

## Extended abstract

# 1980 Earthquake

## Transformations in the Housing Typology of Angra do Heroísmo

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**Abstract:** This dissertation analyzes the reconstruction process of Angra do Heroísmo's historic center and studies the impact that the January 1<sup>st</sup> 1980 earthquake had on the transformation of the urban housing typology.

A contextualization of the origin and development of the city was made, such as a characterization of the general methodology of reconstruction. Through case studies, the different interventions in the buildings that took place from the mid-twentieth century to the present days were investigated, having the earthquake as a key period.

One of the goals was to understand how the preservation of the city's memory was reconciled with the necessary adaptations of the buildings, either by introducing construction systems that guaranteed safety or by adapting the house to the needs of that time. This comparative analysis was structured in three aspects: facade design and composition; constructive method; and spatial organization. In order to obtain the information, and in addition to the indispensable bibliographic review, fieldwork was done, interviews were conducted, and the archives of several entities were investigated. The work was carried out between 2019 and 2020.

**Keywords:** 1980 earthquake; Angra do Heroísmo; historic center; current housing; architecture.

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### 1. Introduction

On January 1<sup>st</sup>, 1980, Terceira, São Jorge and Graciosa islands were hit by an earthquake. It destroyed Angra do Heroísmo's historic center, but leveraged the title of World Heritage to this city, achieved three years after the calamity. This dissertation focuses on the residential architecture of the city center, analyzing the transformations that the process of reconstruction introduced in the urban housing typology, considering the mandatory conciliation between the psychological need to preserve the memory of the ruined city, the need to introduce materials and construction processes that would guarantee greater seismic resistance,

the need to adapt the homes to new comfort requirements, with the reflexes of typological modernization and economic pressure.

The living space, a fundamental theme of architecture and under explored in Angra, allows to characterize the built cultural heritage and understand reflections of the local daily life. Through a comparative study, the intention is to read the different interventions in buildings, from the earthquake's eve to the present day, focusing on the changes that may have occurred with the seismic tremor, an event that allowed a new way of looking at the built heritage. The methodology of

the city's reconstruction and its impact on the buildings, in its various aspects (design and composition of the facade, construction method, layout of the space), were investigated.

## 2. Methodology

In order to do this investigation, fieldwork was used, followed by bibliographic review and archive research. Walking through the streets of Angra do Heroísmo, a first record was made. This first recognition also led to the delimitation of the study area (figure 1).

The initial collection was successively filtered, resulting in 18 case studies. A further category maintained six other cases that, due to the lack of planimetric and pre-seismic construction information, have high relevance in the study of their facades, leading to an "18+6" structure.

The essential fieldwork was aided by an analysis form prepared by the author, which, following visits to the site, allowed to synthesize and compare the different case studies. Their analysis was divided into three parts, inspired by an

inverted Vitruvian triad (*firmitas, utilitas, venustas*) which reflects the adopted process. Thus, the analysis was divided into: understanding of the facade and its materials, mainly its finishing; construction methods and structural materials; and spatial organization. Respectively, *venustas, firmitas, utilitas*.

For the investigation, archival material available in several locations was used. At Angra do Heroísmo's City Council, processes related to some case studies were accessed. These usually have plans, sections, elevations and descriptive memories of the projects, sometimes prior to the earthquake, as well as some technical opinion from both the post-earthquake reconstruction period and the later phases. In the Regional Department of Cultural Affairs (DRC), the same type of documents was consulted, making it possible to cross the information from the different archives, consolidating the documentation related to the periods mentioned above. In the Luís da Silva Ribeiro Public Library and Regional Archive (BPARLSR) some photographic albums were

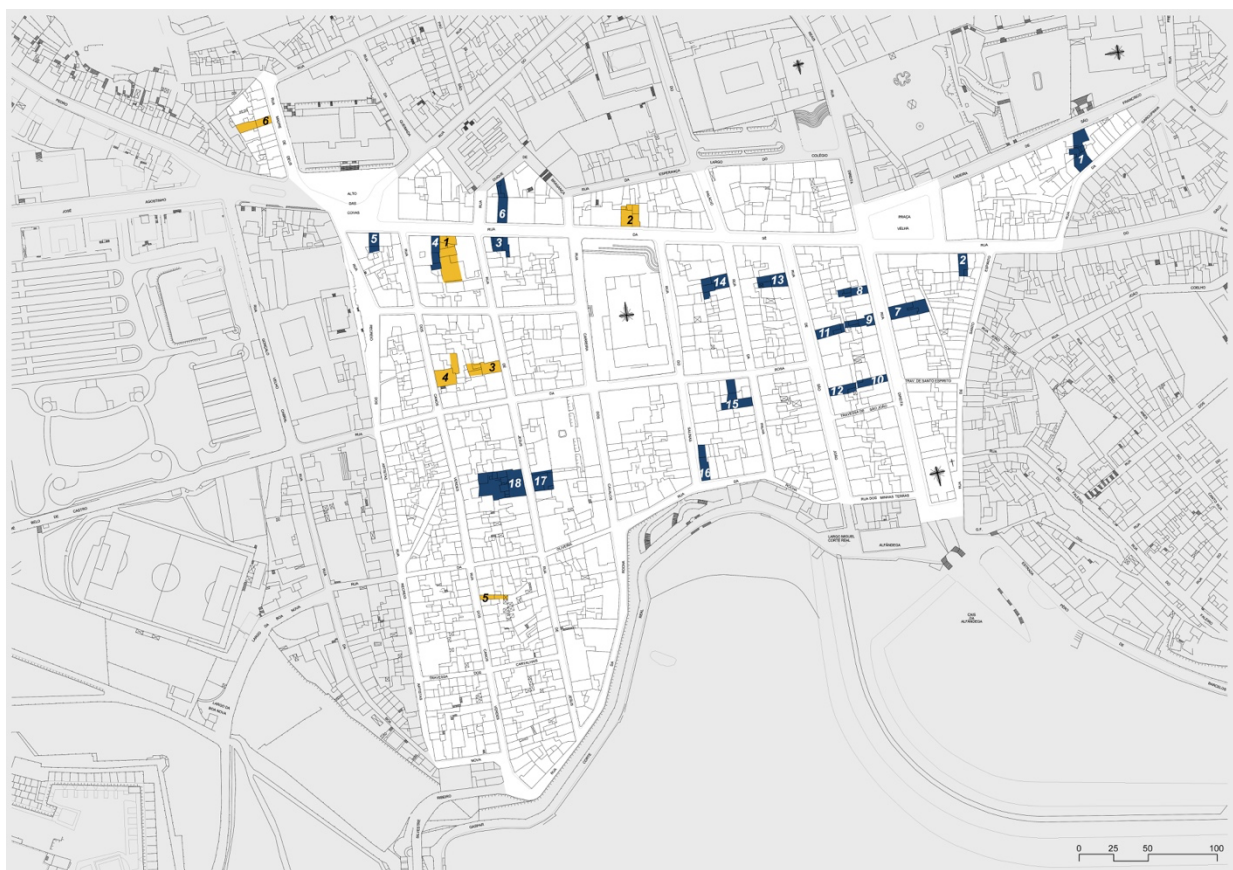


Figure 1 – Location of case studies. Plan designed by the author based on the autocad file provided by CMAH. The lots chosen as case studies are shown in blue and the buildings analyzed by their facade in yellow.

consulted, as well as part of the old DRC archive, in which it was possible to leaf through Angra's candidacy to UNESCO and the 1978 survey of the facades of its main streets, which, compared to what currently exists, allowed to confirm some changes. In the archives of the Regional Secretariat for Transport and Public Works (SRTOP) it was possible to study the files of each property in the city, prepared by the General Directorate for Urban Planning (DGPU) in the post-earthquake, which proved to be very useful not only because of the written information as for the photographs that, when compared with the actual buildings, allowed to cross-check the findings about the transformations.

Some documentation absent from the archives was kindly provided by the owners and, in some cases, an oral reconstruction of what the house was like in the past was made. Interviews with people who, in different ways, were related to the 1980 earthquake and/or to the buildings under study complemented the investigation.

### **3. Origin and development of the city**

Although some authors argue that these islands were already known in ancient times, they were officially discovered by the Portuguese in 1427. The slow settlement process began in 1439, in Santa Maria, followed by São Miguel, then Terceira and, from there, the rest of the "Central Group" was populated.

The first settlements in the Angra region, namely in Outeiro das Maravilhas or das Pedras, as well as another nucleus of settlers, in the area where Corpo Santo and Porto das Pipas were born, took place around 1460. The initial occupation of Angra, until 1474, adapted organically to the topography and the main watercourse (future Ribeira dos Moinhos). The urban planning began after that date, when the settlement was promoted through enterprises such as the diversion of the stream, which was the "backbone" of the city's industry. In a next phase, the reticle was born,

characterizing the urban tissue of the city central area. Even today, it is possible to walk the streets of that grid, which is substantially orthogonal, as, with the exception of the opening of the so-called Praça Velha in 1611, it has generally been stabilized since the end of the 16th century. The main streets, facing the sea, in a north-south direction, maintain approximately the same elevation along its entire length, and the side streets, as well as Rua da Sé, overcome the unevenness. These streets and buildings were the scene of a catastrophe that definitely marked the city and its inhabitants.

### **4. 1980 Earthquake**

On January 1<sup>st</sup>, 1980, at 15:42, an earthquake with a duration of 20 to 30 seconds occurred, causing profound damages in Terceira, São Jorge and Graciosa islands. It reached 7.0 magnitude on the Richter scale and intensities of 8.0–8.5 on the Modified Mercalli scale were observed in several areas of Terceira and São Jorge islands. In addition to the destruction of the housing and monuments, more than 70 people died and more than 20 000 became homeless. Terceira island was the most affected and about 15 900 people in the municipality of Angra do Heroísmo lost their homes. The earthquake affected not only the built heritage, but also the entire urban structure of the city. The rubble of the buildings obstructed the road network, making transport in many areas impossible and the electricity, water and domestic sanitation networks were affected. While dealing with the heritage issue, there was the necessity to respond, simultaneously, to the needs of the population.

The Central and Regional Governments, immediately after the earthquake, realized the huge task they had to undertake. Using the human resources of their services, architects, engineers, designers, surveyors and inspectors arrived in Angra, prospecting the safeguard of the architectural heritage.

During the first few days that followed the catastrophe, in addition to the technical measures, legislative measures were also taken. The Support and Reconstruction Office (GAR — Gabinete de Apoio e Reconstrução) was established on January 4, 1980, by resolution of the Regional Legislative Assembly (Resolution No. 2/80). This office was responsible for the immediate rescue operations, the reconstruction planning, as well as the control of its execution. It was part of the Government Presidency and was based in Angra do Heroísmo. The aim of all these measures was not only to encourage Angra's reconstruction, but to avoid what had happened in previous situations - the island paralyzation and emigration hump. The earthquake affected, at different scales, a whole isolated society in the Atlantic and tested the region's recent autonomy.



Figure 2 – Aerial view of the destroyed city after the earthquake. It is possible to see the grid and, in the background, the "acampamento do Bailão", still composed of tents. Photograph provided by Rúben Quadros. Unknown author.

## 5. Conclusions

The city's buildings built in the 16th / 17th century were replaced during the 18th, 19th and 20th centuries. There are very few buildings with facades from the 17th century. The facades from the 18th and 19th centuries predominate (or inspired by them) and, occasionally, interventions from the 20th century. These buildings, when having a facade from the mid-20th century, usually resulted from the demolition of an earlier one. Therefore, they are in their entirety (facade,

organization and construction system) of the 20th century. The same can no longer be said about the previous ones (18th and 19th centuries), because there was the idea of repairing or "beautifying" the house, instead of rebuilding. The house underwent only the necessary renovations to the requirements of the time. Sometimes we are facing an 18th / 19th century facade and parts of the interior date back to the 16th / 17th century. There is also the case of facades that seem to go back to previous centuries and, upon entering, we realize that the entire interior is already of the 20th or 21st century. Many of these cases find an answer in the post-earthquake intervention, which maintained the facade or made a replica with a new interior. Thus, it becomes risky to draw conclusions about the time of the building just by its facade and, for that, it is necessary to visit and know the interior.

From the creation of the city until today, few changes occurred in the road network of the historic center, allowing us to witness what would be the streets of the city in the 16th century. Regarding the rest of the "scenario", the same cannot be said. As expected, the city evolved, the buildings were replaced and Angra became a testimony of living and building from different times. As such, what must be preserved is not just a facade, there is a constructive system and spatial organization that corroborate this evolution. This doesn't mean we should defend a crystallization of the building, but learning through it. Nowadays it is not logical to demolish any building from previous times with the excuse that buildings from the 18th century replaced those from the 17th century and so on, as we have already interpreted the heritage in another way. It is fascinating how Angra's built cultural heritage works as a "time capsule". On several streets, buildings that go back to the 17th century, others from the 19th century, testimonies of the 20th and 21st centuries coexist and, through their reading, the evolution of the city can be understood. The biggest challenge is, through the necessary

interventions, to reconcile the remote memory with the recent one and make them last in time.

The 1980 earthquake forced a drastic change on the island, and in the historic center of Angra in particular, with a proportion and fugacity never experienced before, not only the cataclysm but the response to it. An inherent problem with this type and scale of catastrophe is that often, as it happened in this case, the people who would provide support to the victims are themselves victims. All immediate and simultaneous actions had a “moral” impact on the population, because it showed that they were accompanied by technicians who also felt the “shock” in their day-to-day, in their emotional and family life, but kept working.

The city was damaged not only by the earthquake, but also by a reconstruction that didn't always follow the appropriate standards from the historical and architectural point of view. The volume of unlicensed buildings, as well as licensed ones that didn't comply the approved projects, led to poor inspection, as criticized at the time. Thus, it became difficult to guarantee any quality regarding internationally accepted concepts and restoration criteria.

After the earthquake, the safety of individuals prevailed over the material goods. Available materials were used, which guaranteed safety to residents. In this case, reinforced concrete structures, concrete block masonry walls, among others, which sometimes only reinforced the pre-existing structure and, at other times, completely replaced centenary structures.

Nowadays, it would be incorrect to say the commitments made to UNESCO after the classification are being fulfilled, as many projects are inexplicably approved. It is understood that a good, when classified World Heritage, is no longer property of a single owner, it belongs to all of mankind. When we intervene in heritage we must be aware that it is not the exclusive property of our generation. It will also belong to future generations and, as such, it must be preserved and valued in

the best possible way. It must be taken into account, for example, that the useful life of a current building is scaled to roughly 50 years. The life of buildings in Angra must be reported in centuries and not in decades and, as such, the durability requirement of the various materials has to be considered for this time frame. The privilege given to concrete today contributes to the loss of the “art of building”, as the knowledge of traditional materials and solutions by young professionals has been decreasing. The idea that concrete is the advent still remains in the mind of many of Angra's residents, but the effectiveness of the structures applied in post-earthquake reconstruction will only be put to the test in the next earthquake. Until then, it is still necessary to go through the future concrete rehabilitation in Angra.

With the earthquake and reconstruction, a lot of movable and immovable heritage was lost. Regarding the urban “scenery”, there was no revolution as the layout did not change. Many reconstructed houses are not what they used to be, because, in addition to the many missing interiors, the volume, scale, proportion and decoration were often not respected. The replacement of the traditional system with concrete was one of the causes for such situations. These issues analyzed today with some coldness were not the main concern at the time, as the biggest worry was to guarantee the safety of the inhabitants. In many cases, a similar facade was built, but in concrete blocks, and a similar interior organization was created, but moving some walls, that is, these buildings are no longer from the 18th or 19th century, they are from the late 20th century. Some ruins still show us the effects of the earthquake, such as those of the old “Convento das Concepcionistas” or that of “Santo António dos Capuchos”, but, in general, the city is in very good condition and a less attentive visitor will not notice the traces left by the calamity that ravaged the city's streets, buildings and inhabitants.

With the earthquake, there was an increase in the number of floors and / or “better” use of the attic, which became a habitable part of the building, even without extra floors, leading to an increase in usable area. The buildings grew vertically and often horizontally, occupying grounds and consequently reducing the area of the patio.

The use that each property will have depends on the family that owns it. Each family has its own history and memories and more or less the ability to destroy or repair what the father or grandfather built. When the earthquake occurred, as many families “fled” to the periphery, selling their houses, the sentimental value left the equation of the new owner and was replaced by financial / economic validation.

For a long time, the philosophy applied to many houses, in the center and beyond, was that of small repairs, implying only what is strictly necessary, such as adaptations to receive a new family. Because of this, a lot of immovable heritage got to the 1980s in relatively good condition, but part of it was destroyed by the cataclysm and what wasn't, unfortunately, has been destroyed by human action. Whether before or after the earthquake (even today), the future of buildings in Angra depends on the intentions of their owners and architects. The lack of specialized technicians, which was noted by the quality of the post-earthquake projects, no longer exists, but many projects continue to reflect a lack of sensitivity on the part of the “designers”.

Although constituting a hinge in the history of Angra, its society and its built heritage, as it broke its normal evolution, the 1980 earthquake didn't bring extraordinary changes to the housing typology. Before the earthquake, the houses were already demolished, floors, turrets and louvers were added and people sought to increase the usable area. There was an increase in the tertiary sector as some houses were transformed into services and commerce, although this was not exclusive at that time. The earthquake caused an

increased of the scale and proportion of such changes and, unintentionally, accelerated their organic rhythm.

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