

URBAN PASSENGER TRANSPORT IN MADRID ADVANCES IN INTERMODALITY.

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ABSTRACT:

The population in the Madrid metropolitan area has increased sharply in recent years.

The land area developed for residential other purposes has also increased, as a result of which mobility problems have been greatly exacerbated.

The competent authorities have implemented different measures to palliate these problems.

The main interior ring road, the M-30, has undergone a radical transformation which has practically doubled its capacity.

Parking in the entire area inside the M-30 is restricted for non-residents.

The main roads leading to periurban locations have been doubled with toll motorways.

The successive ring roads – the M-40, M-45 and M-50 – are being completed to channel as much medium distance traffic as possible.

Heavy emphasis has been placed on public transport.

The underground network has grown by 33% in the last four years and the airport has practically doubled its capacity.

Five large modal interchanges have been built to link the different modes of public transport.

But all of the measures are insufficient and additional improvements are in the works.

The most notable of these are:

Construction of platforms reserved for public transport at the main access points to the city.

Construction of up to 54 dissuasive car parks (16 in the first phase) to foster mixed transport. Users drive their own vehicles to these centres and continue from them on public transport.

1. INTRODUCTION

The percentage of population in the greater Madrid metropolitan area is growing all the time.

This increase in population generates a larger urban land area. This is influenced not only by the number of inhabitants but also by higher standards of living, since the people with higher incomes tend to seek individual housing outside of the city with larger unitary floor space in an environment removed from the hustle and bustle of the city.

At the same time, the rate of motorisation increases as do the distances to be covered on each trip back and forth.

The increase in the number of vehicles and the frequency of trips causes congestion in the old quarter of the city centre, where many government offices, cultural buildings and services are still located.

However, this situation co-exists with the new business centres located on the outskirts of the city which results in the centrifugation of executives who still have to visit government offices, etc.

It is a very complex world with one very clear consequence: the number of daily trips into and out of the metropolitan area is a figure that is growing much faster than the rest of the indicators.

And this increase in the number of trips automatically causes traffic to become congested in the city centre and its accesses.

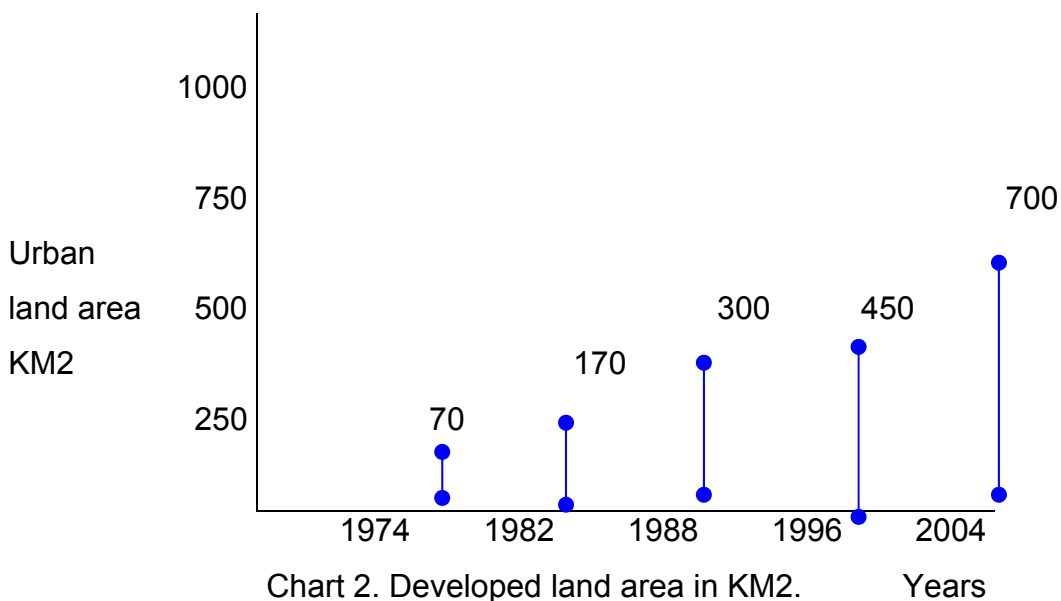
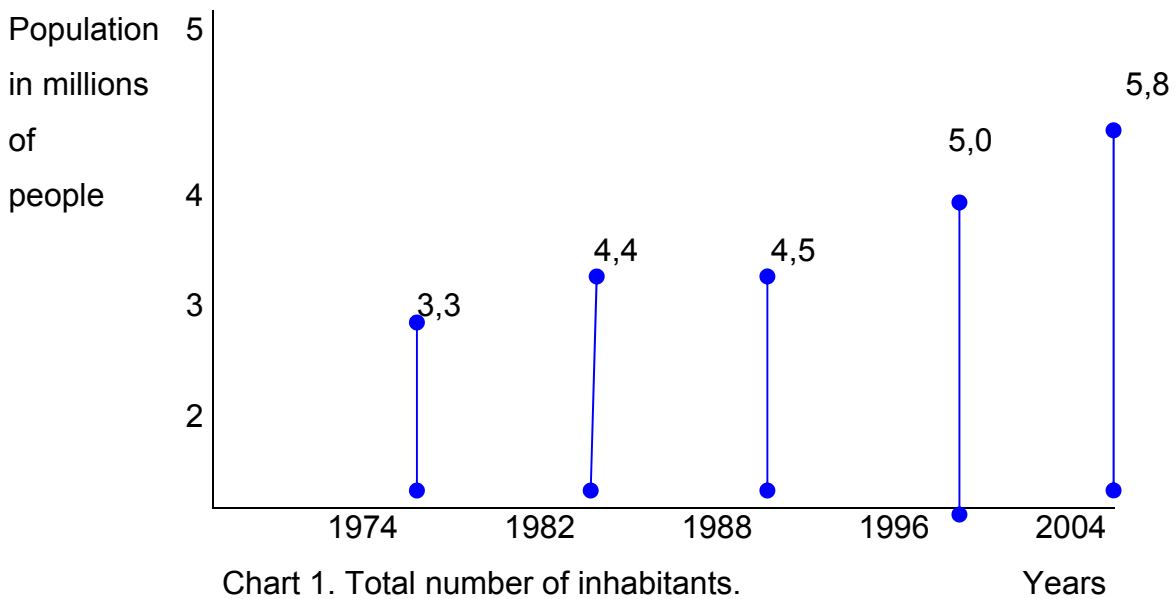
2. THE EXPANSION OF A CITY AND ITS DENSITY.

The expansion of a city in constant growth, barring special topographical, geotechnical or environmental circumstances, follows an “oil stain” pattern, growing more or less concentrically.

The population density decreases as the newly developed areas move out of the centre.

Cities naturally progress in an outward direction, with the expressways or high capacity motorways acting as the “launching points” precisely because of the fact that they facilitate the ease of movement of the people living around them, although sooner or later the ring roads are completed with new urban developments.

In the case of Madrid and its periurban environment, we have data for the years in which Mobility Surveys have been conducted. The approximate data are as follows:



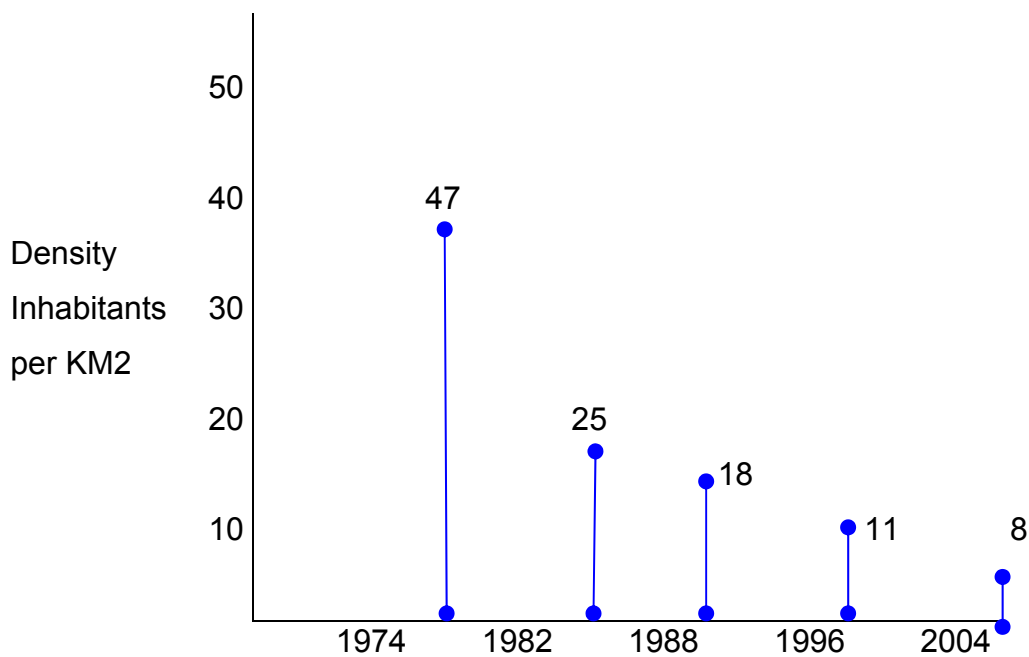


Chart 3. Densities in inhabitants per KM2. Years

The consequences of these low densities are immediate for mass public transit.

The maximum distance which a potential traveller must walk to reach the nearest station is, on average, 500 m, so that a station is effective for approximately 1 km².

The number of stations which a city with a 15 km. radius would need would be around 700 to cover the demand fully and the Madrid area exceeds this distance in many areas.

The construction and maintenance costs associated with this figure make them unattainable by any government.

The universal recipe for a practical solution is not to fill the city with underground transport.

In each case it is necessary to adopt the palliative measures that combine efficiency and the government's economic possibilities and ability to assume debt.

3. INFORMATION ON THE MADRID AREA.

3.1. Transport Macrodata

There are close to 6 million people in the city and according to the latest EDM-04 mobility survey conducted in 2004, there are approximately 10 million mechanised trips on an average workday, an increase of 52% over the previous EDM survey.

The mean number of private cars per inhabitant is 0.34 and per family, 0.97.

The number of mechanised trips on public transport has decreased from 61.3% to 54.7%, while the trips in private vehicles have increased from 38.7% to 45.3%.

The number of trips per person grew by 20% and the mechanised mobility per person rose by 32%.

Within mechanised mobility, the stages per person using public transport increased by 12% while the increase using private transport was 46%.

Under the heading of public transport, the stages per person have increased as follows:

- 46% in the Metro
- 20% in local RENFE trains
- 9% in inter-city buses
- -16% in city buses.

It is important to note that the non-compulsory increase in mobility is 88%, while the compulsory increase in mobility is only 32%. This is a clear indicator of an increase in the economic and cultural standard of living.

3.2. The Solutions

The solutions implemented in and around Madrid to improve traffic problems follow the general guidelines established above:

- In the entire area inside the M-30, which is the city centre, there is a Regulated Parking Service (RPS) which limits on-street parking and makes it more expensive.
- In certain areas, this Service has caused occasional protests but on the whole people recognise that traffic has improved, that the double and triple parking have disappeared and that it is now much easier to find a place to park.
- In actual fact, there are fewer cars on the road than there were before these measures were implemented.
- As far as public transport is concerned:
 - The underground has been enlarged and improved.
 - The services of the local train system have been enhanced and train frequency increased.
 - The airport's capacity has been increased.
 - The number of bus lanes has been increased and their use is controlled.

All of these measures are leading us in the right direction toward improving transport in general and collective transport in particular, but will they really solve the problem? No, they will improve the situation, but not enough.

4. SYSTEM ENHANCEMENTS

4.1.- More limitation on city traffic.

The regulated on-street parking now encompasses the entire Old Quarter of the city delimited by the M-30 ring road and other areas, in all some 70 has.

This measure appears to have reached its limit in terms of extension and its effectiveness will only be increased now by raising parking metre rates.

Fostering the private initiative to build conventional underground parking garages on both public and private land would increase the space available in the city for driving and rotational parking.

However, the people responsible for regulating city traffic must be fully aware that these measures are essential DISSUASIVE and NEGATIVE in that they essential attempt to prevent vehicles and people from accessing the city centre.

In the medium term, these types of measures lead to the centrifugation of the population and the decay of classical commercial activity and in the longer term to the degradation of the city centre.

Starting in the oldest parts of the city, the population is gradually replaced, since the degradation of the housing over time allows the lowest income sectors to access those homes at low costs.

In the specific case of Madrid, it is obvious that certain inner city areas now have high percentages of immigrant populations.

4.2.- Improving the Extension of Public Transport.

In terms of public transport in and around Madrid, there have been certain improvements which can be classified in some cases as spectacular.

The length of the Madrid undergrounds has increased spectacularly in recent years and significant additions to the system of approximately 33% are planned for 2007.

This is clearly noted in the EMD-04 data which show that the use of the undergrounds system had increased by 46% as of 2004.

The local train system has not increased much in terms of extension, although the duplication of the system's backbone, the Charmartín-Atocha artery, will be decisive.

As of the EMD-04 survey, the use of the local train system had increased by 20%.

While the network of inter-city buses has not grown in terms of infrastructures, it has improved in terms of the number and frequency of services.

However, the plans to install bus lanes on the main highways leading into Madrid may increase their efficiency and usage.

The drudge of public transport is the Empresa Municipal de Transportes de Madrid (EMT) which operates the city buses. As of the EMD-04 survey, the use of city buses had dropped by 16% and there are no significant data which would indicate that this trend is going to change.

The establishment of city bus lanes and the attempts to make city buses more respectable will have only a slight impact on their use.

The number of taxi rides (1.5%) is insignificant. A high percentage of tax usage takes place at large intermodal transport centres (airports, stations, etc.).

4.3. Improvements to Transport Infrastructures

There are ambitious transport infrastructure projects underway in and around Madrid which will undoubtedly help to palliate the existing traffic problems.

One of these is the renovation of the M-30 ring road, a project surrounded by controversy due to the high costs and the inconveniences caused to drivers while the work was being done.

However, it is technically unquestionable that the increased capacity and smoothness it will afford urban traffic will divert a significant number of travellers who now cross through the old quarter of the city.

The arterial roads around Madrid have gradually increased their market share of road connections with the population centres outside of the city. As has always happened with highways, these roads have seen new urban developments spring up around them.

The enlargement and enhancement of the Barajas Airport has converted it into a generator of new origins and destinations which gradually become more noticeable.

There are numerous other projects of a lesser magnitude which currently underway or in the planning stages but which are omitted here so as not to lengthen this presentation unnecessarily.

All of the measures, as mentioned above in section 4.2, are correct and they fulfil their mission. But are they sufficient? No.

The most significant chapter of the EMD-04 survey is the one which indicates that despite the traffic limitations and congestion, private vehicular traffic jumped from 38.7% to 45.3% and the use of public transport dropped from 61.3% to 54.7%.

4.4.- Causes of the Underutilisation of Public Transport

From the foregoing data one reaches a worrisome conclusion:

WITH CLEARLY IMPROVED URBAN TRANSPORT, USAGE LEVELS DECREASE

The causes are not difficult to understand.

- The starting and ending points of users are located in more extensive and less dense environments.

Under these circumstances, the powerful modes of public transport (metro, trains) become less effective.

- Users need to travel longer distances and the diversity of zones makes it almost impossible to use a single mode of transport. The total time required to use public transport increases in way which is unacceptable to users.
- The access points to public transport networks are located far away from users' homes and when they try to access them in their own vehicles they encounter serious parking difficulties.

5.- SOLUTIONS

5.1.- Improve Traffic and Transport Surveys.

In this presentation reference has been made repeatedly to the EDM-04, which is well done.

However, it falls short in terms of the need for additional data in order to improve the efficacy of the system.

It is necessary to move on to a second, much more ambitious phase of the study. For each population centre, the possible destinations or foreseeable travel of the population should be broken down.

For each one, the alternatives available to users should be studied and the real travel time and waiting time involved from the time they leave their homes until the time they arrive. The study should include a look at which options they will choose and why.

With these data, traffic engineers could study ways to optimise the use of the system.

Obviously, the cost of such detailed engineering studies is high, but their usefulness would more than justify the investment.

The person making this proposal is perfectly aware that the people “responsible” for roads would much rather spend their money on concrete, which can be seen, rather than on “grey matter” which is less visible, but the fact remains that it must be stated with conviction.

A 25 M€ investment would provide many specific solutions to improve public transport.

5.2. Improve the Efficacy of the Transport System.

The issues that are most important to users when making the decision to use public transport are that the total travel time is as short as possible and that the price is reasonable.

To achieve this, the following channels are proposed:

- Mixed public-private transport.

Users start out in their private vehicles and park in a parking area next to a mode of public transport with convenient connections and a total cost which is equivalent to a bus or underground ticket.

- Reduced waiting and walking time at interchanges.

There are too many “endless corridors and staircases”.

At each transport node, faster and more powerful connections must be studied (lifts, rolling walkways, etc.).

The maximum amount of time users are willing to spend in an intermodal interchange is about 5 minutes.

- Improved underground-bus connectivity.

At each underground exit, users must be able to see which buses are close by, where they are going and where the stops are located. The overall signage has to be improved. Some stops may have to be changed to improve transfers.

- Connection of taxi stops with public transport.

Numerous users might use public transport for long distances and take taxis at the place of origin or destination.

6.- INTERCHANGES.

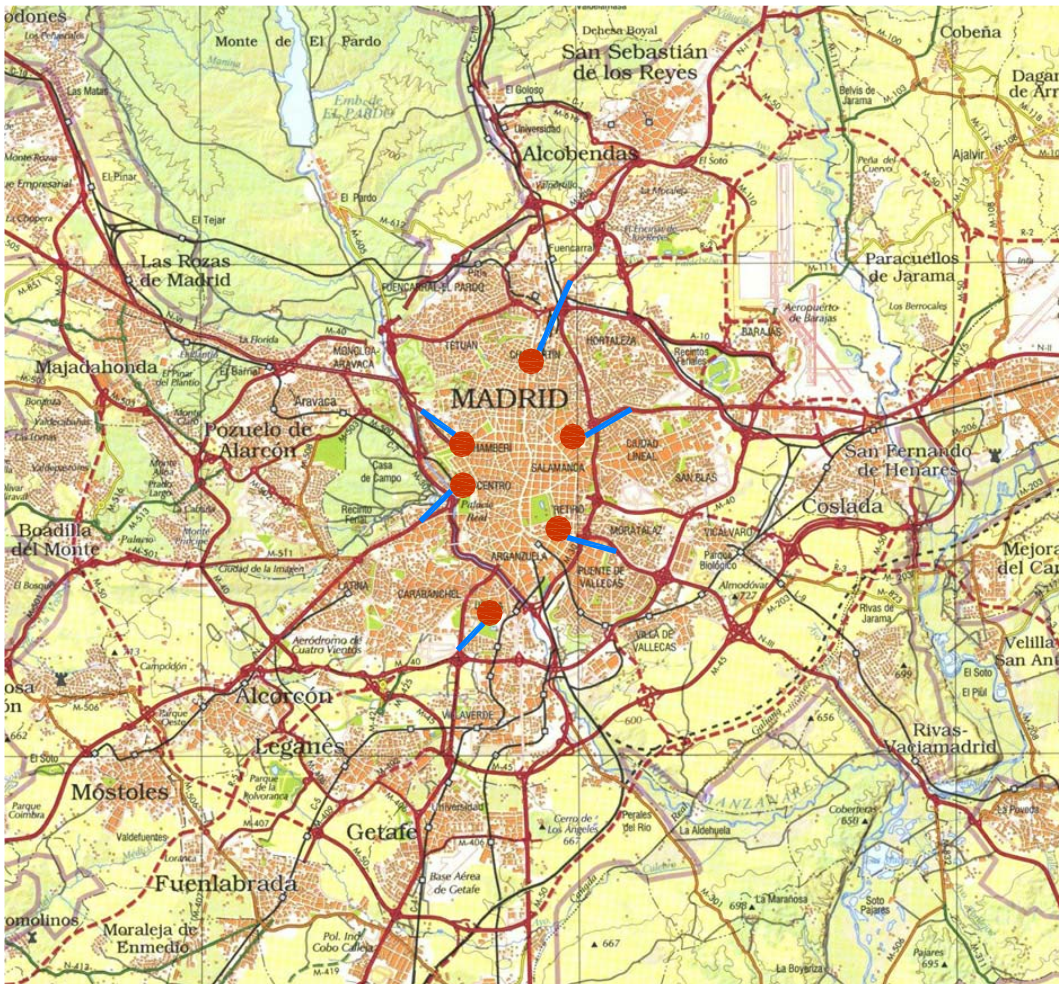
The word interchange is commonly used to refer to those locations where different types of collective transport converge.

We propose expanding the concept of public transport interchanges to include the concept of dissuasive parking areas with a mixed public-private transport system.

6.1.- Transport Interchanges.

At this time, there are plans to implement 6 modal interchanges in and around Madrid, which is a step in the right direction in favour of multimodal travel.

The new Barajas Airport as well as the Chamartín, Nuevos Ministerios and Atocha train stations already make provisions for well-studied modal interchange connections for mass transit.



In addition, new or improved multimodal interchanges are underway at Plaza de Castilla, Príncipe Pío, Monchoa, Plaza Elíptica and Avenida de América. Without a doubt, they will improve the transit system.

These modal interchanges will provide direct access to the roads leading into Madrid.

But the concept of DISSUASIVE PARKING does not appear in all of them, even though it has already been accepted by the competent authorities to be undertaken immediately. The parking areas for private vehicles that do exist are small and charge by the hour.

At all of these nodes, the possibility of external users leaving their cars there would foster the use of public transport.

Today, these types of parking areas exist at:

- Barajas Airport, near terminals T-1 to T-3, where an Extended Stay parking area was implemented several years ago which is very popular.
- The RENFE train system in the Community of Madrid have more than 20,000 parking spaces at different stations which are very successful.

6.2.- Dissuasive Interchanges. Justification.

As mentioned above, the use of a mixed public-private transport system requires DISSUASIVE parking areas which enable users to do part of the trip in their own private vehicles.

The EDM-04 survey showed that in and around Madrid, there are 4.5 million private vehicles on the roads on any given workday.

Attracting just 10% of this total to dissuasive parking areas would require 225,000 parking spaces.

The budget outlay necessary to provide these parking spaces would be 2,000,000,000 euros, which would produce direct annual revenues of some 50 million euros plus 125 million euros due to the increased use of public transport.

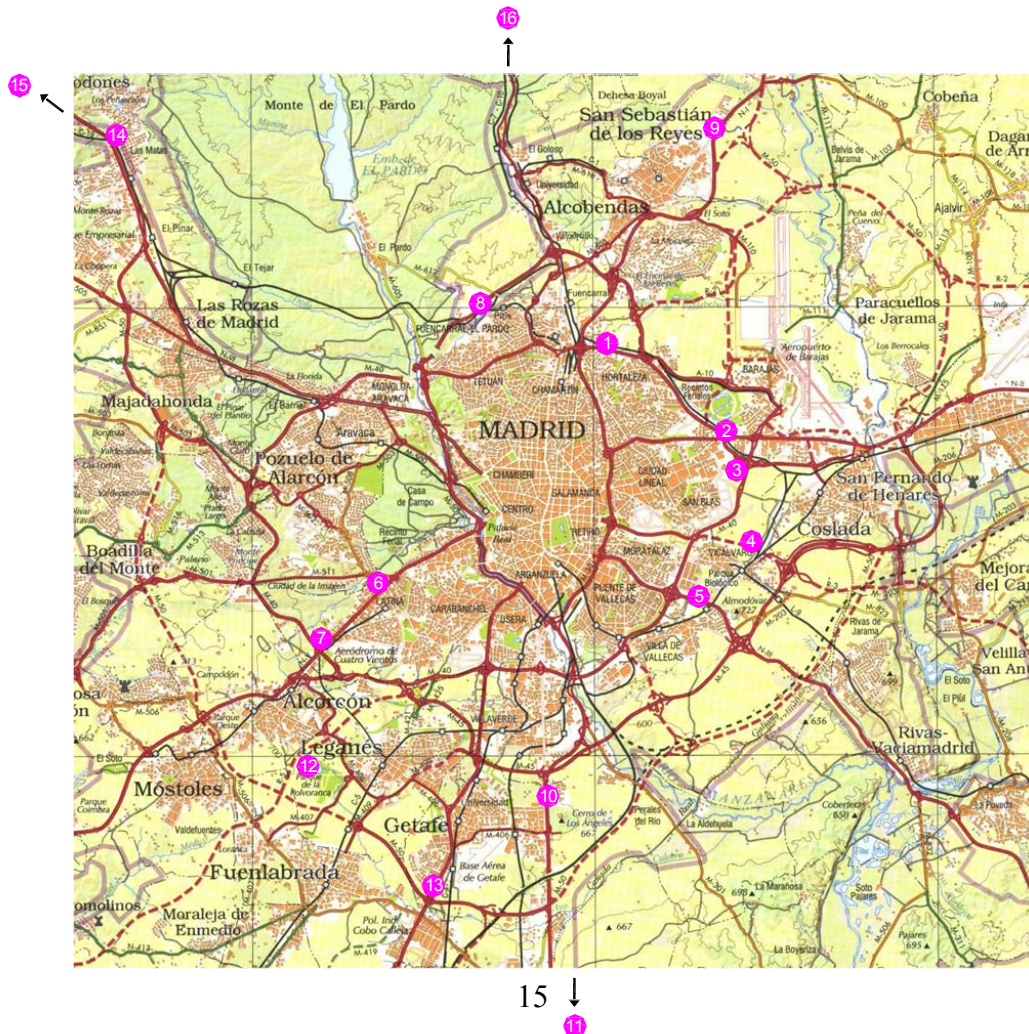
6.3.- Dissuasive Interchanges. Functionality.

In order for a dissuasive interchange to be useful, it must be conceived with the following characteristics:

- Easy access by private vehicles from the catchment area
- A design which enables user to connect to the public transport system in 5 minutes from any parking space and on any platform.
- Since the volumes will be considerable, they should have mechanised, well lighted and well ventilated mechanised walkways.
- There should be a security system for pedestrians and vehicles so people are not afraid to use them.
- The maximum price of a daily ticket should be similar to that of a one-way bus or underground ticket.
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6.4.- Dissuasive Interchanges. Location.

In the Community of Madrid, there are plans to build 16 dissuasive interchanges over the next four years out of the planned total of 54 interchanges.



7. RESERVED PLATFORMS.

In addition to the measures mentioned above, there are also plans to build platforms reserved from public transport on the main roads leading into the city.