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Guardiola Villora, AP.; Basset-Salom, L.; Perez-Garcia, A. (2021). Private air-raid shelters designed by the Valencian architect Joaquín Rieta during the Spanish Civil War. *The Journal of Architecture (Online)*. 26(3):286-315. <https://doi.org/10.1080/13602365.2021.1897646>



The final publication is available at

<https://doi.org/10.1080/13602365.2021.1897646>

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Additional Information

Private air-raid shelters designed by the Valencian architect Joaquín Rieta during the Spanish Civil War

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Private air-raid shelters designed by the Valencian architect Joaquín Rieta during the Spanish Civil War

ABSTRACT

Joaquín Rieta was one of Valencia's most outstanding architects of the 20th century, well known for the design of some of the most famous buildings in the city centre of Valencia. His promising career was interrupted by the Spanish Civil War when Valencia became one of the most bombed cities in Spain. During this period, Rieta designed a series of private air-raid shelters to protect the civilian population. These pioneering structures, which formed an essential part of the architecture of air-raid shelters during World War II, have been analysed from the point of view of the materials, construction, and structural system. More than eighty years after the end of the Spanish Civil War, this paper brings to light the documents of six air-raid shelters designed by Rieta, to put a value on the quality of the original projects, to acknowledge the cultural value of these war architectural sites, and to keep alive the memory of this painful historical period.

Introduction

Joaquín Rieta Sister (Valencia 1897-1982) was one of Valencia's most outstanding architects of the 20th century.¹ He carried out, with Luis Albert Ballesteros (Valencia 1902-1968), the most advanced attempt to incorporate the Valencia's architecture at the time to the innovative tendencies of the Modern Movement.²

His stage of professional consolidation occurred at the same time as the Second Spanish Republic (1931-1939), a period in which he designed some of his most unique buildings, namely Building Cervera (Valencia, 1931) and Building Gil (Valencia, 1933) among others.

The Spanish Civil War implied a parenthesis in his work as an architect involved in the transformation of the city centre and the expansion of the city of Valencia.

However, in the summer of 1938, Rieta designed a series of private air-raid shelters

demanded by a population who was being bombed almost daily. Through the study of these projects it is worth noting the evolution of his knowledge regarding this type of work, as well as the different structural and constructional solutions adopted in each case, as will be explained.

As soon as the war was over, and Franco's dictatorship was established, the Spanish architecture was marked by the needs for reconstruction, the beginning of the Second World War, and the isolation from abroad. In this new professional stage, Rieta, returned to the classical and eclectic architectural style he had studied at the School of Architecture in Barcelona, leaving aside the most international or avant-garde tendencies,³ but maintaining his interest in the structural rationalism,⁴ of which the building Tecles (Valencia 1939-1941) is one of his most renowned projects from that time. Nowadays, his buildings are an essential part of the urban landscape of the city centre (see Figure 1).

In spite of the uniqueness of Rieta in the Valencian context, the existing bibliography is not very abundant. Two examples form the basis of most of the essays dedicated to his work: his own acceptance speech in the Valencia's Academy of the Fine Arts of San Carlos, the document in which he himself summarized 'half century of architecture practice in the Kingdom of Valencia' and Luis Gay's welcome speech⁵.

None of these documents refer to the professional activity of the architect during the Spanish Civil War, this period not being included in the list of his works.^{6 7} There is only a reference in the book⁸ 'Valencia 1874-1959 Ciudad Arquitectura y Arquitectos' naming a list of renowned architects in Valencia at that time who designed, like Rieta, air-raid shelters: 'In the war years the construction of shelters by the Office of Passive Defence, up to a number of forty-three - on which architects like Gómez Davó , Donderis, Gosálvez, Carles, Pascual, and⁹ Rieta worked - is revealed as a unique and

logical urban novelty. Some of them, still preserved, show a non-negligible level of design’.

The authors of this paper recognise the uniqueness of these projects from the point of view of the singularity, complexity and novelty that, for an architect trained in the design of the first buildings of Valencian modernity, would represent the design of these war structures.

In this study, the architect's development of and experimentation in the use of new structural materials, such as steel, but above all reinforced concrete, and the evolution in the design of the different shelters are analysed, drawing attention to the value of the quality of the drawings of the original projects.

Since an official list of the air-raid shelters built in Valencia does not exist, several authors^{10 11 12} have elaborated different compendia, including a list of more than 300 air shelters of different typologies.

As pointed out by Moreno Martín and Sapena Escrivá talking about the city’s air-raid shelters, does not mean speaking only about bomb attacks and defence strategies, but also reflecting on the civilian population; the people who did not fight in the front and yet, observed how the city of Valencia and their life became a priority target for the continuing threat of the army air raids. Precisely, this social and civil component of these shelters is what highlights them as singular elements of wartime heritage. They emphasize that ‘they were not a mere construction, nor a place of active defense by a military body, but a space and architecture that arises from the implementation of citizen protection measures and of civilian targets by means of organised passive defence’¹³.

In line with this idea, the regional Government (Generalitat Valenciana) has identified several public shelters as Local Relevant Assets^{14 15} recognizing their

undoubted historical value and the need to be protected according to the *Valencian Cultural Heritage Law*¹⁶ and the *Valencian Democratic Memory and Coexistence Law*.¹⁷ This second Law establishes that the documents produced during the Spanish Civil War constitute the Valencian Community's documentary heritage and should be protected. Moreover, the places and itineraries of historic significance and memory should be identified and catalogued in the *Catalogue of Places and Itineraries for the Democratic Memory of the Valencian Community*. However, there is no official information about the air-raid shelters designed by Rieta (not having been previously studied and only having been mentioned by a few authors without specifying his authorship).

More than eighty years after the end of the war, the recovery of the historical memory cannot be ignored. These wartime documents and architectural sites should be considered not only as part of the Spanish heritage and history, but also a Second World War precedent about how to protect the civilian population, who were the target of massive bombing campaigns for the first time, but not the last, as this new strategy of modern warfare arrived to stay.

Bringing to light the documents related to these shelters and searching for possible remains that confirm where they were built is essential not only to keeping the history of the city alive but to understanding the singularity of these air-raid shelters which were pioneering pre-Second World War structures.

Materials and Methods

This research is focused on the analysis of the projects of the air-raid shelters designed by Rieta during the Spanish Civil War. The main objectives are to showcase his unknown activity of building private passive defence constructions to protect the civilian population during this period of time, to put a value not only on the projects per

se (structural solutions and use of concrete as a new material) but also on their graphic and typographic quality, and to trace their location and existence in the current building stock of the city.

To obtain information about the private shelters designed by Rieta during the war, the Rieta collection¹⁸ (digitalised and original documents of part of the projects and uncatalogued material) has been thoroughly reviewed. From the inspection of the original documents, the authors have been able to identify a shelter designed by Rieta that was neither registered nor catalogued and whose documents were mixed with those for another shelter's project located in the same street.

Knowing of the existence of a shelter in the basement of a refurbished building within the Area of Archaeological Vigilance of the Historical City Centre of Valencia, the archaeological report and the rehabilitation project have been consulted in the Historical Archive of the Valencian Community (AHCV). Research has also been carried out in the Municipal Historical Archive of Valencia (AHMV). Subsequently, the historical cartography of the city of Valencia,¹⁹ in addition to the 1929-1944 Cadastral City Map²⁰ have helped in locating the air-raid shelters, taking into account the change of name of the streets during the Spanish Republic and after the war.

Finally, once the buildings that housed the shelters were located and their cadastral dossier consulted, on-site research was carried out, visiting the buildings that had not been demolished and replaced, collecting the personal testimony of neighbours, owners, tenants and workers to check if they have any memories about their existence and if there are any remains left.

Valencia during the Spanish Civil War. Air-raid shelters

During the Civil War, rearguard cities became military targets for massive air-raids campaigns that sought to destroy their industry and to frighten and demoralise the

civilian population.²¹ This was the starting point of a war strategy, using Spain to test new military tactics and experimental armaments before the Second World War.²²

Valencia was key during the Civil War, not only because it was the capital of the Spanish Republic and seat of the Government (from November 7th, 1936 to October 31st, 1937), but also because its harbour was an important access route for provisions. Consequently, it was the third most bombed city, after Madrid and Barcelona. Bombings started on 12th January 1937, following which, air-raids took a prominent role, becoming an increased threat to the city, transforming everyday life, destroying numerous buildings (Figure 2), changing the physiognomy of Valencia, and leaving a deep imprint on the memory of generations of Valencian people.^{23 24}

Before the city was bombed, defence measures were developed to protect the civilian population. The so-called Organised Passive Defence of the city started the construction of public air-raid shelters. A list of the shelters and instructions for the population were periodically published in the Journal 'Fragua Social' from October 1936. Because of the numerous bombings and in order to organise, unify and standardise the passive defence procedures throughout the Republican territory, on 28th June 1937, the Ministry of National Defence issued a decree²⁵ establishing as mandatory the organisation of the Passive Defence under the direction of the Directorate for Special Defence Against Aircraft. Provincial and local Passive Defence Committees (JDP) were created, including, among others, architects or engineers.²⁶

The local JDP of Valencia and the City Council put all their resources and means at their disposal and went on to manage the existing shelters and to build new ones following a series of technical and architectural requirements.²⁷ Funds were provided by the government of the Republic, by international aid, as well as by monthly fees paid by the population.²⁸

The JDP played an important role leading to the construction of forty-three public shelters and a hundred basement arrangements with a total cost of 8.5 million pesetas (Spanish currency).²⁹ However, not all the shelters were built by public initiative. From April 1938, at the same time as the JDP was building big public shelters in districts, schools or public buildings (capacity for more than 1000 people) and due to the increased intensity of the conflict, the authorities urged the population to build as many private shelters as possible, in buildings, neighbourhoods, companies and premises.³⁰ A lot of small private shelters were built until the end of the war, some of them in basements or courtyards, with a 10 to 50 people capacity.

To be approved by the JDP, the projects for public and private shelters had to be submitted to the City Council including a technical report, plans (floor, elevation and cross section at a regular scale) and the signature of an architect, who was responsible for the construction process. This signature was fundamental to guarantee the supply of materials which were controlled by the City Council during the war (see Figure 3). Once the shelter was built, the municipal architect had to confirm the adequacy of the project and its conformity to the safety requirements.

It is quite difficult to know the total number and location of the air-raid shelters built in Valencia, especially in the case of the private ones, due mainly to the lack of information, to the fact that some of them were not declared, to the changes in streets' names and numbers and to the demolition of some buildings after the war.^{31 32} Therefore, the list of shelters varies from one publication to another. Peinado³³ includes more than 300 air-raid shelters taken from different sources, the available information on which is quite scarce; many times the reference is only an address in an official list, a building permit application, or the police report for the lack of building permit.

One of the characteristics of the civil defence architecture of Valencia³⁴ compared to that of other cities, was its resistance and strength, thanks to the knowledge and experience of the renowned architects involved, and the outstanding cement and steel industry of the city of Sagunto (30 km north from Valencia), which was key in the supply of the necessary materials.

The purpose of the air-raid shelters was to protect the population from the effects of the bombing, namely the direct action of the bombs, the shrapnel produced during the explosion and the shock wave. The air-raid shelters in Valencia were designed to resist bombs up to 200 kg weight.³⁵ Figure 4 shows the maximum penetration of a bomb in a concrete block and Figure 5 the wall thickness with the same resistance against the shrapnel depending on the material.

Valencia's shelters were different from others in Spain, not only because of the use of reinforced concrete,³⁶ but also, because the water table was high in the city (3-4 m in the city centre and less than 1 m near the sea), most of them were semi-basements. Both public and private shelters were built with reinforced concrete walls and, in some cases, with additional columns. There were two main construction systems for roofs, one being vaulted roofs and the other being flat roofs.^{37 38}

A reinforced concrete slab of 70-150 cm depth was a common solution. According to some archaeological research and some available construction project documentation, to improve and strengthen the protection, the slab was covered by a semi-soft layer with cells filled sometimes with sand and even with seaweed or other materials such as bricks, tiles, wood, gravel, etc.^{39 40}

In addition to their resistance against bombing, they had to guarantee the ventilation and the electricity supply. Furthermore, there was a recommendation to have

two entrances, preferably with an L-shape, to avoid the shrapnel getting inside and to reduce the effects of a possible shock wave.

Not all the shelters were built ex-novo. In many cases, mainly private shelters, the commercial ground floors, courtyards or basements were adapted as such, with the authorisation of the JDP. The resistance to collapse of the upper floors had to be calculated in addition to the impact resistance, depending on the number of floors and the structural system (load bearing masonry wall or framed structures, bearing in all cases a minimum of 1500 kg/m²). The shapes, dimensions, protection systems, constructive solutions, etc., of these private shelters were different depending on the characteristics of the place, the soil, and the building.⁴¹

Private air-raid shelters designed by Joaquín Rieta

During the Civil War, Rieta designed a series of small private shelters for private individuals and legalised others that had been built without a project, certifying that they met the compulsory established requirements.

There is evidence of six shelters designed by him from July 16th to August 14th, 1938. The documents for these projects include plans and information regarding the location, dimensions, materials, budget, etc. These shelters, in chronological order, are described and analysed in this section. Their situation today, verifying if there are remains or signs of their existence in the building stock of the city, is also discussed.

An initial consideration about the location of the six analysed air-raid shelters must be pointed out. As shown in the map in Figure 6, four of the air-raid shelters (SH1, SH2, SH3 and SH6) were built within a distance of 150 m from the train station, bombed on 8th January, 1937. SH5 was built in front of the Palace of Benicarló, the ancient house of the Borgias, an aristocratic palace of Valencian Gothic and Renaissance styles, that was, during the Civil War, the headquarters of the Republican

government installed in Valencia, which is nowadays the site of the Valencia's Parliament. Finally, SH4, was the only one built in the outskirts of the city, on the other side of the river.

Shelter 1 (SH1): Játiva St. (16th July 1938)

This air-raid shelter was built against shrapnel and collapse for Juan Iborra Folgado, and was located on the ground floor of the building at 14 Játiva St.⁴²

This was a small shelter (3.45 m², 1.85 m estimated height) with only one entrance allowing ventilation, and a capacity of 10 people (0.35 m²/person). Figure 7 shows the technical report and Figure 8 the section and the floor plan. According to these documents, this shelter was located between the existing shop and the owner's house, and was built with brick walls 40 cm thick and double T cross sections with an upper reinforced concrete slab, whose depth would not have exceeded 25 cm, considering the dimensions of the walls and the spans in the plans. As stated by the architect, the provided solution would avoid the effects of collapse and shrapnel, but not a direct bomb attack. Peinado⁴³ mentions that this shelter was reported to the authorities on 15th July 1938 because it did not have a building permit, which was subsequently obtained in October 1938. (see the application in Figure 9). The shelter was finished in May 1939.

The building at 14 Játiva St., in which Mr Iborra, Rieta's client, had a delicatessen shop in 1938 (Figure 10a), was on the corner with Convento Jerusalén St. (Figure 10b). Built in 1890, it is standing today (Figure 10c, 10d). The shape and dimensions of the shelter would fit in the current building on the ground floor (Figure 10e). However, in 1942, Mr Iborra built a new basement under the shop⁴⁴. The floor was removed and replaced by a new one, consequently, there are no remains of this

shelter. Currently there is a new shop on this plot, but neither the shop assistants nor the shopkeeper are aware of the existence of this shelter in the past.

Shelter 2 (SH2): 14 Luis Morote St. (19th July 1938)

This air-raid shelter was built against shrapnel and collapse in a commercial ground floor, for D. José Oltra Molés at 14 Luis Morote St,⁴⁵ today renamed as Convento Jerusalén St.

This shelter, of about 6 m² in area and 1.9 m in height, was designed with a double entrance to guarantee ventilation and to avoid the adverse consequences of a possible collapse (see floor plan and section in Figure 11)

The technical report (Figure 12) describes that it was built with brick walls 40 cm thick, taking advantage of the party wall of the adjoining building. It was covered with a reinforced concrete slab, 75 cm thick, and a sand layer acting as a cushion. A brick column was built in the centre of the shelter to bear the weight of the concrete slab and the sand layer.

Moreno Martín and Muñoz Ballester⁴⁶ mention that this shelter was reported on 26th June 1938 due to not having the mandatory building permit (see application in Figure 13). This was subsequently obtained in October 1938, and it was finished in October 1939, once the war was over, and Spain was struggling with the idea of taking part in WWII.

The buildings at Convento Jerusalén St. were renumbered, so number 14 (Figure 14a), which was already built in 1933 (before the demolition of a Convent which gave the name to the street), corresponds to number 16 (Figure 14b, 14c). It is a Grade 2 listed building, however, in the corresponding file of the Catalogue of the City urban plan there is no reference to the existence of any air-raid shelter.

This shelter was built behind the fitting rooms of Mr Oltra's tailor shop (figure 14d). The shop's ownership was transferred about ten years ago. The new owners renovated the premises completely, hence there is no trace of the shelter. The shopkeeper and a 77-year-old inhabitant of the building (who remembers playing in the tailor's shop) were unsuccessfully interviewed. None of them have ever heard about the shelter.

Shelter 3 (SH): 4 Luis Morote St (Undated)

This underground air-raid shelter at 4 Luis Morote street,⁴⁷ is undated and uncatalogued

In the folder corresponding to 14 Luis Morote St. of the Rieta collection, a plan and a sketch of an undated air-raid shelter designed for Eduardo Uhden at 4 Luis Morote St. were found (Figure 15a).

The shelter was designed to be built ex-novo with brick and concrete walls, a reinforced concrete slab and a concrete pavement, according to the materials defined on the left side of the document (Figure 15a). A first analysis suggests that the red lines correspond to the brick masonry which was used as a formwork for the concrete wall in blue. However, considering the floor plan dimensions and the volume of concrete and brick represented in Figure 15b, it can be concluded that the staircase walls were made of brick masonry and the shelter walls of concrete. The sketch in Figure 15c indicates that the shelter's capacity was 20 people (0.3 m²/person).

The budget, including volumes and costs of the excavation and different construction materials (concrete, reinforcement bars, bricks, etc), matching with the dimensions, volumes, and materials in Figure 15a, was in a different folder (Figure 16).

As a result, this shelter is now catalogued independently.

Due to the changes in name and numbers, 4 Luis Morote St., in 1938, (figure 17a) corresponds today to 6 Convento Jerusalén St. (figure 17b). Built in 1895, it is

listed in the *Catalogue of Special Protection Plan of Ciutat Vella*⁴⁸ with a Grade 2 protection order, however there is no reference to any air-shelter.

Mr Udhen was the owner of part of the building including the ground floor which still belongs to his family. To check the existence of the shelter today, his grandchildren and the new tenant of the premises have been interviewed. None of them know about the shelter or about any cellar in the premises.

Even though the shelter dimensions (figure 17c) match the shape of the plot at the rear and it is likely that it hosted the shelter in the past (figure 17d), neither the existence of any remains nor its exact position can be proved.

Shelter 4 (SH4): Sagunto St. (20th July 1938)

This air-raid shelter was built to provide protection against bombing for D. Francisco Farinós at the backyard of house number 7 at Sagunto St.⁴⁹

This was a newly built underground shelter (7.74 m² and 2.25 m high) with a vaulted roof and two entrances with zigzag stairs to prevent the shrapnel reaching the inside (Figure 18). The technical report (Figure 19) limited the maximum capacity to 30 persons, which gives a ratio of 0.25 m²/person. It was designed with mixed brick and concrete walls of 80 cm thick, a reinforced concrete vaulted slab (100 cm minimum thickness) and concrete pavement. There is no information regarding a possible sand layer over the slab neither in the report nor in the section provided. This solution was designed to resist the effects of shrapnel and small-calibre bombs.

The building permit was requested by the owner on 21st July 1938 (Figure 20). The current building at 5 Sagunto St. (Figure 21a) was built in 1963 on the plots corresponding to numbers 7 and 9 in the 1929-1944 Cadastral City map (Figure 21b, 21c). Being an excavated shelter, it could have been demolished during the construction of the foundations for the new building, or it might still be buried in the backyard.

Shelter 5 (SH5): Samaniego St. (14th August 1938)

This structure was an underground air-raid shelter against bombing built for D. Benito Merlo Hernández at 6 Samaniego St. with one façade on Navellos St.⁵⁰

This single entrance shelter (Figure 22) was excavated and built with concrete walls and a reinforced concrete flat slab (Figure 23). There are no dimensions in the plans but considering 1:50 scale, the walls are assumed to be 70 cm thick and the slab depth about 1.4 m. It was built to resist the effect of small-calibre bombs, shrapnel and larger bombs dropped at a certain distance (not specified). Figure 24 shows the building permit application.

Nowadays on Navellos St., at the corner of 6 Samaniego St., there is a building that, according to the Cadastral database, was built in 1890 but suffered a comprehensive restoration in 2002. The plot and the current building are shown in Figure 25. In the protection order listing there is no mention, as in the previous cases, of the possible existence of an air-raid shelter in the catalogue file.

To find traces of this underground shelter, the restaurant on the ground floor of the building was visited. The staff confirmed that the two commercial ground floor lounges were joined to make the single space that nowadays houses the restaurant, agreeing that currently the cellar does not exist.

Being located near the Roman Forum and the Cathedral within the Area of Archaeological Vigilance of the Historical City Centre of Valencia, that was declared as Asset of Cultural Interest, an archaeological intervention report was mandatory before the rehabilitation of the building in 2002. Thus, the archaeological report and the rehabilitation project have been consulted in the AHCV.

The previous state of the building was included in the rehabilitation project.⁵¹ The original façade is shown in Figure 26a. The position of the well, proposed as a

second entrance, is highlighted in Figure 26b. The columns and the party wall between the commercial spaces have been over lined in red to facilitate the interpretation of the shelter plan (Figure 26b and Figure 26c). The archaeological report⁵² confirms that the shelter was built and that it was covered in the second half of the 20th century with a 40 cm thick concrete slab, not being accessible today.

Shelter 6 (SH6): Nicolás Salmerón avenue (20th August 1938)

This air-raid shelter against bombing was built for D^a. Manuela Novella Fuster at Nicolás Salmerón Avenue⁵³ (today renamed as Marqués de Sotelo) in Valencia.

This shelter (13.64 m², 2.5 m high), built in the basement, had two entrances. The main one was connected to the main staircase of the building and the secondary one with the adjoining basement (see Figure 27 and Figure 28)

The project documents show that the existing masonry walls were reinforced with new brick walls, and the roof consisted of a reinforced 1 m thick concrete slab. Ventilation was provided (with the help of a fan) through the chimney of the heating system. This solution, with a capacity for 30 persons (0.45m²/person) was designed to resist the effect of small-calibre bombs, shrapnel, and larger bombs dropped at a certain distance (not specified). Figure 29 includes the dimensions and the costs of each construction element (as identified in the left side of the figure).

Marqués de Sotelo St., named after the mayor of Valencia (from 1927 to 1929), was renamed, temporarily, with the advent of the Republic, to the name of the republican politician Nicolás Salmerón. Nowadays, according to the Cadastral database, there is a building dated 1930 with a basement floor. Both the 1929-1944 Cadastral City map and the current Cadastral map are shown in Figure 30 with a current picture of the

building.

The original plans for this building, which are preserved in the AHMV, have been analysed. After drawing the outline of the shelter (Figure 31b), over the ground floor plan (Figure 31a) it is very likely that the shelter designed by Rieta was built in the basement under the building's entrance.

As reported by the building concierge, the basement was used during war times as a shelter, according to the memories of a deceased inhabitant of the building. An authorization to visit the basement and to take photographs was requested, but the access was denied.

This building, located next to the Town Hall Square in an area of archaeological surveillance, is listed too. Again, the catalogue file does not mention the existence of the shelter

Discussion

In April 1938, considering the virulence and frequency of the bomb attacks, the population was urged to build as many private shelters as possible, as there were not enough places in public ones. Since then, a lot of small private shelters were built, some of them, adapting the existing space in ground floors and basements.

On 1st April 1939, the Spanish Civil War was over. In the aftermath, economic recovery was difficult with destroyed cities, industrial, commercial, residential areas, and devastated fields. The Spaniards were divided into vanquishers and vanquished, the latter being excluded from public life and menaced with repression and political purges. In September 1939, under the threat of Spain becoming involved in WWII, an inventory of the number and capacity of public shelters was made⁵⁴. In December 1942, the new JDP wrote a report⁵⁵ stating that many private shelters had been dismantled. After assessing the state and capacity of the public shelters, they proposed to build new ones

to prevent future needs. Finally, in the fifties public shelters started to be dismantled too, usually by blocking the access to the chamber⁵⁶. Two years after Franco's death, in 1977, during Spain's transition to democracy, the main political groups agreed to sign the "pact of silence", believing that time would heal everything. The fratricidal war, the bombings and the war architectural sites nearly fell into oblivion.

To verify if there are remains of the shelters and if people keep memories of their existence, the names of Rieta's clients have been tracked. The three settled in Convento Jerusalén St. have been identified: Mr Iborra (SH1) the owner of a delicatessen shop became a businessman after the war. Mr Oltra, (SH2) was a tailor, well-known in the quarter after 24 years (1942–1968) as chairman of a renowned association of Convento Jerusalén. Mr Udhen, (SH3) a pharmacist, was known as the founder of the Valencian association of trainers of homing pigeons for competition. Only one of the clients was a woman (SH6) which was unusual at that time, especially as it was a high-standing building. It was Mrs Novella or her daughter who related to the building's concierge her experiences at the shelter during the bombings. All were members of the Valencian bourgeoisie. Nothing has been found about the other two clients. On the one hand, the area where SH4 was built underwent a major renovation during the 1960s, when buildings and new inhabitants changed the urban scene and, on the other hand, the building that housed SH5 was transformed, in 2002, into nine new apartments with new inhabitants, including the ground floor.

The authors have interviewed many neighbours, and current owners, tenants, and workers in the premises. Only few aged people remember the names of the shelter's owners in Convento Jerusalén St. but not the shelters themselves. Obviously, the survivors of that dark period in Spanish history have passed away and, regrettably, the memories of those years, the war and the post-war period, have also been lost. The

people who were interviewed, not only knew nothing about the bombings and the air-raid shelters but they also had no interest, in general, in the subject, probably due to the ignorance that leads them not to attribute the heritage value these structures deserve.

The main characteristics of the six analysed air-shelters are presented in table 1.

As each shelter had to be adapted to the place, the existing building, and the owner's needs, it is obvious that this is a non-homogeneous sample. Among the six analysed shelters, three of them were built ex-novo by excavating the subsoil (SH3, SH4 and SH5) and three were adapted in pre-existent spaces (SH1, SH2 and SH6). Two of the adapted shelters were located on the ground floor premises: SH1 in a delicatessen shop and SH2 behind the fitting rooms in a tailor shop, both quite small in height (1.85 and 1.95 m respectively). SH6 was adapted in the basement, where the central heating system used to be, using the chimney as a ventilation conduit.

It is worth noting the differences in the horizontal and vertical structure, their composition, and dimensions.

The horizontal structure in SH1 consisted of a series of rolled steel profiles covered with a thin concrete slab, while in the other projects the thickness of the reinforced concrete slab increased up to 1.4 m (SH5), and were in some cases covered with sand (SH2 and SH3). The shelter at Sagunto St. (SH4), the only one built outdoors, in the backyard of a house, was designed with a 1m thick, 1.80m span reinforced concrete barrel-vault roof, buried under a 55 cm thick layer of soil. According to the Technical report, the vaulted solution was chosen to facilitate the construction. Despite being said in the technical reports that the concrete was reinforced, none of the designs show the rebars, and only SH3's budget includes the weight of the required steel (1500 kg) and the cost (2 pts/kg). In the adapted shelters (SH1, SH2 and SH6), Rieta reinforced the existing party-walls with brick masonry walls, increasing their thickness

up to 40 cm (SH1, SH2) or to 50 cm in the shelter chamber and 75 cm in the entrances in SH6. Only SH2 had a central brick column. The area of the slab to be supported was not too large, but the ratio length/width was 1.34, nearly a two-dimensional slab. The authors think that Rieta probably decided on the column due to his lack of expertise in reinforced concrete structures at the time. The dimensions of the concrete slab in SH6 show that he had achieved the abovementioned competence.

The vertical structures of SH3 and SH5 were designed with reinforced concrete walls, 75 and 70 cm thick respectively. However, once again, the rebars were not drawn in the plans. In contrast with SH6 dimensions, the entrance walls were only 25 cm thick, probably justified by the fact that these shelters were excavated, and the stairs' walls were backed. SH4 was built with 80 cm mixed brick and concrete walls according to the architect. As there are not technical details in the plans, it is not possible to infer the adopted solution.

Accessibility, security, ventilation and electricity supply were also important requirements. Built in the backyard, without structural and space limitations, SH4 was the only shelter with two L-shape entrances and zigzag stairs, following the recommendations given by the JDP with respect to accessibility and security. Lighting and ventilation are described in the technical reports, but not drawn in the plans, except for SH6, where there is not a key for the symbols used. It is worth noting that the occupancy ratio in all these shelters, ranging from 0.25 to 0.45 m²/person, is smaller than the average reported by Peinado⁵⁷ (1m²/2 persons) and far from the optimal estimated at 0.6 m²/person⁵⁸. Data about the volume needed per person, which definitely relates to the volume of breathable air within the shelter, have not been found in literature. Values included in table 1 show that SH6 was the most comfortable considering area and volume.

Only two of the projects include a budget forecast. The cost of the newly built SH3 was estimated at 20105 pts for 20 places (1005pts/person) being more than half due to the price of concrete, while the cost of SH6 (adapted shelter) was estimated at 11141.73 pts for 30 places (372pts/person), approximately a third of the previous one. Both ratios are less than the 1500pts/person of minimum average cost calculated for newly built public shelters, as published in the 1942 Air-raid shelters report prepared by the new JDP⁵⁹.

Conclusions

The authors have been able to trace the location of all the shelters, but unfortunately, no remains have been found, either due to the renovation of the premises (SH1 and SH2), to the apparent inexistence of any underground structure in the visited building (SH3), to the disappearance or the complete rehabilitation of the original building (SH4 and SH5, respectively) or to the impossibility of visiting it (SH6). Their existence is not reported in any of the official consulted sources. In our opinion, the City Council Urban office should include in the records of the buildings at 6 Convento Jerusalén St. and 7 Sagunto St. the possible existence of a shelter buried in the backyard, to prevent destruction and promote further study, if future works are carried out.

Peinado's PhD thesis⁶⁰ is the only document that mentions the shelters except SH3 (a few authors name only two or three), but no reference to the architect is given. Furthermore, no study includes either the technical reports or the original plans, unlike the authors, who want to acknowledge the quality of the drawings of the original projects.

The process to acknowledging the cultural value of the shelters as part of the Valencia's war architectural heritage started very recently and very slowly, due to the

painful memory of the Spanish Civil War,⁶¹ and as a consequence, many of them have disappeared, have been forgotten or have been demolished. However, the approval of the *Valencian Democratic Memory and Coexistence Law*, which specifically mentions ‘the preservation of the documents produced during the Spanish Civil War, and the recognition of places, and itineraries of historic significance and memory’, seems to be a milestone, a starting point to identify, recognise and catalogue the vestiges of the Spanish Civil War.

It is necessary to put a value not only on the heritage assets of the Civil War, like the government of Valencia intends to do⁶² as part of an important period of our history, but also on the original projects and documentation. The architectural values of these projects are many, namely the paper, colours and graphic design of the original plans; the documents written with an old mechanical typewriter; the vocabulary used within the technical reports; the handwritten notes, the budgets and the described building techniques. Taking into account that most of these shelters have disappeared, recovering their heritage value as a space of remembrance and keeping the memory of them alive is a must. Designing a route linking the buildings in which the shelters were built, (marked with a plaque that includes the plan and description) and connecting them to other public or private shelters open for visiting could be the next step.

Finally, it is important to highlight that the design and construction of the analysed private air-raid shelters allowed Rieta to experiment with reinforced concrete, a structural material that he would end up using when designing the post-war new buildings and during his future professional practice, abandoning the design of steel structures that characterised his initial works.

Acknowledgments

Thanks are due to the staff at CIA-ETSA, the Historical Archive of the Valencia's Architects Society, the Historical Archive of the Valencian Community and the SIAM (Municipal Archaeology Section) for their availability and support and to all the neighbours, owners, tenants and workers who were interviewed for helping us trace the history of the buildings and their owners. Finally, the authors wish to thank the anonymous reviewers for their valuable feedback which has helped improving the paper and make it easier to understand, and Jane Price for being available in August to proof-read this document.

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Tables

NUMBER 1	Address: 14 Játiva st	Client: Juan Iborra Folgado	Date: 16 July 1938
Typology: adapted	Use: Owner of the shop and inhabitants of the ground floor household		Position: Ground floor shelter
Shape: rectangle	Area: $2.3 \times 1.5 = 3.45 \text{ m}^2$ L/W = $2.3/1.5 = 1.53$		Height (estimated): 1.85 m
Access and capacity	Occupation: 10 p. (0.35 m ² /person)		Entrances: 1
Lighting	Electrical lighting and additional one with batteries		
Ventilation	Through the access and adequate hatches		
Structure	Foundations: Brick masonry		
	Vertical: 40 cm thick brick masonry walls		
	Horizontal: Flat roof, 25 cm reinforced concrete slab, over 4 hot rolled beams (double T cross sections)		
References	Vera Deleito and Vera de Leito 2000; Moreno Martin and Muñoz Ballester 2011; Peinado Cucarella 2015		
Documents	Plans, technical report and building permit application		State: DEMOLISHED
NUMBER 2	Address: 14 Luis Morote st	Client: José Oltra Molés	Date: 19 July 1938
Typology: adapted	Use: owner of the tailor shop and inhabitants of the building		Position: Ground floor shelter
Shape: rectangle	Area: $2.95 \times 2.2 = 6 \text{ m}^2$ L/W = $2.95/2.2 = 1.34$		Height: 1.90 m
Access and capacity	Occupation: not given		Entrances: 2
Lighting	Electrical lighting and additional oil installation		
Ventilation	Through the accesses and additional ventilation conducts		
Structure	Foundations: Unknown		
	Vertical: 40 cm thick brick masonry walls and a central brick column		
	Horizontal: Flat roof, 75 cm reinforced concrete slab with a 25 cm sand layer over it		
Stairs	Three steps going downstairs		
References	Vera Deleito and Vera de Leito 2000; Aragò, Azkàrraga, and Salazar. 2010; Moreno Martin and Muñoz Ballester 2011; Peinado Cucarella 2015		
Documents	Plans, technical report and building permit application		State: DEMOLISHED
NUMBER 3	Address: 4 Luis Morote st	Client: Eduardo Uhden	Date: unknown
Typology: newly built	Use: Unknown		Position: Underground shelter
Shape: rectangle	Area: $4 \times 1.5 = 6 \text{ m}^2$ L/W = $4/1.5 = 2.66$		Height: 2 m
Access and capacity	Occupation: 20 p. (0.30 m ² /person)		Entrances: 1
Lighting	4 lamps included in the budget without additional description		
Ventilation	8 conducts included in the budget without additional description		
Structure	Foundations: Not included in the budget		
	Vertical: 75 cm thick reinforced concrete walls for the shelter chamber and brick walls for the stairs		
	Horizontal: Flat roof, 125 cm reinforced concrete slab with a 25 cm sand layer over it		
Stairs	Zigzag stairs. Three flights of stairs. 22 steps		
References	Unpublished. Discovered in Rieta collection CIA-ETSA. Without technical report		
Documents	Plans and budget. Total cost :20105 pts, equivalent to 1005 pts/ place		State: UNKNOWN
NUMBER 4	Address: 7 Sagunto st.	Client: Francisco Farinós	Date: 20 July 1938
Typology: newly built	Use: Residential (big family and close refugees)		Position: Underground shelter
Shape: rectangle	Area: $4.30 \times 1.80 = 7.74 \text{ m}^2$ L/W = $4/1.5 = 2.38$		Height: 2.25 m
Access and capacity	Occupation: 30 p. (0.25 m ² /person)		Entrances: 2
Lighting	Electrical lighting and additional oil installation		
Ventilation	Through the accesses and additional ventilation chimneys		
Structure	Foundations: Unknown		
	Vertical: 80 cm thick concrete and brick masonry walls. The walls of the stairs are 25 cm thick		
	Horizontal: Vaulted reinforced concrete roof 1 metre thick		
Stairs	Two Zigzag stairs. Two flights of stairs. 19 steps		
References	Moreno Martin and Muñoz Ballester 2011; Peinado Cucarella 2015		
Documents	Plans, technical report and building permit application		State: DEMOLISHED
NUMBER 5	Address: 6 Samaniego st.	Client: Benito Merlo Hernández	Date: 14 August 1938
Typology: newly built	Use: Not said. Probably residential		Position: Underground shelter
Shape: rectangle	Area: $3.5 \times 1 = 3.5 \text{ m}^2$ L/W = $3/1 = 3$		Height: 2.25 m
Access and capacity	Occupation: 14 p. (0.25 m ² /person)		Entrances: 1
Lighting	Electrical lighting		
Ventilation	Ventilation chimneys and electric fans		
Structure	Foundations: Unknown		
	Vertical: 70 cm thick concrete walls (measured in the plans)		
	Horizontal: Flat roof, 1.4 m reinforced concrete slab (measured in the plans)		
Stairs	One flight straight stair. 19 steps. A Second entrance may be built through the well		
References	Peinado Cucarella 2015		
Documents	Plans, technical report and building permit application		State: DEMOLISHED
NUMBER 6	Address: 1 Nicolás Salmerón st.	Manuela Novella Fuster	Date: 20 August 1938
Typology: adapted	Use: Not said. Probably residential		Position: Basement shelter
Shape: rectangle	Area: $4.4 \times 3.1 = 16.64 \text{ m}^2$ L/W = $4.4/3.1 = 1.46$		Height: 2.5 m
Access and capacity	Occupation: 30 p. (0.45 m ² /person)		Entrances: 2
Lighting	Electrical lighting and additional oil installation. Electrical elements drawn in the cross section		
Ventilation	Chimney of the boiler heating and electric fan. Ventilation conducts drawn in the cross section		
Structure	Foundations: Included in the budget: 0.55 cm thick		
	Vertical: 50/75 cm thick brick masonry walls		
	Horizontal: Flat roof, 1 m reinforced concrete slab		
Stairs	There is only one unclear solution for the stairs drawn		
References	Peinado Cucarella 2015		
Documents	Plans, technical report and total budget (11141.73 pts, equivalent to 372 pts/place), building permit application.		State: Unauthorised visit

Table 1. Main characteristics of the analysed shelters

Figures



Figure 1. Valencia's Town Hall Square aerial street view



Figure 2. Valencia, 1937. Bombing of the city Town Hall (Aragó, Salazar, and Azcárraga 2006) and the North Train Station (Ufficio Storico della Aeronautica Militare)

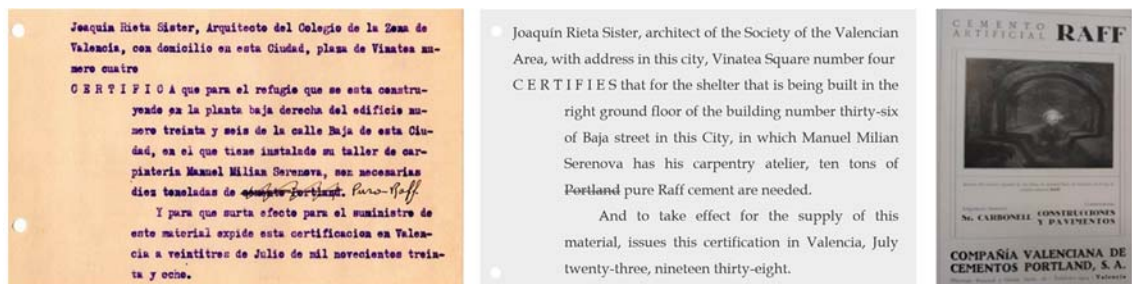


Figure 3. Certificate for the cement supply (Rieta Collection), translation, and Raff cement advertisement (AHMV. Fondo Emilio Rieta, caja 55)

Destrucción de un macizo de hormigón en masa					Destruction of a mass concrete block				
Peso de la bomba	Máxima penetración	Radio de explosión	Profundidad del embudo	Diámetro del embudo	Weight of the bomb	Maximum penetration	Explosion radius	Depth of the funnel	Diameter of the crater
50 Kg.	0.34 m.	0.54 m.	0.71 m.	2.13 m.	50 Kg.	0.34 m.	0.54 m.	0.71 m.	2.13 m.
100 »	0.37 »	0.94 »	1.13 »	3.39 »	100 »	0.37 »	0.94 »	1.13 »	3.39 »
250 »	0.27 »	1.24 »	1.38 »	4.14 »	250 »	0.27 »	1.24 »	1.38 »	4.14 »

Figure 4. Maximum penetration of a bomb in a concrete block. Photo taken at the air-raid shelter in Cartagena and translation.

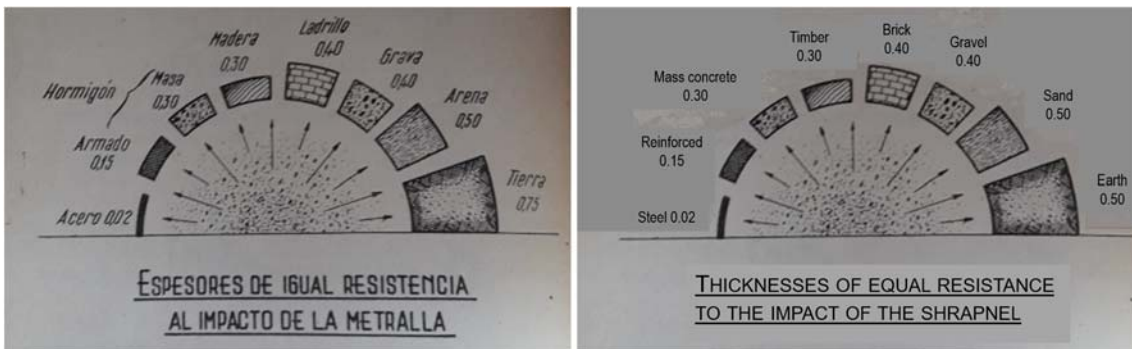


Figure 5. Wall thickness with the same resistance against the shrapnel depending on the material (J. Crespo Granja. 'La Defensa pasiva 2ª edición', Ejército, Madrid, 1954) and translation.

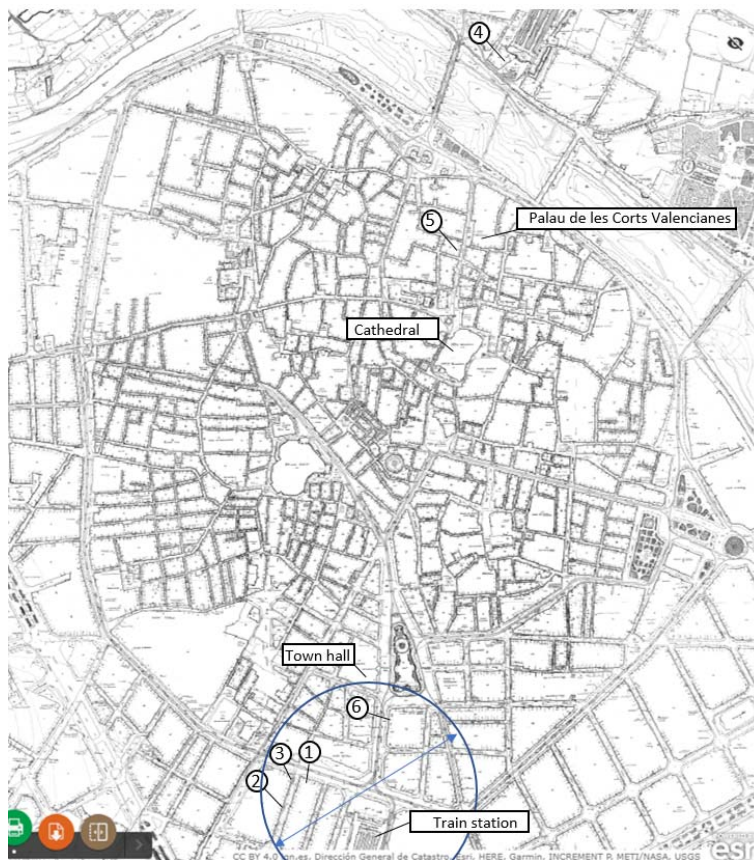


Figure 6. Location of the air-raid shelters in Valencia cadastral city map, 1929-1944

(AHMV)

TECHNICAL REPORT

BACKGROUND- Juan Iborra Folgado, having a shop in the ground floor of the building nº 14 in Jativa street of this city, has entrusted the undersigned architect, the project and construction of a shelter against shrapnel and collapse in this ground floor.

ADOPTED SOLUTION- The foundations and the protective walls will be built with brick masonry, some newly built and others reinforcing the existing ones
The protective roof will be made with steel laminated beams, continuous deck with joists of the same material and a reinforced concrete upper slab

LIGHTING AND VENTILATION- The normal lighting will be electrical, connected to the house electricity power, and in anticipation that it will fail, another installation with batteries will be done. Ventilation will be through the access and adequate hatches.

ACCESS AND CAPACITY- An only entrance adequately protected is projected due to its proximity to the façade voids. The maximum admissible capacity is 10 people.

SECURITY- As indicated, its aim is to avoid the effects of a likely building collapse and of shrapnel

Valencia 16th July 1938
The architect

MEMORIA

ANTECEDENTES.- Juan Iborra Folgado, que tiene instalado un comercio en la planta baja del edificio nº 14 de la calle de Jativa de esta Ciudad, ha encomendado al Arquitecto que suscribe, el proyecto y construcción de un refugio contra metralla y derrumbamiento en dicha planta baja.

SOLUCIÓN ADOPTADA.- Los cimientos y muros protectores se ejecutarán con fábrica de ladrillo unos de nueva planta y otros mediante el refuerzo de los existentes.
La cubierta protectora será formada con jácenas de hierro laminado, placa continua de viguetas del mismo material y placa superior de hormigón armado.

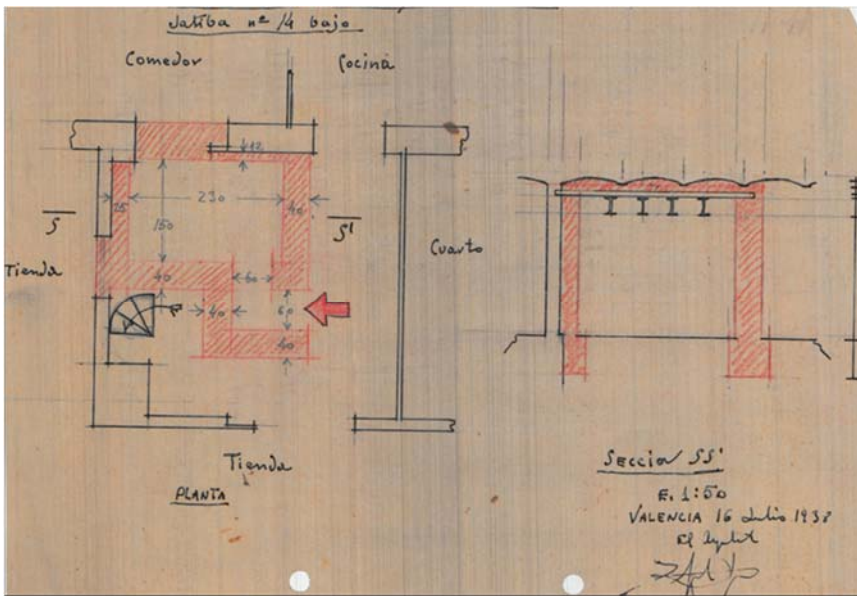
ILUMINACIÓN Y VENTILACIÓN.- La iluminación normal será eléctrica tomando el fluido de la instalación de la vivienda y a previsión de que este falte se realizará otra instalación con pilas.
La ventilación se realizará por el acceso y adecuados registros.

ACCESO Y CAPACIDAD.- Se proyecta un acceso único adecuadamente protegido por su proximidad a los huecos de fachada.
La capacidad máxima admisible es de diez personas.

SEGURIDAD.- Como se ha indicado tiene como finalidad evitar los efectos derivados del posible derrumbamiento del edificio y de la metralla.

Valencia 16 de Julio de 1938
El Arquitecto,

Figure 7. Shelter SH1: technical report (original and translation)_(Rieta collection)



Translation:
Comedor: dining room
Cocina: kitchen
Tienda: Shop
Cuarto: room

Figure 8. Shelter SH1: section and floor plan (Rieta collection)

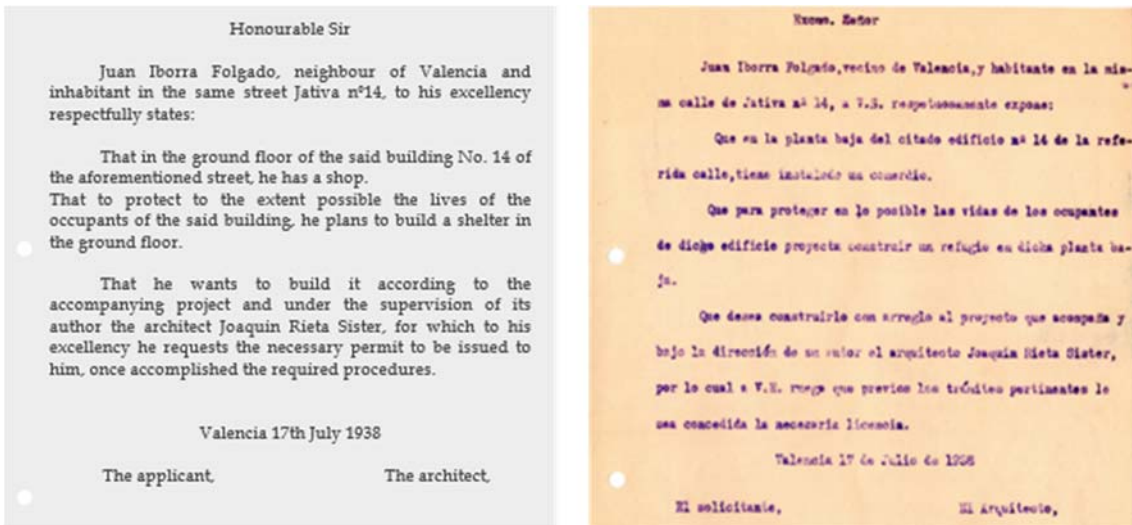


Figure 9. Shelter SH1: building permit application and translation (Rieta collection)

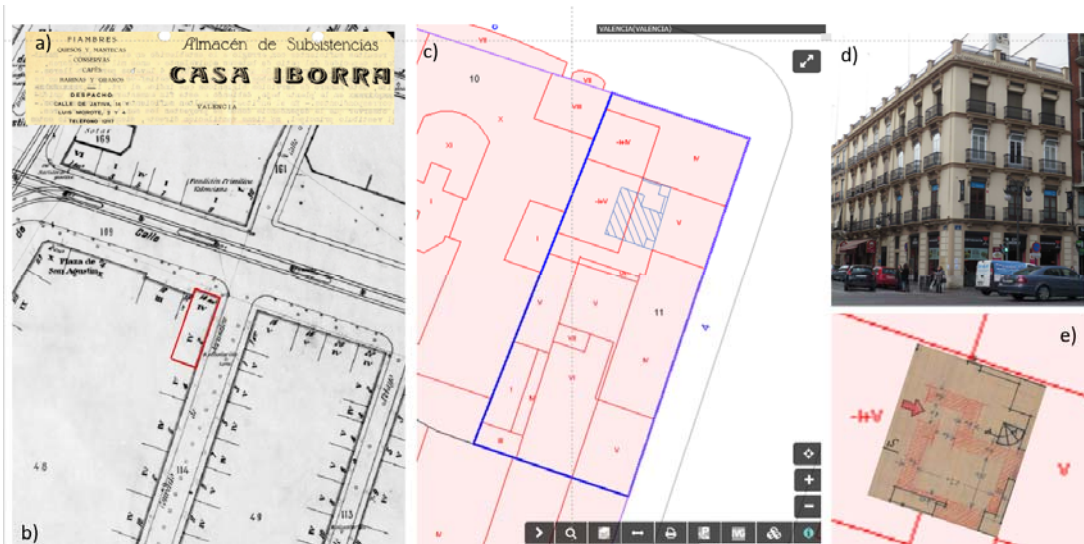
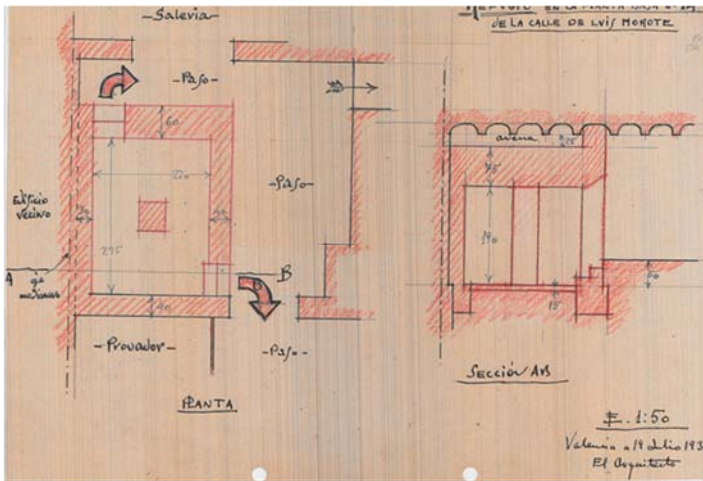


Figure 10. a) Delicatessen shop letterhead (Rieta collection), b) Valencia Cadastral city map, 1929-1944 (AHMV), c) and d) Current cadastral map and building (Cadastral database), e) Shelter in the current plot.



Translation:
 Edificio vecino: adjoining building
 Eje medianero: Party wall axis
 Provador: changing room
 Paso: passage
 Salevia: this word doesn't exist in modern Spanish. It could be "sale via" meaning exit

Figure 11. Shelter SH2: floor plan and section (Rieta collection)

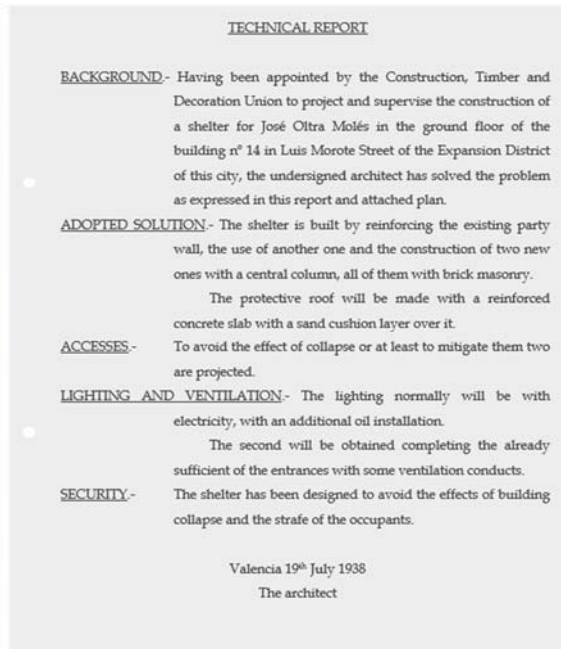
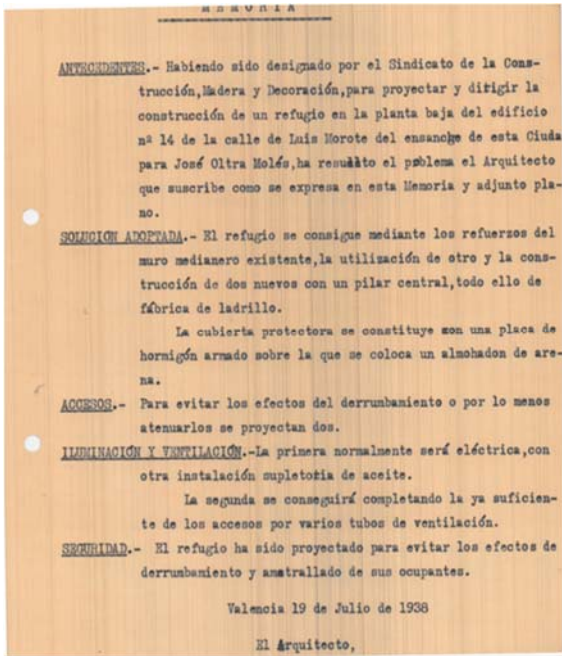


Figure 12. Shelter SH2: technical report (Rieta collection)

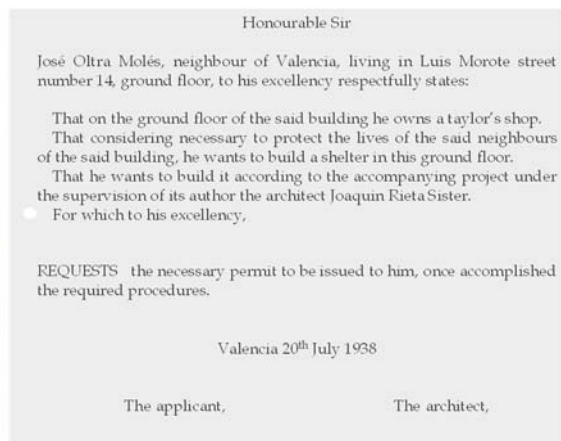
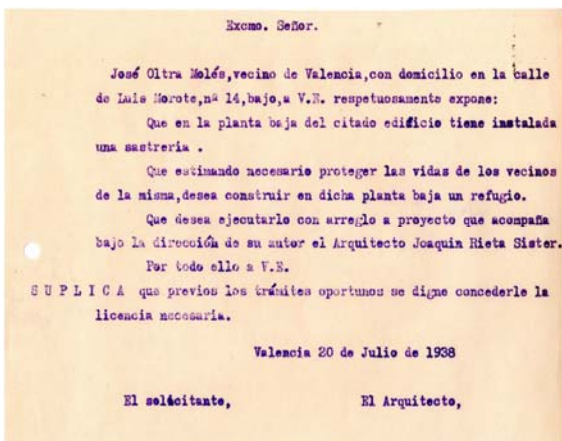


Figure 13. Shelter SH2: building permit application (Rieta collection)

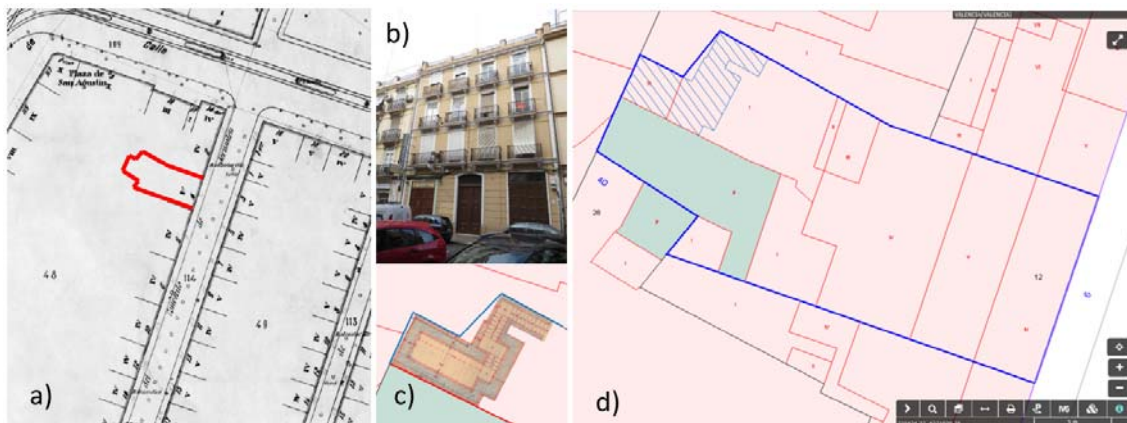


Figure 17. a) Valencia Cadastral city map, 1929-1944 (AHMV), b) Current building, (Cadastral database), c) and d) Shelter in the current plot

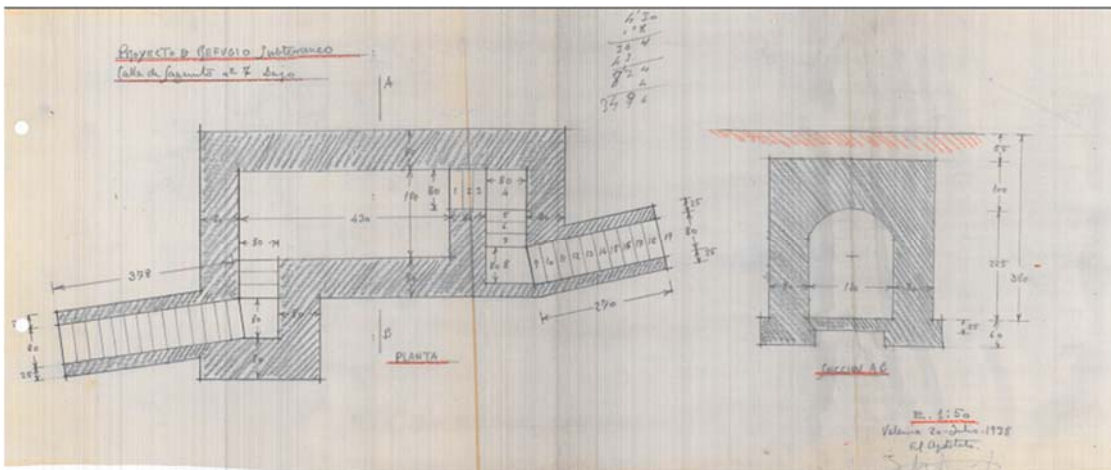


Figure 18. Shelter SH4: plan and section (Rieta collection)

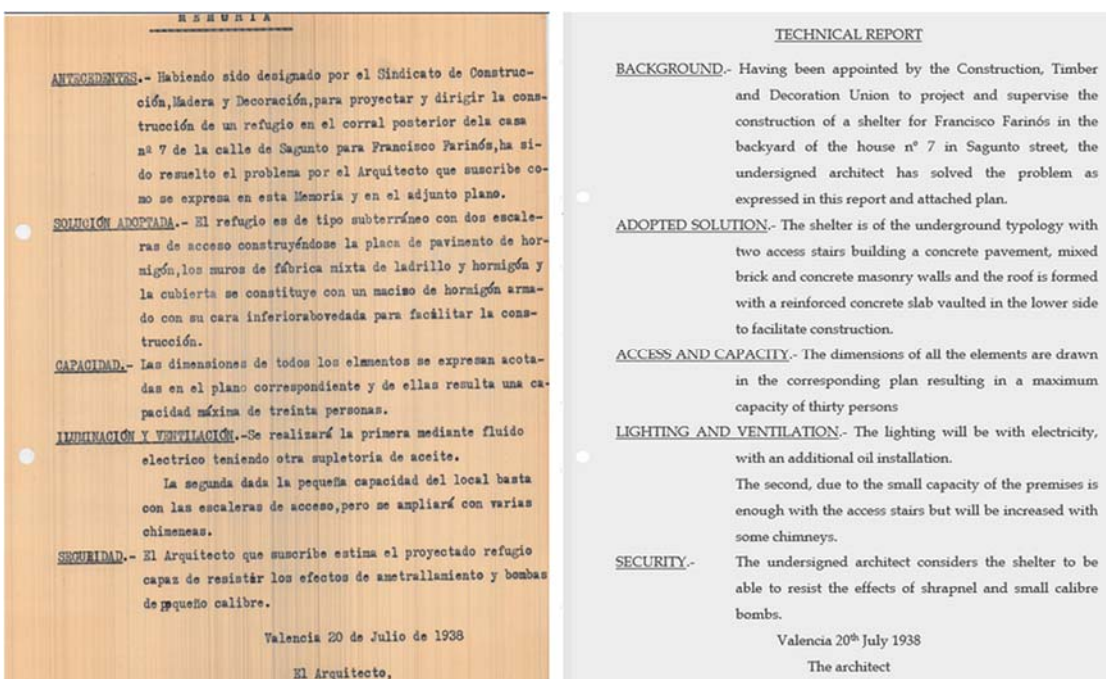


Figure 19. Shelter SH4: technical report (Rieta collection)

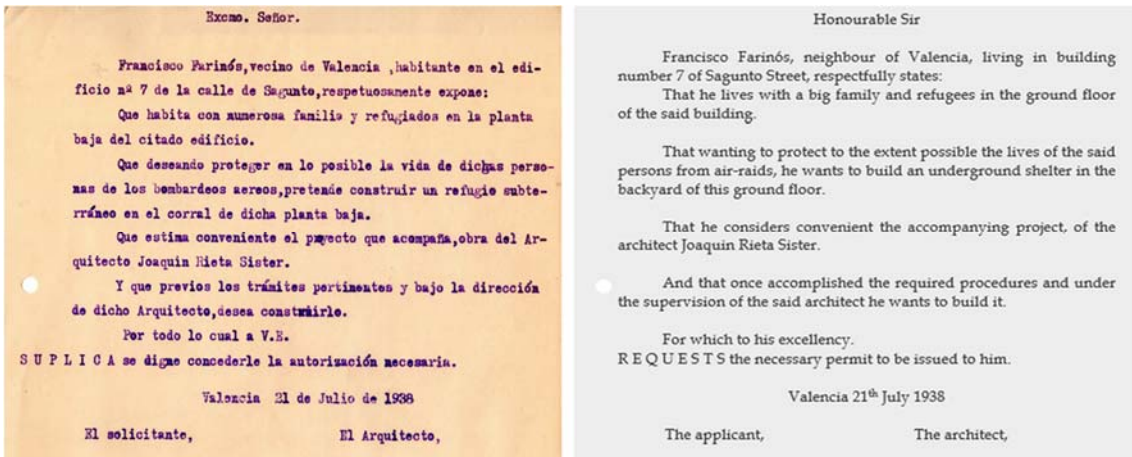


Figure 20. Shelter SH4; building permit application (Rieta collection)

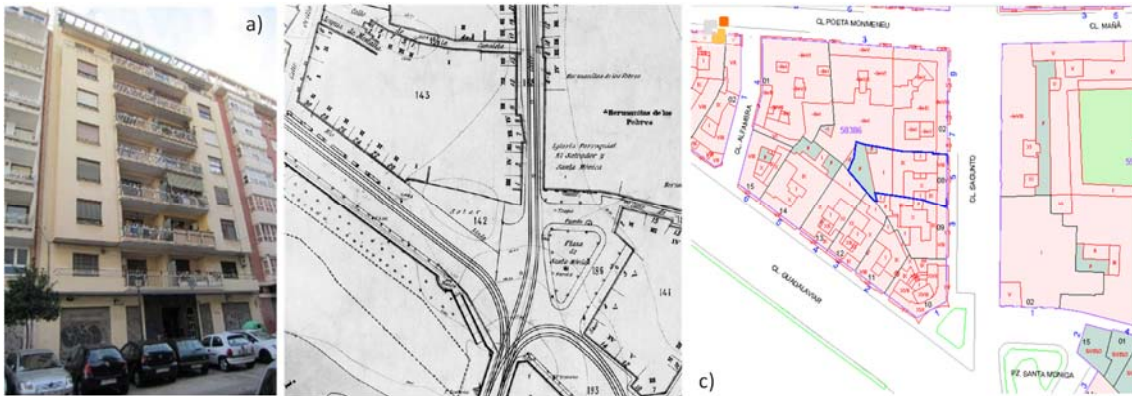


Figure 21. a) Current building, b) Valencia Cadastral city map, 1929-1944 (AHMV), c) Current cadastral map, Cadastral database

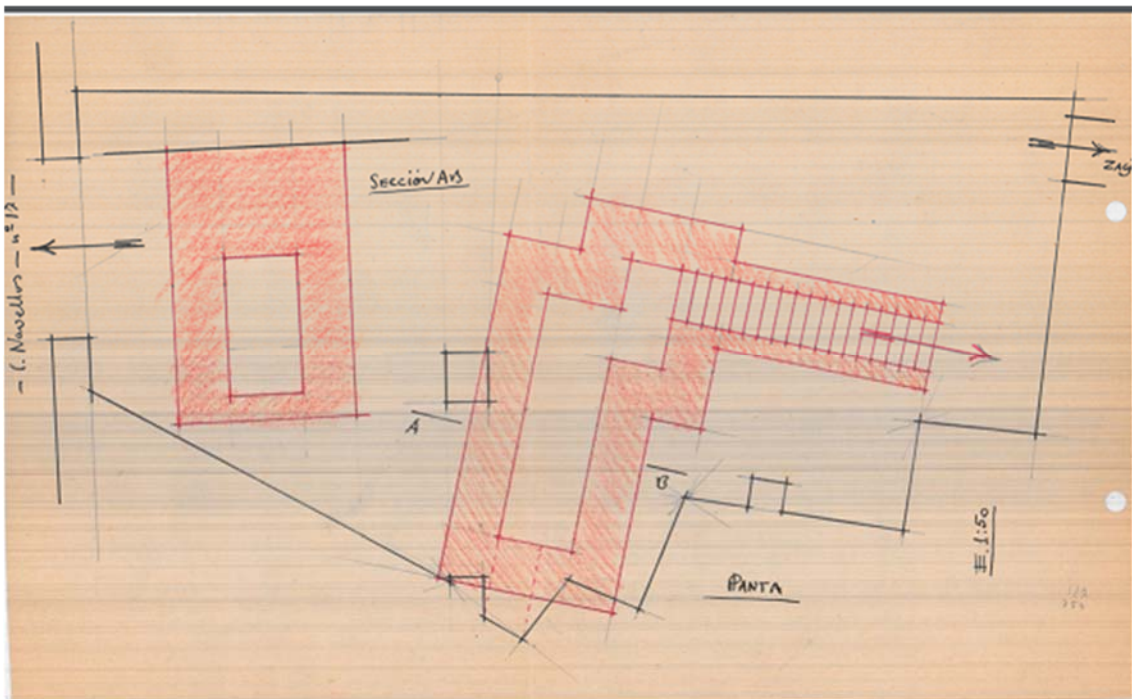


Figure 22. Shelter SH5: plan (Rieta collection)

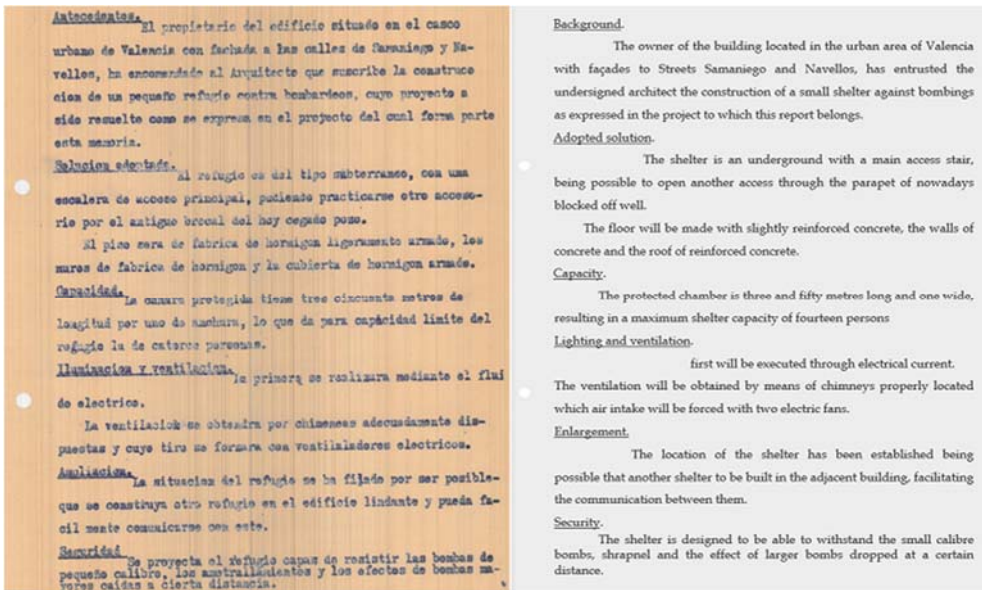


Figure 23. Shelter SH5: technical report (Rieta collection)

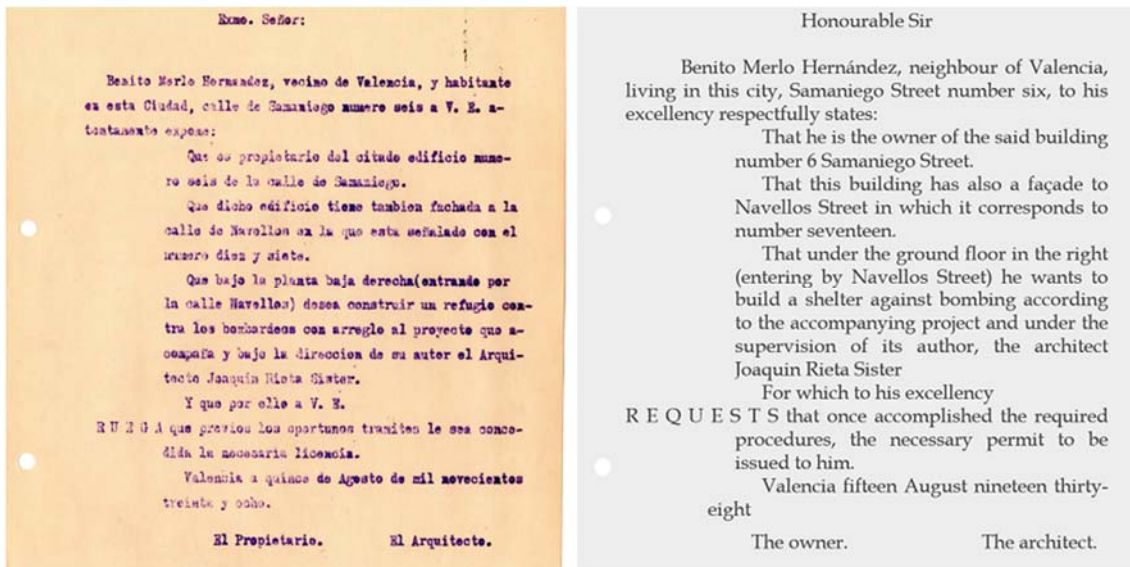


Figure 24. Shelter SH5: Building permit application (Rieta collection)



Figure 25. a) Valencia Cadastral city map, 1929-1944 (AHMV), b) Current cadastral map and building at Samaniego 6, (Cadastral database)

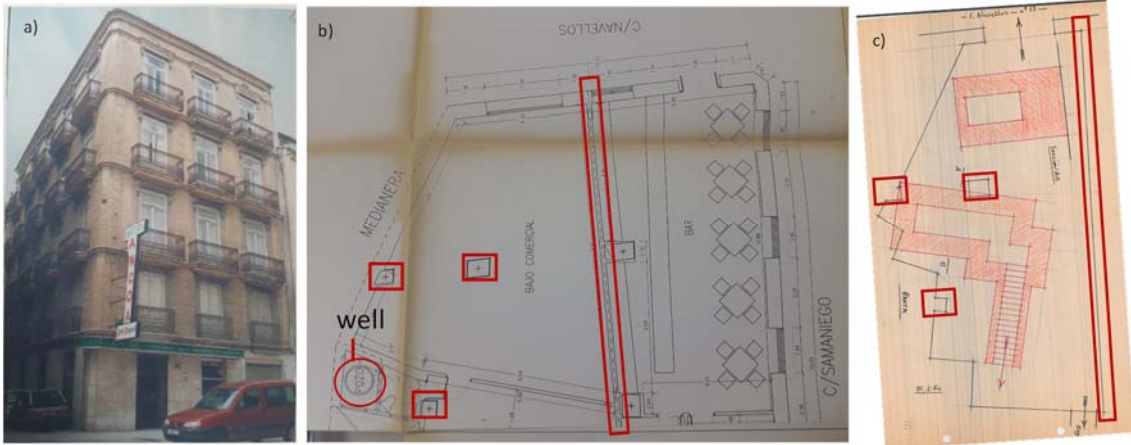


Figure 26. Building before the rehabilitation: a) façade b) ground floor plan (AHMV) c) Shelter SH5: plan (Rieta Collection)

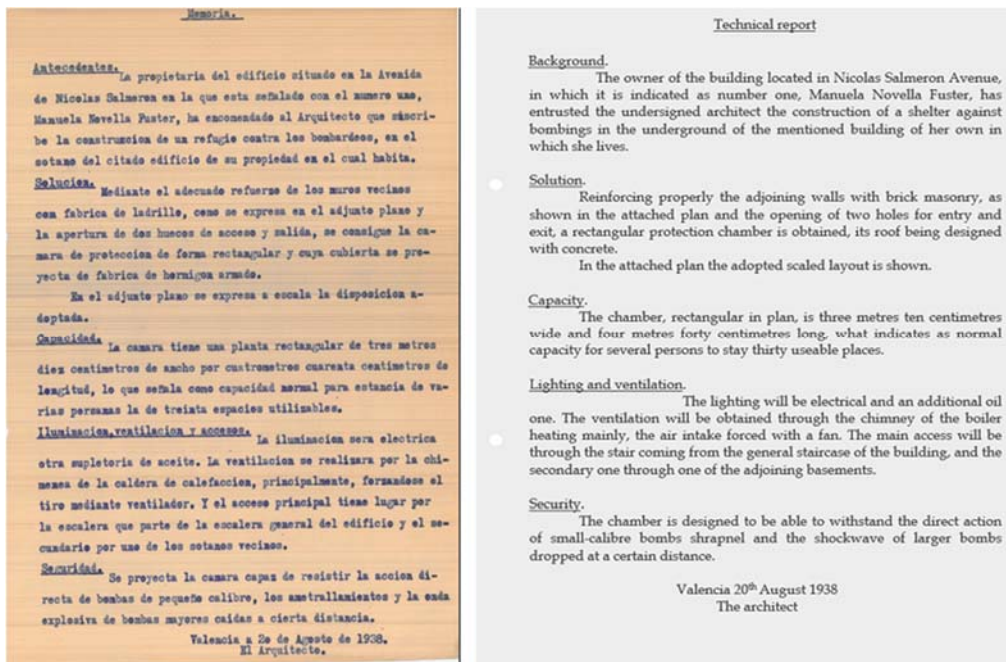


Figure 27. Shelter SH6: technical report (Rieta collection)

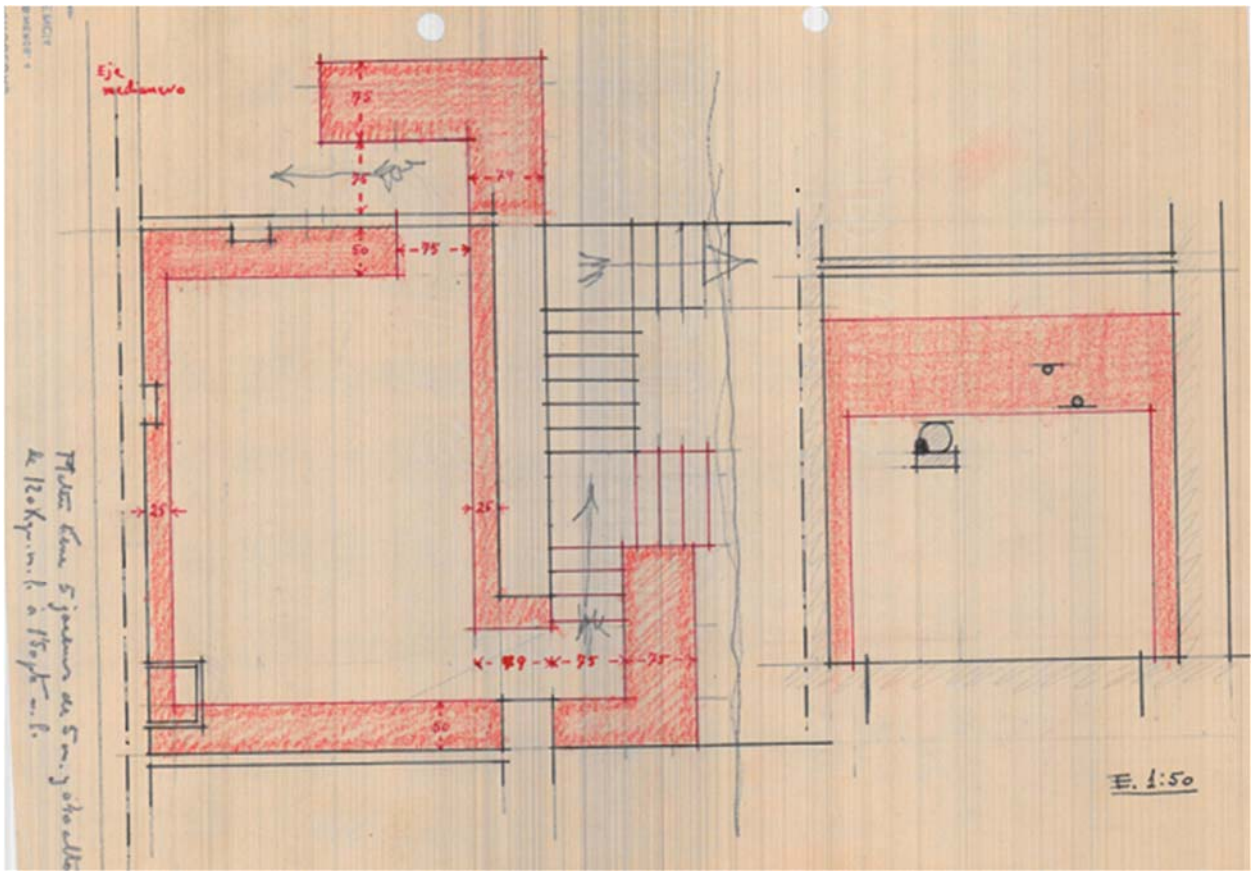


Figure 28. Shelter SH6: plan and section (Rieta collection)

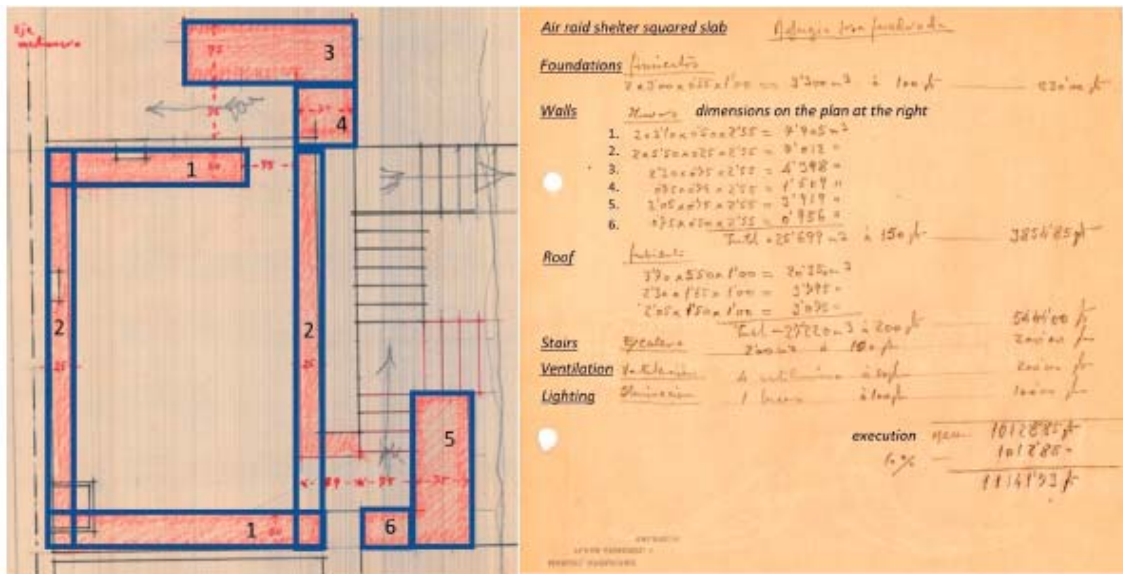


Figure 29. Shelter SH6: budget (Rieta collection)



Figure 30. Valencia cadastral city map, 1929-1944 (AHMV), b) Current cadastral map and building at Marqués de Sotelo 1



Figure 31. a) Original plan of Marques de Sotelo, 1 (AHMV: Serie Policía Urbana, año 1925, caja 1 y expediente 6835) b) Shelter scheme drawn over the original plan of the building