

## LISBON EARTHQUAKES AND THEIR EFFECTS ON THE CITY' S EVOLUTION

### - From the Roman Times to the Century of Pombal -

#### ABSTRACT

It is well known that Lisbon has been affected by several strong earthquakes in the past. Some of them caused severe damage and were responsible for important changes in Lisbon's urban structure and evolution.

In fact, until the nineteenth century, the most important changes in the urbanisation and spatial organisation of Lisbon took place after the occurrence of strong earthquakes. They were clearly related to the need to respond to destruction, either by repairing the damages, or by developing new ways of planning and conceiving the city, in order to provide it with new architectural, technical, social and economic structures, able to survive similar seismic situations in the future.

We still can find today several vestiges both of the effects of the most damaging earthquakes that hit Lisbon and of the most remarkable phases of the city's urbanisation process, as well as the relationship between these two facts. Some of this vestiges date back from the Roman period or even before, while the most impressive date back from Pombal's time. Lisbon of Pombal is considered one of the most important and best accomplished urbanisation programmes of modern times.

A guided tour was specially organised for the colloquy «National Systems and Major Earthquakes: Response of the Authorities and Reduction of the Vulnerability of Buildings» (*Les Systèmes Nationaux face aux Séismes Majeurs: la Réponse des Autorités et la Réduction de la Vulnérabilité du Bâti*), in order to help identifying and characterising these vestiges in the field (fig. 1). The present paper is based on the text prepared for that tour.

#### LISBON : THE EARTHQUAKES AND THE URBANISATION OF THE CITY

Up until the nineteenth century, the major stages in the urbanisation, and administrative and territorial reorganisation of Lisbon were primarily related to the need to respond to the destruction caused by earthquakes, and to plan development that would be capable of surviving similar situations in the future.

The spatial development processes that influenced Lisbon's urban tradition had always been rooted in models that were more empirical than rational in nature. At various junctures, the city was reorganised and endowed with new technical, administrative, social and economic structures. The periods during which these measures were taken were characterised by specific historical circumstances in which references and facts of national and local importance joined together to give shape to a new conception of the city. Without a doubt, population growth and territorial expansion were factors which influenced the formulation of these measures; but, in this city, whose architectural and urban history had always been influenced by powerful physical phenomena, the earthquake played the role of providing immediate and timely motivations for fundamental responses rooted in the marriage of political action and urban culture.

Between the Portuguese Middle Ages (the twelfth century) and the end of the Modern Era (the end of the eighteenth century) we can identify four historic points at which the above-mentioned type of scenario framed the process of Lisbon's organisation (whether through the reorganisation of the existing spaces or the creation of new developments). Chronologically, these points are located in the twelfth, fourteenth, sixteenth and eighteenth centuries, and correspond as well to particular phases in the history of urbanism in Portugal, with special relevance for Lisbon.

The city which was conquered by King Afonso Henriques from the Moors in 1147, ended up in ruins, not only because of the war, but because of the earthquake that struck that same year. The territorial and administrative organisation that was to transform the Muslim fortress and neighbourhoods into a Christian city, faced a completely ruined town. For this reason, the decision was made to keep the city's basic street plan with its ancient linear, organic foundations, and to renovate the buildings within the old walls between the Castle and the river, and along the Cathedral hillside and slope, integrating the ruins as archaeological reminders.

Within this organic Medieval street plan, deeply influenced by the city's specific topography and geography, Lisbon was rebuilt around important architectural projects such as churches, palaces and convents. Its physical, visual and urban limits were the reconstructed old walls.

During the fourteenth century, Lisbon was hit by several earthquakes with the severest consequences resulting from those of 1321 (destruction of many houses on the slope between the Castle and the river, and of the chancel of the cathedral), 1334 (destruction of buildings and collapse of the Cathedral dome) and 1356 (widespread destruction in the city and in the surrounding neighbourhoods of Alfama and S. Francisco, and panic among the population).

Meantime in 1352, the court made Lisbon its permanent home, with the city becoming Portugal's capital, resulting in a generalised recognition of its political, strategic and economic importance. By then, Lisbon had spread far beyond the old city walls, occupying the Baixa (Lower) Valley, and the neighbourhoods of Alfama and São Francisco and Carmo slopes.

A number of legislative and urban improvement measures for the city had previously been taken, leading to the systematic occupation of the area along the river, the sedimentation of the arm of the Tagus river that reached up into the Baixa Valley, and this area's subsequent development.

Beginning in the mid-fourteenth century, Lisbon took on a new framework based on a different urban model. The Baixa and the western slopes were rapidly occupied not only by those arriving from other parts of the country to pursue mercantile and commercial activities, but also by great numbers of people moving there from the old centre. The new neighbourhoods were better planned, the air was fresher there and the buildings were stronger. Although Lisbon was still a Medieval city, it had now a rational basis and was laid out along more orderly lines.

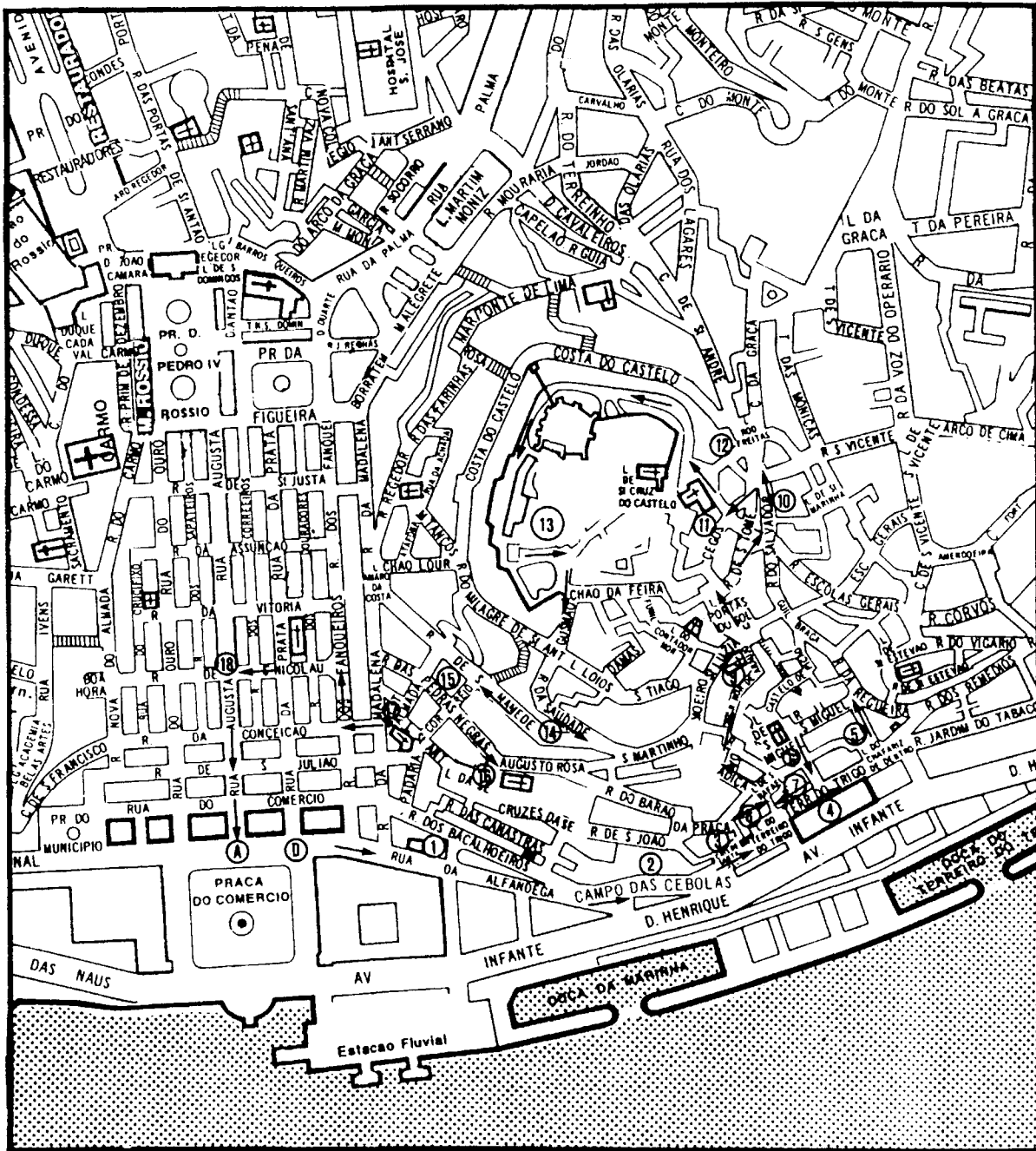
The new walls that King Fernando built around the city between 1373-75 not only helped defend the city from the Castilians, but also conformed its new profile, taking in the neighbourhoods which had grown up during the century. When King João I armed Lisbon's governors in 1395, he formalised the Medieval city's status as the Portuguese territorial and specialised functions administrator.

The earthquakes that hit Lisbon during the sixteenth century are remembered by the way they affected the old city (which continued to be rebuilt along the same lines) and the outlying neighbourhoods (where new solutions were tried out). Documentary references specifically mention the quakes of 1512 (destruction of many new and old buildings and partial submersion of the river front by the Tagus), 1531 (widespread destruction and a significant number of casualties) and 1597, which hit hardest in the western neighbourhoods beyond the city walls opening up a fissure in Belfry Hill, between Chagas and Santa Catarina which «swallowed» three streets.

As a direct result of the 1512 earthquake, King Manuel enacted a number of urban measures concerning improvements, vehicle circulation and the conditions for construction; while the development of Vila Nova de Andrade laid out in 1513 in what was to be the first phase of the neighbourhood of Bairro Alto, underwent rapid growth because once again former residents of the city's old historical centre and river front moved into new areas beyond the city walls.

The 1597 earthquake led to the developing of Bica and Boavista neighbourhoods during the following century, according to a basic model composed of small units set down in a hierarchically-structured «rectilinear outline». The configuration of the neighbourhoods of Bairro Alto, Bica and Boa Vista represent major accomplishments of sixteenth and seventeenth centuries Portuguese architecture, as well as important references in the history of Lisbon's urban development.

# ITINERARY



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- **Figure 1:** Itinerary of the Guided Tour (D- Departure; 1- Conceição-Velha Church; 2- Casa dos Bicos and Casa das Varandas (Terrace House); 3- Chafariz (Fountain) d'El-Rei; 4- Old Celeiro Público (Cereal Warehouse); 5- Chafariz (Fountain) de Dentro; 6- S. Miguel Church; 7- Alcaçarias (Site of the Former Thermal Springs); 8- Rua da Judiaria (Jewish Street); 9- Santa Luzia Church; 10- 17<sup>th</sup> Century Traffic Sign (Rua do Salvador); 11- 16<sup>th</sup> Century House in Rua dos Cegos; 12- 16<sup>th</sup> Century House in Largo do Menino Deus; 13- Castelo de S. Jorge (Saint George's Castle); 14- Roman Theatre; 15- Penafiel Palace; 16- Sé (Cathedral); 17- Baixa (Downtown); A- Arrival).

But it was without a doubt the earthquake of 1755 that most influenced the city's urban future. The destruction caused by the quake and the subsequent tidal wave and fire, the political context of the enlightened of the time and the maturity of the urban philosophy of the Portuguese architects and military engineers made possible the conception of a rational model based on a rectangular grid of large blocks and broad directional axis, where architecture came to be conceived as a scenario for urban spaces.

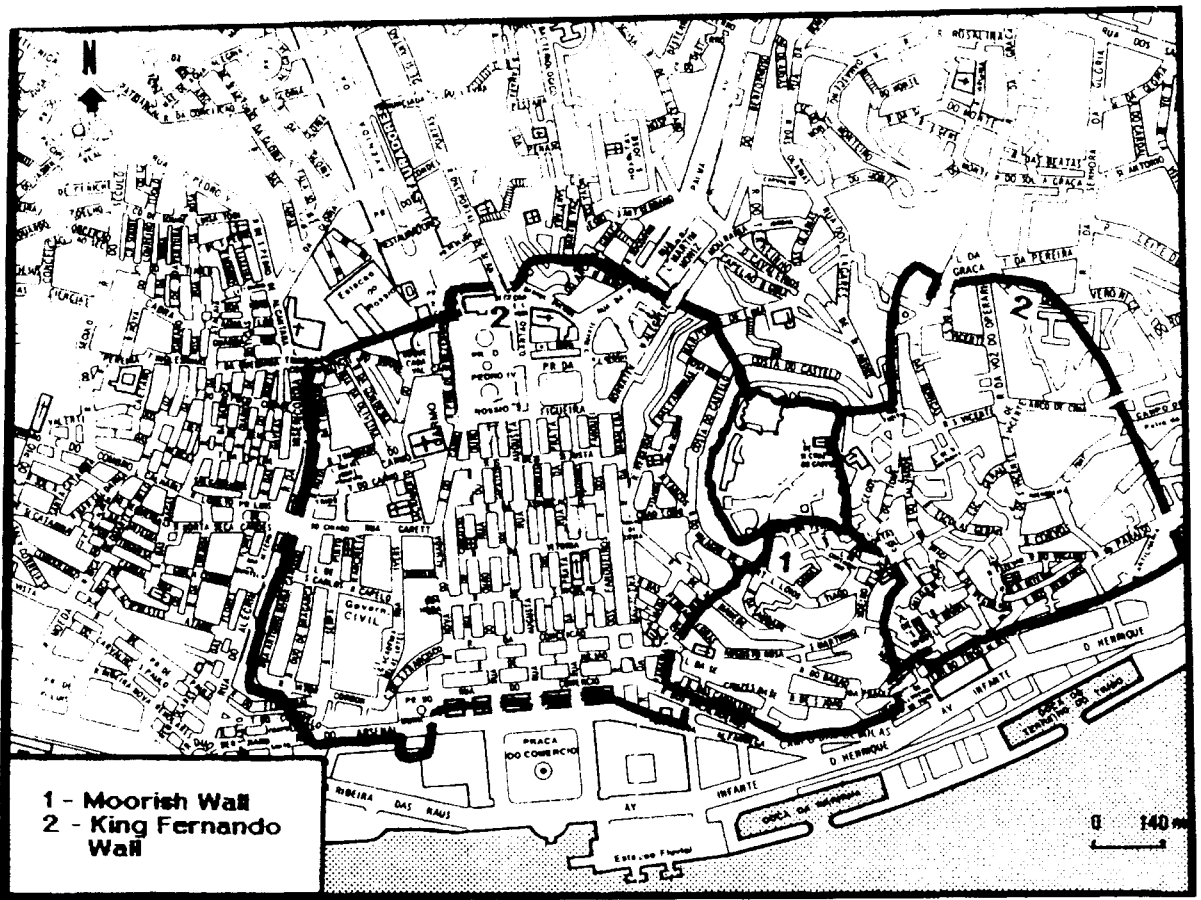
The methodology of conception and execution thoroughly rooted in technical-construction processes by efficient urban legislation, made the reconstruction of the city an exemplary case of rationality and modernity. The City was conceived of as whole, with its centre in the Baixa and other important areas in its western sector (the neighbourhoods of Principe Real/São Bento and Lapa). The development of the eastern sector, continuously postponed, in spite of several nineteenth century proposals, only came about in the second half of the twentieth century, with the institution of models for historical renovation (Fig.2 and Fig.3). Any journey through the old parts of Lisbon brings one into contact with numerous traces of this city which was always rebuilt in the same place, expanding outward from this point. But in addition to these monumental testimonies, the city preserves reminders of countless places and urban spaces which were incorporated, and at time reformulated into new reconstruction's. It is this remarkable quality of having always incorporated its most ancient layers that makes Lisbon the best narrator of its own story. The city, bearing memorials of the various epochs of its history, stands as an authentic memorial itself.

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- Figure 2: Plan of Lisbon in the 16<sup>th</sup> Century.



- Figure 3: The Moorish and King Fernando Walls in Today's Lisbon.

## GOING UP THE CASTLE HILL

### *Alfama*

Alfama was built on the eastern slope of the Castle hill, overlooking the river, and it has managed to keep its traditional historical characteristics throughout the centuries. This quarter includes today the parishes of São Miguel, St° Estevão, Sé, Santiago, Castelo as well as part of São Vicente.

Both its geographical location and topography account for Alfama's unique characteristics. Despite a close relationship with the river nearby, it was able to keep some inferiority and a considerable privacy, favoured by the twelfth century Muslim urban model. On the other hand, successive flows of a great variety of people gradually allowed for a heterogeneous but rather pleasant social tissue.

Alfama's typically medieval image is well known and has become a symbol of Lisbon itself. The labyrinth-like structure and the network of narrow streets and lanes, cobblestone stairs and small squares reflect both the cultural heritage of the Muslim urban model and an empirical knowledge of space occupation and organisation.

### *Alfama - a Muslim residential area*

The first urban settlements were built on the eastern slope of the Castle hill a long time ago. In spite of the exiguity of space and the irregular topography, the area was rather attractive since it faced south and had plenty of water. In the second century, during the Roman occupation, the discovery of thermal springs with

healing potential led to the building of leisure resorts, thermal facilities and fountains, attracting the inhabitants of Olisipo<sup>1</sup>.

During the Muslim occupation, between the eighth and the twelfth century, the thermal industry flourished and some aristocrat families built their residences in the area. The quality of the water or of the place itself are apparently in the origin of the name "Alfama". According to tradition, the toponym "Al-hama" means "hot spring", "good water" or simply "beautiful place".

There were several paths that run along the riverbank and the city wall towards the city. Alfama's inhabitants used to go in and out of the Muslim medina through the ancient wall that surrounded the city, using two doors later called *Portas de São Pedro* and *Portas do Sol* (Fig.4).



- **Figure 4:** Former Moorish Wall Gate "Arco Escuro" (in V. da Silva, 1987).

#### *MEDIEVAL ALFAMA*

When King Afonso Henriques conquered Lisbon from the Moors in 1147, Alfama was abandoned. During the siege the local inhabitants moved to the medina while the Christian troops and the crusaders took strategic positions along the riverbank and near the south-eastern gate of the Moorish Wall. The Christians used precisely *Porta de São Pedro* to occupy part of the walled city.

Following its incorporation in the kingdom of Portugal, the city was subject to a new administrative and territorial organisation and adapted to the Christian social patterns. Temples were built according to the ancient religious structure of the Visigothic age and parishes were created inside the walled Christian city, while rural communities developed gradually in the outskirts.

The Old University (*Escolas Gerais*) was established in the thirteenth century (around 1240) and remained in Lisbon until 1537, when it moved definitely to Coimbra. There is still a street named after the University (*Rua das Escolas Gerais*), exactly in its former site.

The development of the medieval quarter of Alfama followed the Muslim urban model with its organic and irregular labyrinth-like structure. Three main streets (*Adiça*, along the wall, *São Pedro* and *São Miguel*) could be already identified in the network of narrow streets, stairs and small squares. They were all oriented towards a church, according to the traditional pattern, ending in squares that were also centres of social contact and commerce.

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<sup>1</sup> Roman name for Lisbon

Largo do Chafariz dos Cavalos, by the river, was the most important and liveliest public space in town. It was later called Chafariz de Dentro<sup>2</sup> when it became part of the city, after the King Fernando Wall was built in

the fourteenth century. Local people and travellers used the square for leisure and water supply. The regular market and periodical fairs usually took place there as well, expanding to Rua de São Pedro and to the seashore.

The population grew considerably in the thirteenth and fourteenth centuries, specially with the arrival of Christians, Moors and Jews, as well as mixed Christian-Muslim families. Although there was a high number of craftsmen and sailors, the trade of agricultural products and handicraft was the main economic activity. Activities related to the river and the sea were also relevant, as well as those related to the thermal industry.

A significant Jewish community settled in Alfama in the fourteenth century. Their main activity was commerce. They had their own legal statute and most of them lived in Rua da Judiaria (Jewish Street) and in the surrounding area. Alfama remained a favourite quarter for the Jewish population for a long time, even after King Manuel abolished the Jewish ghettos. There is still a number of signs of the Jewish presence in Alfama, such as the above-mentioned Rua da Judiaria.

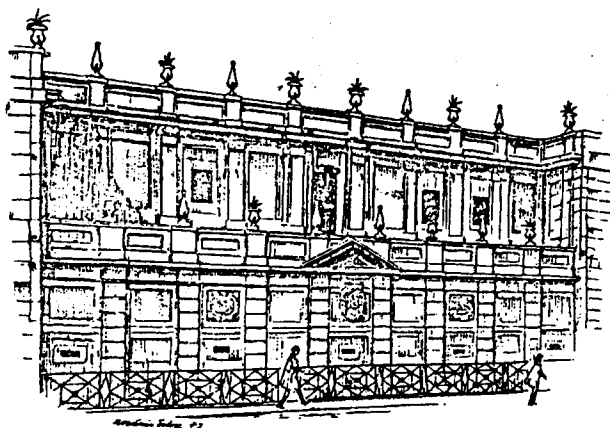
Meanwhile the city had grown considerably down the slopes of the Castle hill. During the political crisis of 1373-1375, the threat of a Castillian invasion led to the conclusion that the Moorish Wall had lost most of its usefulness, both as an urban limit and from a strategic point of view. The King Fernando Wall was built during those critical years, enclosing and unifying a group of new and heterogeneous urban areas of relevant historical value. Vestiges of the wall and its gates are still visible today in the Castle hill.

#### *ALFAMA IN THE SIXTEENTH CENTURY*

The development of the rivershore area towards the east was particularly remarkable in the fifteenth and sixteenth centuries, during the Portuguese maritime discoveries. The new Royal Residence of King Manuel in Terreiro do Paço, by the river, led to the renewal of old traditional equipment and a number of buildings related both to internal and external trade appeared in that area - shipyards, an armoury (Tercenas Novas), a biscuit factory intended to supply both the population and the vessels and a huge Renaissance-style cereal warehouse (Terreiro do Trigo). The docks were rectified and a new water supply system and was made possible through the improvement of already existing fountains (Chafariz).

#### *- Chafariz d'El-Rei*

This wonderful building with marble pillars and arcades was equipped with six taps and its utilisation for domestic and ship supply was subject to regulation. Three further taps were added in the eighteenth century and the upper part was built and decorated in the nineteenth century (Fig.5).



**- Figure 5:** Chafariz (Fountain) D'El-Rei (in J. D. Lisboa, 1973).

<sup>2</sup> Chafariz de Dentro means «Fountain inside the wall»

- Chafariz de Dentro / dos Cavalos

It was apparently built in 1285. It was improved in the sixteenth century, when a number of horse-like bronze taps (to match the fountain's name Cavalos, meaning horses) were added.

- Chafariz da Praia

It does not exist any more. It was placed right in front of Chafariz de Dentre and was used mainly for ship supply. A water pump-house was built on its site.

- Alcaçarias

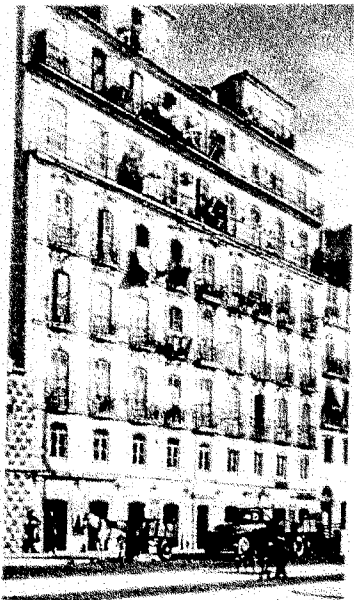
It has also disappeared. It was built in a small square, today called Largo das Alcaçarias, between Chafariz d'El-Rei and Chafariz de Dentro, and people used it to wash clothes, leather and wool.

New houses were built in the wall itself, leading to significant changes in the warehouse area between the market (Mercado da Ribeira, today Campo das Cebolas) and Chafariz de Dentro. These houses had usually two or three floors. Their owners were well-off merchants belonging to a bourgeoisie which had slowly developed with the maritime activities and also a few foreign merchants. The wall gradually despaired as the new houses were built. The «Ribeira terraces», a group of houses with galleries and terraces overlooking the river, became famous.

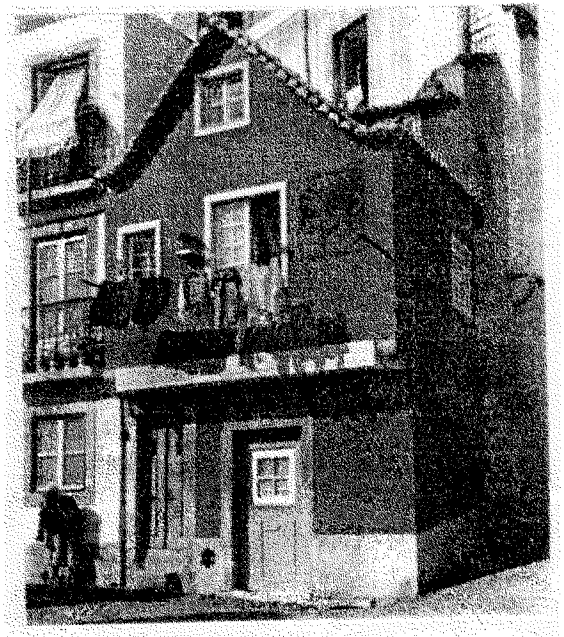
The wall had a considerable number of gates opening to the rivershore. Some of them became part of buildings, while others were replaced by Pombal-style houses or more recent buildings. Some important buildings in this area were severely damaged by the earthquake of 1755 and were rebuilt afterwards:

- Casa das Varandas (Terrace House)

It was built in the sixteenth century and rebuilt after the earthquake. The upper floors, with large terraces, were added in the nineteenth century and built in the fashionable style of that period (Fig.6).



- **Figure 6:** Terrace House (Casa das Varandas)  
Today (in J. A. França, 1987).



- **Figure 7:** 16<sup>th</sup> Century House in Rua dos Cegos

Although the urban structure of Alfama had already been defined in the medieval period, it was completed in the sixteenth century, when a considerable number of houses was built along the main streets (São Pedro, São Miguel, Judiaria and Regueira), all in the characteristic style of the sixteenth and seventeenth centuries - projected façades, solid stone external angles and narrow gables (Fig.7).

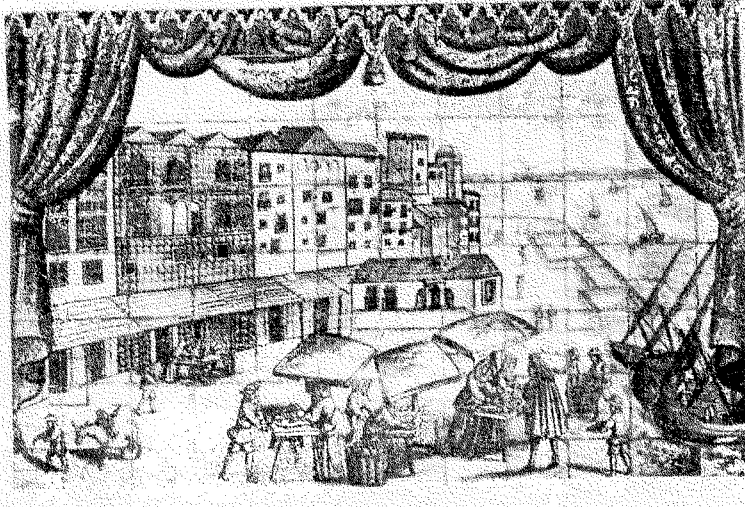


## - Conceição-Velha Church

Its former name was Misericórdia Church. It was almost totally destroyed by the earthquake of 1755. It was rebuilt on the same place, and the former side-door of Misericórdia Church became the facade of the new church.

## - Casa dos Bicos

It was first built in 1521-1523 and it was owned by the Albuquerque family. The *façade* still exists, richly decorated with stones in the shape of pyramids like the Diamond House in Ferrara, which was built approximately in the same period. Two of the doors were built, however, in the Portuguese King Manuel-style. It had originally four floors, two of which were destroyed by the earthquake of 1755 (Fig.8 and Fig.9).



- **Figure 8:** Casa dos Bicos in the 16<sup>th</sup> Century and Ribeira Velha Market (in F. Castelo-Branco,1969).



- **Figure 9:** Casa dos Bicos Rebuilt after the 1755 Earthquake.

The building was slightly changed and some modern elements were added in 1983, when it was used for the 17<sup>th</sup> Exhibition of Art, Science and Culture. It has become a cultural space ever since, and it is frequently used as an exhibition hall (Fig.10).



- **Figure 10:** Casa dos Bicos Today.

## *THE EARTHQUAKE OF 1755 AND ITS CONSEQUENCES*

The earthquake and the fire that followed destroyed a considerable part of Alfama, including several churches, monasteries, palaces and private homes.

The reconstruction of Alfama did not follow a specific plan. The Public Housing Department (Casa do Risco das Obras Públicas) gave only sporadic support. There was never a general plan of urbanisation for the eastern part of the city and although some ideas were discussed their implementation kept being postponed. There was nevertheless a reconstruction plan for the seashore area which included the demolition of some remaining wall vestiges and the definition and alignment of façades.

The old Terreiro do Trigo was replaced by the imposing Celeiro Público, built in Pombal-style with the same function of its predecessor.

The palaces and churches (in particular the churches of São Miguel and Santa Luzia) were rebuilt in the sober fashionable style of the period

In the years that followed there was a strong population flow towards less affected areas. In 1758 Alfama had 4 979 inhabitants; in 1780 only 2 480 people lived there.

In the end of the eighteenth century and during the nineteenth century the population increased again, due to the rehabilitation of the thermal industry in Alfama and later to the development of industry and construction, which attracted people to Lisbon.

#### *ALFAMA IN THE TWENTIETH CENTURY - FROM DECADENCE TO REHABILITATION*

During the twentieth century and in spite of a few necessary adjustments to the life-patterns of a modern city, the quarter of Alfama kept its traditional image as well as its cultural and urban characteristics (Fig.11).



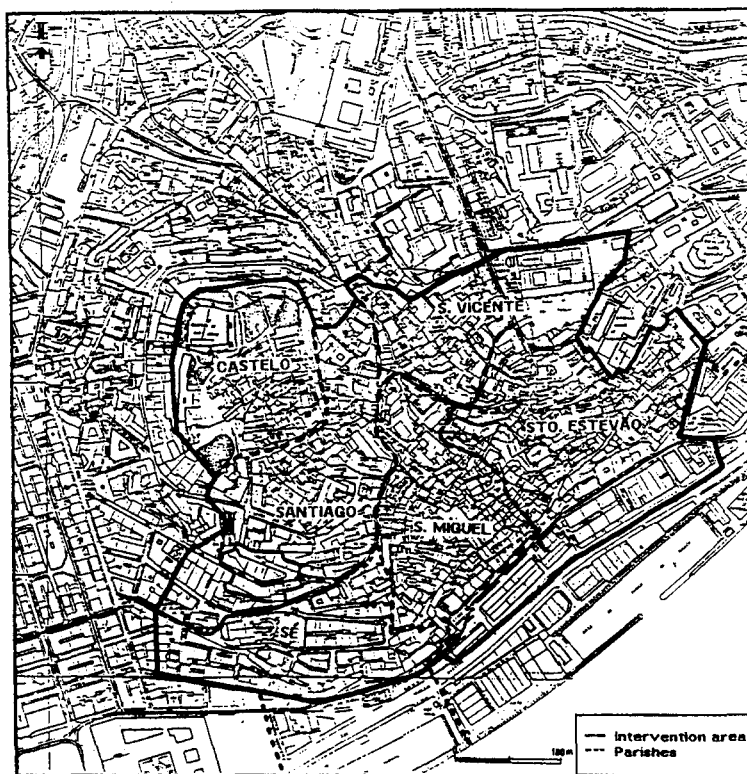
- **Figure 11:** Alfama - São Miguel Stairs (in M. Calado, 1992).

Although there was a considerable population decrease in the sixties, a trend which continued in the following decades, Alfama still has a very high density of population today (about 40 inhabitants per km<sup>2</sup>). Most of the population is old and has lived in Alfama for many years. They have low qualified jobs and work mainly in the industry, transports, commerce and in activities related to the harbour. Most of them work outside Alfama, which has changed it into a residential quarter.

In view of the progressive deterioration of the buildings, increasing social problems, inefficient or nonexistent equipment and infra-structures, the question of the recuperation of Alfama was raised several times in the past few years. The Gabinete Técnico de Alfama (Technical Department of Alfama) was created in 1985 under the auspices of Lisbon's municipality to implement a "Safeguard Plan".

The Gabinete Técnico de Alfama was established in a time of deep concern about the future of the old part of Lisbon. The problem of house deterioration, in a few areas in particular, became so urgent that it was necessary to create a special department to centralise and implement actions of urban rehabilitation.

After a first experimental phase, during which immediate action was taken to tackle the most urgent cases, the Gabinete Técnico de Alfama was integrated in the municipal services and given larger responsibilities. Its action, initially restricted to Alfama, was extended to the quarters of Sé, Castelo, Santiago and São Vicente. It now employs architects, engineers, sociologists and lawyers, in a multidisciplinary which goes far beyond the initial case-by-case approach. Technical, social and economic factors as well as specific problems of each area are now taken into account in the urban rehabilitation projects (Fig.12).



- Figure 12: Intervention Area of the Technical Department of Alfama (S.M.P.C., 1992).

The GTA was one of the first technical departments in Lisbon. It has acquired considerable knowledge and experience concerning both sociological and demographic aspects, while collecting data and information on existing patrimony and areas in need of short-term action.

Over the last seven years the GTA has taken three different types of action in Alfama:

- municipal buildings - their recuperation allowed for the definition of a specific model to be applied in similar cases; it also provided temporary or definitive shelter for low income families.

- compulsory action in private buildings - as a first step, the municipality notifies the owner, urging him to take the necessary action; if he fails to do so, it takes over the administrative responsibility and repairs the building at the owner's expenses.

- private action programmes - the owners and/or the private sector are responsible for the recuperation of their buildings. In most cases (for example, the RECRIA programme) both the Government and the municipality give considerable financial support while encouraging private investment at the same time. The amount of public support is calculated on the basis of rent values, so that low-rent buildings get higher subventions. The results of this type of action have been very positive so far. It has decisively contributed to a global improvement of

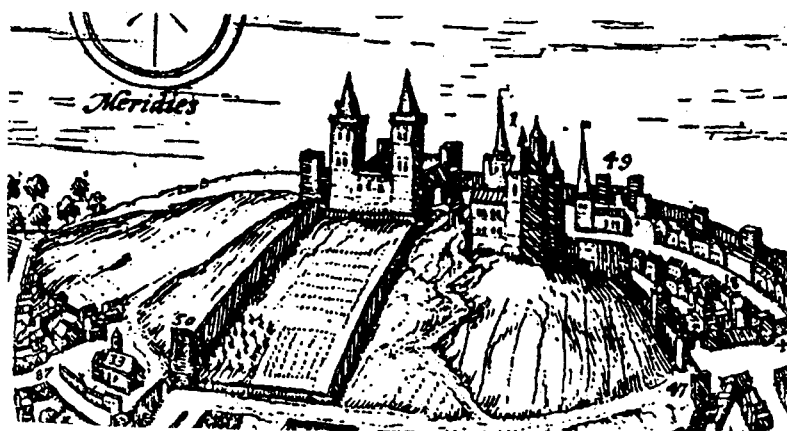
buildings and private homes, also in what concerns security, public health and comfort. On the other hand, a growing number of owners have been adopting this programme to repair their buildings. The municipality also supervises the works and gives all necessary advice, including in cases where the owner supports total repairing costs.

### *SAINTE GEORGE'S CASTLE (CASTELO DE S. JORGE)*

According to the roman texts, the Castle of Lisbon had its origins during the Iron Age.

In the eighth century, the Moors conquered Lisbon and built an impressive defence system, composed of two lines of walls : the Alcáçova, up on the hill and where the governor's Palace stood, and the city walls, known nowadays as the Cerca Moura ( Moorish Wall).

The first king of Portugal Afonso Henriques conquered the city from the Moors in 1147, with the help of north European crusaders. He used the Moorish defence system (Fig.13).



- **Figure 13:** Saint George's Castle in the 16<sup>th</sup> Century (in Braunio Plan).

In the thirteenth century, King Dinis rebuilt the hill Palace, that was to be abandoned by King Manuel, in the sixteenth century, who built a new Palace by the river in Terreiro do Paço, close to the ships of the overseas discoveries.

Long before the eighteenth century, the hill Palace was already in ruins, and finally collapsed during the earthquake of 1755. It was never rebuilt.

The site of the Castle was used for military purposes until 1938.

## **GOING DOWN THE CASTLE HILL**

### *THE ROMAN THEATRE OF LISBON*

Located between the streets of S. Mamede ao Caldas and of Saudade, in the parishes of Sé and Santiago, the Roman Theatre of Lisbon is one of the few archaeological monuments to be visited in our city.

It was found in the end of the 18<sup>th</sup> century during the reurbanization that followed the earthquake of 1755. By then, the royal architect Fabri made some archaeological excavations in the theatre, which allowed him to draw a plan and upright projections of the area surrounding the stage.

After the excavations and registers by Fabri, new houses were built on the theatre used as a real stone-pit, and the new buildings made use of many of the Roman stones that the royal architect had still seen in their original place.

In 1964 Dr. Fernando de Almeida started what we may call "the modern excavations" developed in 1966 and 67 by Dr. Irisalva Moita.

If the main object of the 1960's excavations was to recover the "memory of the theatre" digging up part of the stage and the first rows of seats, the present excavations which we began in June 1989, have as its principal priority the study of "the memory of the city", trying to articulate the diggings of the big public Roman building with the later constructions.

The site where the Romans built the theatre was later on an area of intensive urban occupation. Although already destroyed in the early 5<sup>th</sup> century, its remains settled the urbanism of the area up to the Pombaline reurbanization.

Built during the principedom of Augustus, possibly in the end of the first century B.C., the Roman Theatre of Lisbon suffered large modifications in its noblest parts (stage and *orchestra* ) in 57 A.D., when it was dedicated to the Emperor Nero. Demolished during the late IV, early V century, the ruins were used to build some humble houses.

The area already excavated uncovered a strip going from the stage to the peribolum walls, the North limit of the upper seats.

#### *THE PENAFIEL PALACE*

Although the present plan of this palace dates from the middle of the 19<sup>th</sup> century, it was originally built in the end of the 18<sup>th</sup> century, according to the Pombaline reurbanization. At that time, in 1772, the diggings for the foundations uncovered the remains of a Roman building very well characterised by a nowadays lost inscription: «the Cassius baths». Unfortunately none of the vestiges found at the time were preserved.

In 1991, the Ministry of the Public Buildings decided to construct an underground garage in the gardens of the palace. According to the known archaeological interest of the site, we were called by the Direcção-Geral de Edifícios e Monumentos Nacionais to do the archaeological excavations prior to the building of the garage.

Although the excavation allowed us to register the urban evolution of the place up to now, the more interesting remains belong to a Manueline palace (early 16<sup>th</sup> century) corresponding to the golden era of the maritime commerce with India and naturally to the development of the public and private buildings in Lisbon. Curiously, the palace shows important modifications dated from the reign of King João V, in the beginning of the 18<sup>th</sup> century, another important period in the history of the city, and related now to the gold traffic from Brazil.

The palace was to be destroyed in 1775, by the big fire that followed the earthquake. At the time it belonged to the nobleman Luís de Portugal.

The remains only allow us to know the plan of the ground floor: the main entrance was turned to the West through an atrium paved with black and white stones composing a geometric pattern. In the left side of the atrium a marble stairway stood, leading to the noble floor.

The stables were South to the atrium and, in a second room to the East, we were able to find the coach-house with a large direct entrance to the street. The remaining rooms were used for storing and for the servants quarters.

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#### *LISBON CATHEDRAL (SÉ DE LISBOA)*

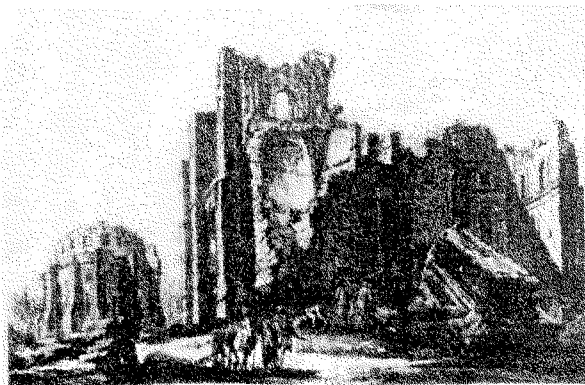
The Cathedral (Sé) is Lisbon's oldest and most important church. It is devoted to Saint Mary. Its architectural and artistic characteristics reflect many significant moments of Portugal's history and culture.

The construction of the Sé began in 1147, right after King Afonso Henriques conquered Lisbon from the Moors.

According to available data, a Muslim mosque may have existed there. Some visigothic carved stones were also found in the walls of the church during the rebuilding periods that followed its destruction by the earthquake of 1755. In fact, the stones may prove the existence of a former visigothic temple, but they also could have been brought from other places and used there to build the new church (Fig.14).



- **Figure 14:** Lisbon Cathedral in the 16<sup>th</sup> Century (in Summavielle, 1986).



- **Figure 15:** The Cathedral after the Earthquake of 1755 (in Summavielle, 1986).

The Cathedral was severely damaged by several earthquakes, particularly by those that occurred in 1344, 1531 and 1755. It was therefore reconstructed and repaired frequently, which led to a pleasant coexistence of styles still visible today (Fig.15).

The building of the Cathedral occurred mainly in two periods : the romanic (late 17th century ) and the gothic (13<sup>th</sup> and 14<sup>th</sup> centuries).

The building's façade looks like a fortress. It has two solid square bell-towers with battlement and window slits. On the top of each tower we can see a gothic window.

In the middle of the façade, the main door of the church is composed of four archivolts in romanic style. Above the door, a rosette is to be seen (Fig.16).



- **Figure 16:** The Cathedral Today.

The cloisters date from the 13<sup>th</sup> century, but they have been rebuilt and modified several times.

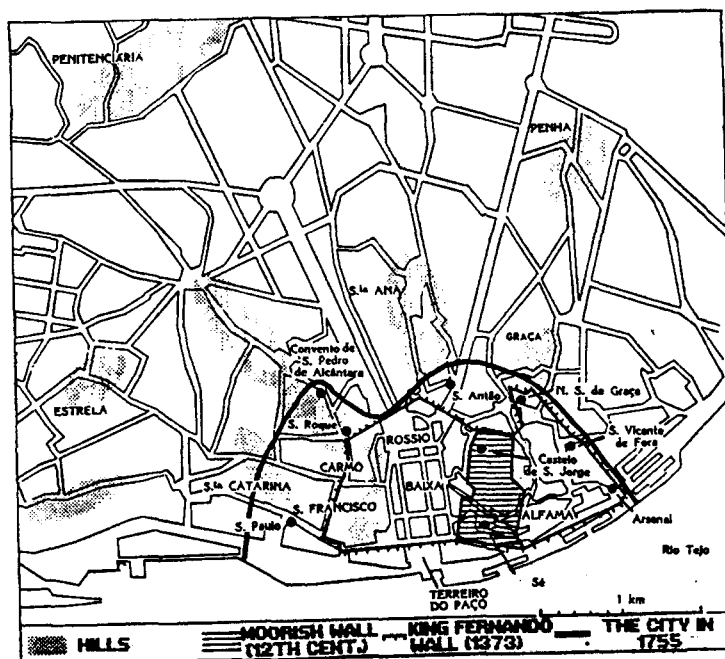
Until 1755, the Sé had a clerestory, a prominent structure above the church transept. It collapsed completely during the earthquake and was never rebuilt.

## LISBON OF POMBAL

### THE BAIXA (DOWNTOWN)

#### BEFORE THE EARTHQUAKE

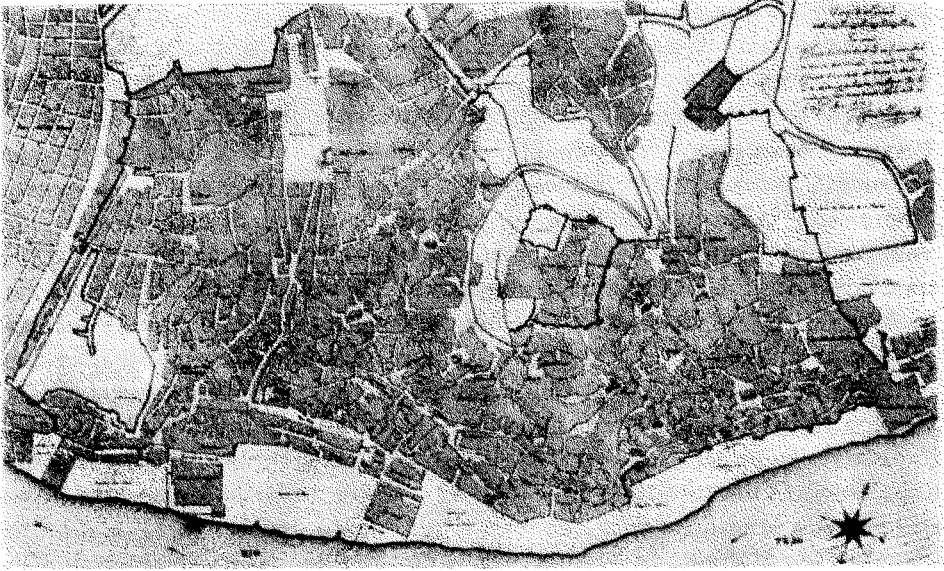
The city destroyed by the earthquake in 1755 had been built along the right bank of the Tagus, from Pedrouços and Belém to Xabregas, with a growing urban concentration towards the centre. The most densely populated area of the city began in São Paulo, up to São Pedro de Alcântara and Alto da Graça, then down again to Santa Apolónia in the east, including the old quarters of the Castle and Alfama, perched high up the hill, and to the lower part of the city or "Baixa", which had been built on a former arm of the Tagus (Fig.17).



- Figure 17: Urban Evolution of Lisbon before 1755 (in J. A. França, 1987).

The only available document showing the topography of Lisbon before the earthquake of 1755 is the plan drawn by Joao Nunes Tinoco in 1650, since the more accurate plan drawn by Manuel da Maia in 1719, showing the destroyed city, is lost (Fig.18). A thorough analysis of Tinoco's plan shows that between 1650 and 1755 there were very few changes in the topography of the area which was most severely damaged by the cataclysm. In 1755 it still looked like a labyrinth, with a typically medieval, densely concentrated urban image, squeezed between the Castle hill in the east and São Francisco hill in the west, but already opening towards the two squares - Terreiro do Paço and Rossio - which will survive the earthquake. A few imposing buildings rose amidst the labyrinth of houses and streets: the old Paços de Alcáçova, a former Royal Residence abandoned in the beginning of the sixteenth century, and the Royal Residence Paço da Ribeira, facing the river in Terreiro do Paço, built during King Manuel's reign and further improved in the following reigns. Its high dome, designed by Terzi, dominated the most important axis of the city. It was surrounded by the most important, public buildings: the customhouse, the House of India, the shipyards and, on the east side, the Misericórdia Church, with its King Manuel-style door, Casa dos Bicos with its bewildering facade, the Bragança Residence and Ribeira Velha, the main fish and vegetable market. A magnificent group of buildings, in particular the Royal Hospital de

Todos-os-Santos and São Domingos Monastery, ennobled Rossío. On the north side of this square, the Estaus Paçace became the headquarters of the Inquisition Court during the reign of King Joao III.



- **Figure 18:** Plan of Lisbon by J. N. Tinoco (in J. A. França, 1987).

A number of important buildings appeared during the reign of King Joao V, as the city expanded towards the west: Palace of Necessidades, Palace of Belém, the Patriarcal Church, the Opera House (opened in 1755 and immediately destroyed by the earthquake), Ludovici Palace in São Pedro de Alcantara and several beautiful fountains, some of which still exist today. The Aqueduct of Aguas Livres, a remarkable engineering work, was finished in 1744, but it did not change the city's general appearance, as it was away from the centre. It is still the most magnificent urban edification in today's Lisbon.

The structure of the traditional quarters remained unchanged, except for Bairro Alto, built during the sixteenth and seventeenth centuries. Its Renaissance plan announced already the orthogonal design of Illuminism cities, including Lisbon of Pombal.

The city about to be severely damaged by the earthquake of 1755 and the subsequent fire had a basically medieval structure. It had grown chaotically and had been subject to various and rich influences, while incorporating artistic and architectural treasures of considerable value.

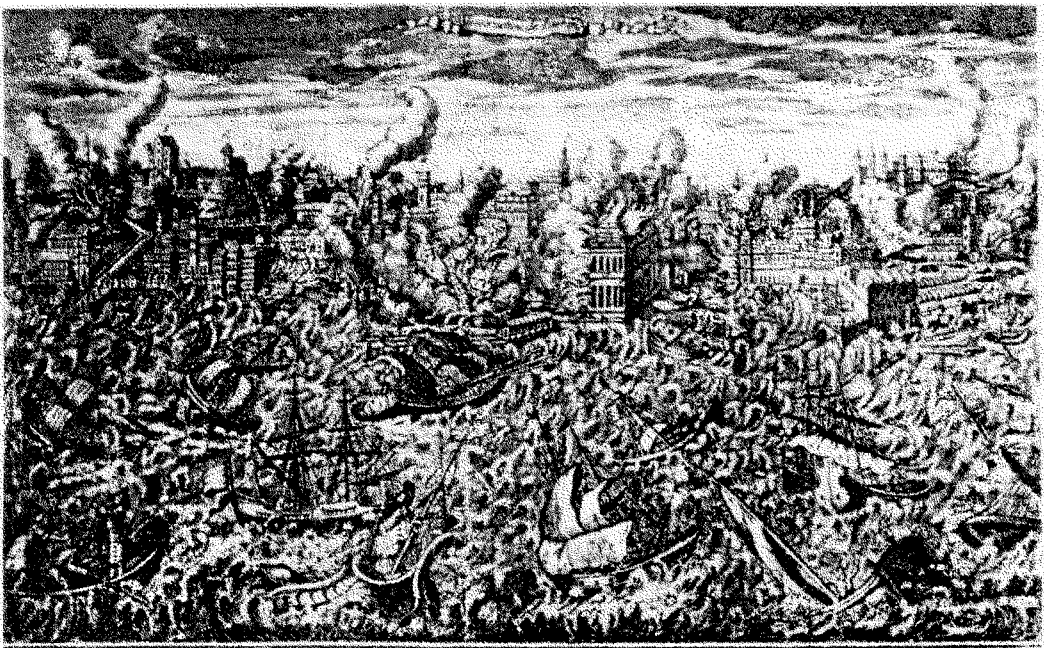
### *THE EARTHQUAKE OF 1755*

On the first of November 1755, All Saints Day, at exactly forty past nine in the morning, when most of the population was in church, a series of increasingly strong earthquakes destroyed with a deafening roar and in a suffocating cloud of dust the noblest area of a city that centuries of history had made famous all over Europe. The earthquake had an unusual intensity (VII to X in the modified Mercalli scale) and magnitude (8.75 to 9 in the Richter scale). It was followed by a violent and unexpected tsunami and a dreadful fire that lasted four days and destroyed what had been left by the earthquake.

The central downtown area of "Baixa", as well as São Francisco hill up to Chagas and Carmo and a considerable part of the eastern area, including the Cathedral (Sé) and São Mamede, were almost completely destroyed. Other areas of the city were also severely damaged. According to available data 10.000 to 30.000 were killed (Fig.19).

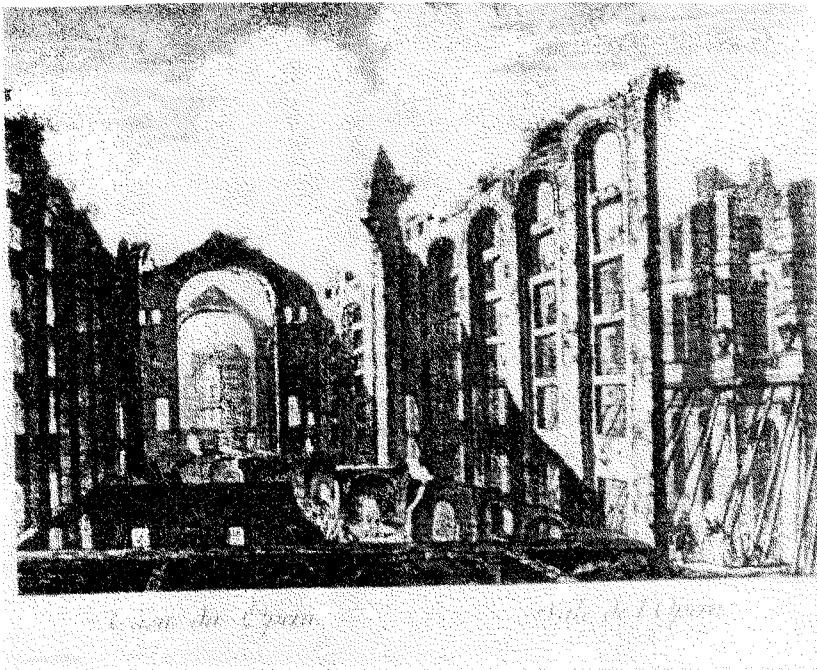
It is possible to imagine what this cataclysm must have been like by going through some very lively, detailed and sometimes rather fanciful descriptions and drawings done by eye-witnesses, most of them foreigners.





- **Figure 19:** The Earthquake of 1755 (in J. A. França, 1987).

There are a lot of prints showing Lisbon during and after the earthquake. Some of them were compiled in a book in Paris. They show some of the most beautiful buildings in Lisbon: São Roque Tower, São Paulo Church, the Cathedral (Sé), the Opera House, São Nicolau Church and the Patriarcal Church near the Ribeira Royal Residence, built during the reign of King João V (Fig.20).



- **Figure 20:** The Opera House after the Earthquake (in J. A. França, 1987).

In the turmoil that followed the earthquake, a lot of frightened people were killed as they tried desperately to escape, while the survivors fled from the burning city centre towards the seashore, where they ended up being swallowed by the gigantic waves of the tsunamis. Some people fled to the inland, seeking shelter in less affected

areas such as squares, monasteries and gardens. They camped there, in tents made of canopies used in the procession of Corpo de Deus and tissues taken from the city's warehouses. They also fled to Cotovia and São Bento hills and to Belém. Lisbon was almost totally abandoned by its inhabitants. It was left to tramps and thieves and became a city of misery and desolation.

The royal family was in Belém when the earthquake happened. They decided to stay there, in a wooden palace designed by Carlos Mardel and situated in Alto da Ajuda, thus leaving the city centre for good.

### *REBUILDING THE CITY*

Sebastiao José de Carvalho e Melo, Marquis of Pombal and Prime Minister of King José I, was given the great responsibility of taking urgent and efficient measures to mitigate the situation. He began his work immediately, for both his political career and the future of the nation were at stake.

On the very day of the earthquake and on the following days Pombal took several preventive measures with a view to ensuring food supply and fixing prices. Thieves and speculators who had tried to take advantage of the situation were punished.

A series of protective measures to avoid population flow towards the outskirts followed, encouraging people to return and camp in the city. Wooden houses were imported from the Netherlands and became very popular among the Lisbon upper class.

Legal measures were taken to prevent illegal construction outside the city as well as to forbid the construction of stone houses in the city, for there were no official propriety registers. These laws were strictly enforced so that all houses illegally built in the following months were demolished in February 1756.

On November 29 and December 3 two important decrees were published. The first stipulated the official register of every destroyed quarter while the second announced the publishing, at the earliest possible date, of reconstruction plans for every quarter.

Pombal had a difficult task ahead. But he was not alone, nor is he the only one to get all the credits for the gigantic work done. He relied on the help of a team of determined politicians (for example, Duke of Lafões, who co-ordinated the reconstruction work) and efficient technicians (Manuel da Maia, Eugénio dos Santos, Carlos Mardel, Joao Pedro Ludovici, José Poppe, Gualter da Fonseca and many others).

There was a time of hesitation and doubt concerning the future of Lisbon. While some favoured the construction of a whole new city in a safer area like Belém or Campo de Ourique, strong economic arguments led both King José I and Pombal to decide in favour of rebuilding the city on its original site, in particular the central and most severely damaged area.

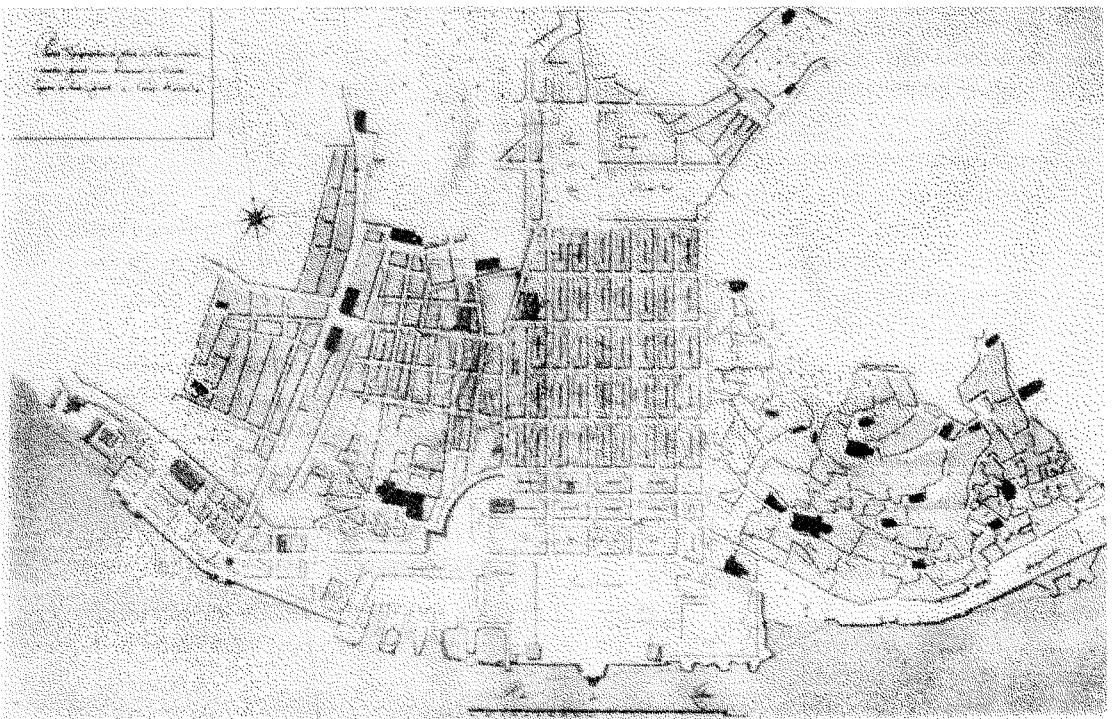
Absolute priority was given to the downtown area of "Baixa", the economic and commercial centre of the city. The preliminary alignment work started in December.

Manuel da Maia was a very meticulous and hard-working man. He considered carefully every proposal presented to him, in a total of six. These proposals ranged from an ambitious plan to demolish what was left and to build a whole new city to the simple reconstruction of the destroyed area exactly as it was before. Manuel da Maia sent all six proposals to Duke of Lafões, together with detailed plans designed by three teams of architects led by Eugénio dos Santos, Gualter da Fonseca and E.S. Poppe. These projects were made on already existing plans of the area to be rebuilt, and they all showed a more or less evident geometrical design.

The selected project, by Eugénio dos Santos, was based on one of Manuel da Maia's ideas. It was approved by the Decree of June 12, 1756, and its implementation began immediately (Fig.21).

For the first time in six Christian centuries Lisbon had a systematic plan of construction and an effective programme of implementation.

Eugénio dos Santos' plan covers the central downtown area of the city and, with less accuracy due to the irregular relief, São Francisco and Castle hills, as well as the western seashore area until São Paulo.



- **Figure 21:** Eugénio dos Santos Plan (in J. A. França, 1987).

The two traditional squares of Rossio and Terreiro do Paço were aligned and linked by a network of longitudinal and transversal streets forming right angles. These streets were organised according to a hierarchy and their importance was defined by their wideness, quality of pavement and sewage as well as the number of innovative urban elements. Three "noble" streets (Áurea, Augusta and Bela da Rainha or Prata) have their origin in Terreiro do Paço, facing the river. Two of them end in Rossio while the third ends in another parallel square, Praça da Figueira, built on the site of the old Royal Hospital (transferred to the Monastery of Sant'Antão and later called São José Hospital). A regular market was held there for many years. Two other parallel streets, Nova da Princesa (Fanqueiros) and Madalena, have approximately the same length as their neighbour streets. Between each one of the three "noble" streets there are three narrower streets. One of them, Rua Nova d'El-Rei (Rua do Comércio), was built on the site of old and famous Rua Nova dos Ferros and geometrically aligned with the others. All these streets define longitudinal and transversal blocks, thus creating a rather dynamic and lively urban network.

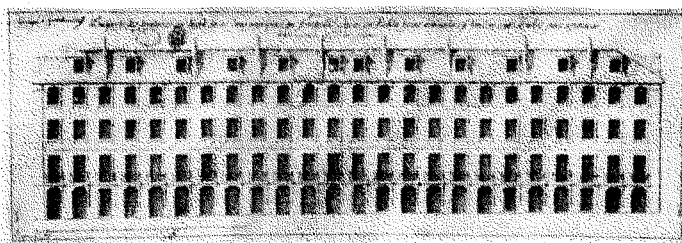
The reconstruction plan of Rossio was designed by Carlos Mardel. The reconstruction of Terreiro do Paço was assigned to Eugénio dos Santos. It became the noblest place in the newly-rebuilt city centre: regular arcades, a triumphal arch (which was finished only a century later) leading to the inner city, Spanish-style turrets and a statue of King José I riding his horse - this masterpiece by the sculptor Machado de Castro, built in 1775, was the first relevant monument of Lisbon. All these elements formed a "Place Royale" of international taste, in opposition to its new name Praça do Comércio (Commerce Square) which reflected the social, political and ideological intentions of Pombal's Illuminism.

Although priority was given to the central downtown area, Pombal's plan of reconstruction was very ambitious and contained more or less detailed urbanisation projects for other areas of the city. One of them should be applied to a triangle formed by Rossio, São Sebastião da Pedreira and Arco do Carvalhão, while another was intended to comprise an irregular area defined by Arroios, Graça and Santos-o-Novo. Other projects were implemented in the quarters of Cotovia (where a factory was built), São Bento (where the friars helped in the urbanisation of their own land), fashionable Buenos Aires hill, São Mamede by the Cathedral (Sé), Caetanos (where Pombal had his residence) and Alegria Square, in the northern limit of the city. In 1760 Mardel designed and implemented a general plan to improve the Lisbon harbour.

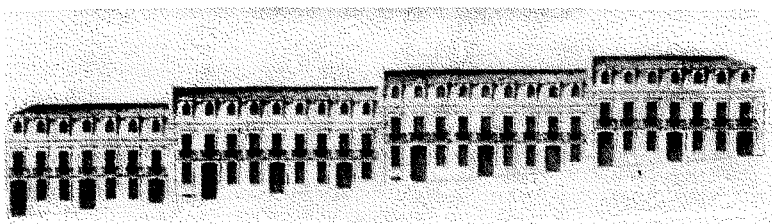
This systematic large-scale programme reflects the ambitious intention of Pombal to give Lisbon a rational urbanization plan with a view to controlling its growth after the earthquake. It proved too excessive in view of the limited capacities of that time, and eventually it was abandoned. It was nevertheless a first global

approach to the problem of urban growth. One has to admit that only a man with an enterprising, foreseeing and innovative spirit like Pombal could have considered implementing such a far-reaching project.

Manuel da Maia's plan also included projects for the city's new buildings, signed by Eugénio dos Santos. These projects followed Manuel da Maia's guidelines concerning size, number of floors and balconies, as well as the new concept of chimney-boards built on the side walls and rising above the roof. The new houses should have two floors, so as to achieve a balance between the building's dimension and the size of the streets, thus avoiding major damages in case of an earthquake. As the two-floor project did not meet the demands of owners and economic groups, it was replaced in 1758-59 by a new one, also signed by Eugénio dos Santos. According to this new project, houses should have three floors; the first with large windows and a long balcony, the second and third with bay windows and a mansard with windows opening out on the roof. The ground floor was used for commercial purposes. The facade decoration of the "Pombal building" varied according to the hierarchical importance and broadness of the streets (Fig.22 and Fig.23).



- **Figure 22:** Buildings' Façades in the Main Streets by Eugénio dos Santos (in J. A. França, 1987).



- **Figure 23:** Buildings' Façades in the Steep Streets by Eugénio dos Santos (in J. A. França, 1987).

This model reflects, also in the interiors, an attempt to obtain a harmonisation of patterns and will be adopted later in other areas of the city.

A pleasant balance was achieved between a certain monotony of the streets and the proportion and relative position of the blocks. In the middle of the twentieth century, the development of commerce and the decoration of shops in the main streets helped brighten up the area. Architecture was therefore determined by urbanism and based on rational principles of both practical and symbolic nature. This is after all the basic philosophy of a modern city.

According to Eugénio dos Santos, this new concept should serve a "city of tradesmen": it should be economical and strong; aesthetically concerns were secondary. This concept was subject to criticism, but it also reflected a positive approach to Pombal's policy, based on middle-class support.

Shops and workshops were distributed by the new streets according to a specific occupation or craft (goldsmiths, silversmiths, shoemakers, saddlers, gliders, haberdashers, drapers), grouped in independent guilds similar to those of the Middle Ages.

The Government and Court of Justice, the economical departments, the Stock Exchange and the Customhouse were established in Praça do Comércio, as well as a building occasionally used as a residence by the King.

In Rossio, Carlos Mardel's subtle and elegant design, based on German-style roofs, contrasted with the monotony of the nearby streets, built according to the traditional Portuguese system.

In the central downtown area (Baixa Pombalina), a traditional commercial quarter, there was no place for noble residences, most of which were built in the new quarters. Only a few of them were palaces. Their owners belonged to a prosperous bourgeoisie (they will be given titles of nobility in the nineteenth century and although their houses were larger and had richly decorated doors and gates, they preferred to adopt the sober design of Pombal-style buildings. They also built large and gracious summer residences and leisure farms in the outskirts of Lisbon.

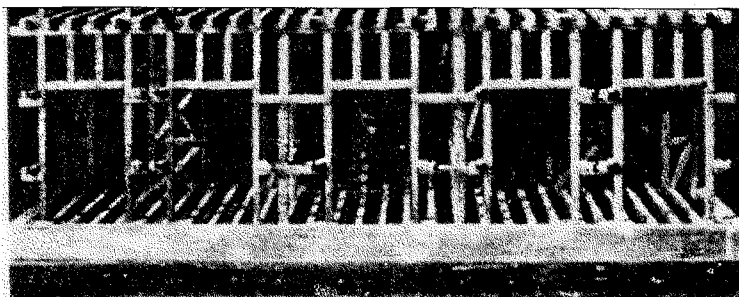
Sobriety was also the outstanding characteristic of churches built or rebuilt during this period, in spite of the availability of financial resources (expenses were supported by the religious orders) and a larger freedom of concept. Most of them looked rather discrete and monotonous. They usually had a triangular gable and some had two symmetrical towers, like São Paulo and Santo Estêvão. The interior was also austere: the "azulejos" (tiles) and carvings were simple and often replaced by stone or plaster.

### *CONCLUSION*

Pombal's plan of reconstruction was meant to face a special situation - the destruction of Lisbon caused by the earthquake of 1755. It was based on very strict principles of functionality and economy both of time and money. It introduced important technical innovations and developed advanced public health and urban theories. Although some of them were never applied, it is worth recalling a few important innovations:

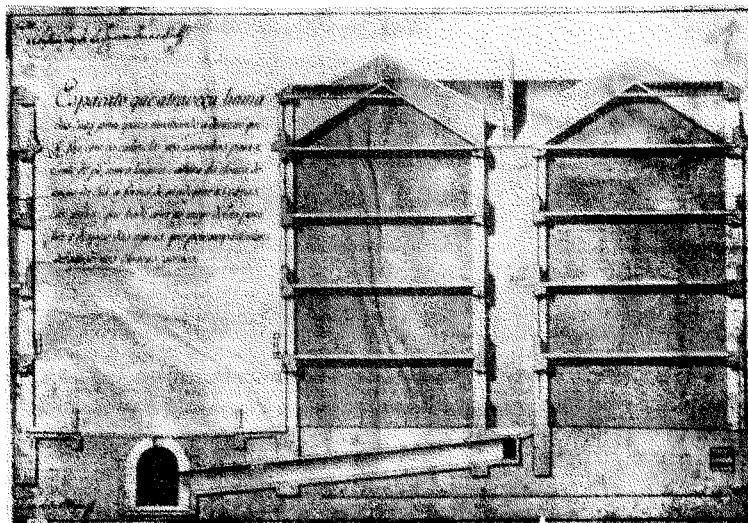
1/ The reconstruction of Lisbon set up a mass production system long before the industrial revolution took place in Portugal. The uniformity of construction led to the adoption of models which were made according to previously programmed dimensions and structures. It was therefore possible to produce a considerable number of parts that could be used almost everywhere. This also applied to the Pombal-style "azulejo", which followed the seventeenth century model and was subject to mass-production as well.

2/ The need to develop safety systems to prevent major damages in case of an earthquake led to the adoption of a few devices in the new buildings, namely the "gaiola" (a structure similar to a cage) and the chimney-board (Fig.24).



downtown area or "Baixa", in projects by Eugénio dos Santos. Chimney-boards were usually built on the side walls of every building, rising above the roof. In case of a fire, it would be therefore easier to prevent it from spreading to the neighbour buildings.

3/ There were also some proposals by Manuel da Maia and Eugénio dos Santos concerning public health, namely a sewage system along every main street. As this system was too expensive and not very practical, the hygienic conditions in the city remained very poor throughout the eighteenth century. The same happened inside the buildings, where toilets were unexistent. Manuel da Maia also proposed to establish a new water supply system all over the city (including a water delivery project), but in practical terms only a few fountains were added (Fig.25).



- Figure 25: Sewage System (in J. A. França, 1987).

There were nevertheless some improvements. The alignment of streets and buildings in Baixa according to Pombal's directives solved the problem of regular floods in the lower part of the city. The construction of several large and airy streets and two beautiful new squares, one of them by the river, as well as a long alley surrounded by gardens (Passeio Público), designed by Reinaldo Manuel dos Santos and built in 1764, helped improve the overall public health conditions in the city.

Although only part of the initial reconstruction plan was implemented, its technical innovations as well as a number of original, efficient and bold solutions made it one of the most important and best executed programmes of modern times.

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