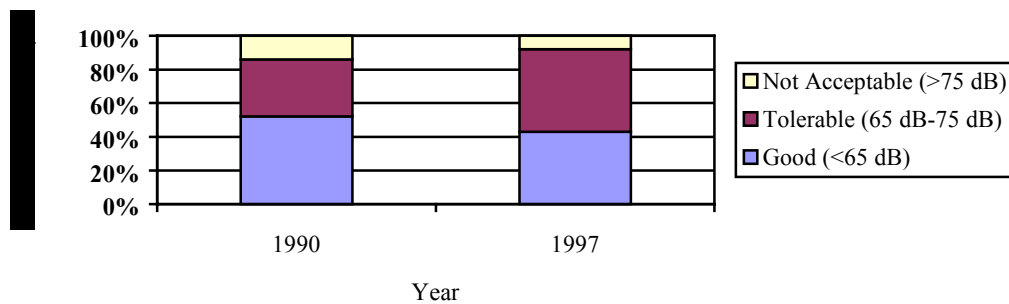


### Noise

- 2.48 Changes in noise levels are more complex; whilst the proportion of city streets experiencing 'acute' noise impacts appears to be falling, those experiencing 'good' conditions are also in decline. This implies that, noise is a growing problem, especially in the outlying municipalities as the urban area expands and traffic levels

increase in former predominantly rural areas. One of the key contributors is the high volume of motorcycles.

**Noise Pollution Index for City of Barcelona 1990 and 1997**



### **Social Inclusion and Accessibility**

2.49 Network densities are lower, but public transport fares are significantly less in Barcelona than for London, with subsidies set at a higher level of the delivery of social objectives.

2.50 The proportion of low floor buses is about 60%, broadly equivalent to London. Metro Line 2 has passenger lifts installed at all stations with others installed at selected Metro and FGC locations. The new Series 2000 rolling stock has an interconnecting isle enabling passengers to walk from one end of the train to the other and reserved spaces for disabled passengers.

2.51 Provision for non-car users has been considerably enhanced through substantial recent expansion and modernisation of the Metro, regional rail and bus networks. There has been significant investment in the pedestrian environment and allocation of street space to walking.



2.52 Far less has been invested in physical measures to encourage cycling, and the take-up of cycling has been slow (less than 1% of all trips). This is largely because of:

- the hilly terrain, north of the city centre;
- the Mediterranean climate which, whilst favourable for walking, is often perceived as being too hot for cycling;
- a perception amongst Barcelonians that cycling is inconvenient and unsafe in heavy traffic, far more so than other European countries such as Denmark or the Netherlands; and
- a lack of investment, until the 1990s, in cycle lanes and cycle parking by the municipal authorities.



### **Public Transport Acceptability**

- 2.53 Major advances have been made in terms of maximising the efficient use of the transport network, including Variable Message Signs, public transport information and intelligent traffic management schemes. There has been strong political will to involve Barcelona in a series of EU Research projects to improve the quality of public transport.
- 2.54 Bus, metro and train reliability is considered to be above London levels and the integrated fares and ticketing structure has been well received by users. Preliminary surveys suggest that 81% of public transport users believe the new fares policy is better than the previous system, with two-thirds finding the fare levels acceptable. The initiative is forecast to increase public transport usage by 15% overall.

## **FUTURE PROSPECTS**

- 2.55 The main focus of proposed future investment is on public transport infrastructure and services, for example through the Metropolitan Infrastructure Plan (PDI). This can be compared to London where the Mayor's Transport Strategy proposes major investment in the regional rail network (e.g. CrossRail) and high-quality local public transport links (e.g. Intermediate Modes). Both cities retain some commitment to road construction, however, with Barcelona examining a new road tunnel to Saborell and London considering new highway river crossings in East London and further widening of the M25.
- 2.56 Whilst increasing the role of cycling is stated as a firm local transport objective, in practice the potential for increasing mode share is probably limited, given the Spanish perception of cycling.

### **Barcelona Infrastructure Strategic Plan (PDI) 2001-2010**

The Barcelona Infrastructure Strategic Plan (PDI) aims to substantially increase the volume of trips within the metropolitan region using public transport as a means of reducing the rate of traffic growth. The Plan envisages a number of major network enhancements including:

- A new orbital metro line 9 connecting a number of the existing lines and serving areas currently poorly served by mass transit;
- A programme of extensions of the existing metro and FGC networks;
- A new tram network linking the downtown area to neighbourhoods to the north-west and east of the city centre. The first phase, 15.5 km from diagonal to Baix Llobregat has just commenced construction through a combination of public (20%) and private (80%) finance;
- A programme of major interchange improvements to diminish the deterrent effect of the need to transfer between the metro, FGC and RENFE networks;
- enhancements to the RENFE network, in particular the construction of a new high-speed line between France and Madrid with a proposed new station at La Sagrera in the eastern suburbs supporting the regeneration of the surrounding area.

The PDI has been developed by ATM in consultation with the Regional Government, municipalities and EMT. ATM is currently working on a Service Delivery Plan considering the operational improvements required for the public transport networks.