HISTORICAL AND STRUCTURAL ASPECTS OF THE PAPAFEIO ORPHANAGE IN THESSALONIKI, GREECE

Alkisti Daniil, Architect AUTH M Arch GSA, Al. Papanastasiou 23, Panorama, 55236, Thessaloniki, Greece, Tel: +30-2310-342-800, +30-2310-220-726, E-mail: alkistid@hotmail.com

Olga Molido, Civil Engineer AUTH, Keramopoulou 27, Kalamaria, 55133, Thessaloniki, Greece, Tel: +30-2310-435-441, E-mail: olgoulio@yahoo.gr

Virginia Patrika, Architect AUTH, Dionisou 79, 59100, Veria, Greece, Tel: +30-23310-23-430, E-mail: virginia.patrika@gmail.com

Aggelos Tasolampros, Architect AUTH, Dorilaiou 4, 54454, Thessaloniki, Greece, Tel: +30-2310-936919, E-mail: agelotasol@hotmail.com

Konstantina Tsironi, Civil engineer AUTH, Sarantaporou 19, 54640, Thessaloniki, Greece, Tel: +30-2310-847946, E-mail: ntina.tsironi@gmail.com

Keywords: Architectural, Protection, Conservation, Restoration

Thematic Area: No*1_ Historical and structural aspects of monuments

ABSTRACT

Many public buildings were erected in Thessaloniki by the different national communities of the city at the end of the 19th century. The Papafeio Orphanage (1903) was one of the most important social welfare institutions created by the Greek community at the time. What is more, in the historical context of the late 19th century and early 20th century, its remarkable architectural characteristics and, most of all, the extremely interesting structure of the building, reflecting the European structural technology of the period, which, when combined, make the Papafeio Orphanage one of the most prominent architectural monuments in the city of Thessaloniki originating from the late Ottoman period. The paper presents the analysis and the documentation of the building. In situ research and a literature review were carried out to record and document the structural, the typological as well as the morphological characteristics of the construction. In addition, a historical survey covered archives and the existing literature to document the history of the institution. The research results demonstrated that the building owed its present good condition largely to the high quality construction including the use of iron in load bearing elements of the structure. The Papafeio Orphanage still fulfils its original function, providing a social resource to the city of Thessaloniki.

INTRODUCTION

The present paper is based on the study for the analysis and the documentation as well as for the proposal of maintenance and restoration of the Papafeio Orphanage. The study was carried out as part of the interdisciplinary workshop, supervised by M. Nomikos, architect, professor AUTH. and C. Ignatakis, civil engineer, professor AUTH., of the interdepartmental post-graduate studies programme “Protection, maintenance and restoration of architectural monuments” within Aristotle University, Thessaloniki. The Papafeio Orphanage is a remarkable example of public architecture in the city of Thessaloniki during the late Ottoman period. The paper starts by describing the social, economic and political context of the era as well as parts of the historical analysis and documentation of the building. Following this, the architectural analysis and documentation concerning the typological and morphological characteristics of the Orphanage are presented in combination with an extensive analysis of the structure and pathology of the building. The aim of the study is to describe Papafeio Orphanage building and thus provide
insights and a broader understanding of the structure of buildings constructed in the same period in Thessaloniki.

**Social, economic and political context**

At the end of the 19th century, Thessaloniki was one of the biggest urban centres and important ports in the Balkans. The beneficial reforms of the late Ottoman period (Tanzimat) helped the city evolve and significantly changed the way its social life, administration and economy were organised. Thessaloniki was modernised as new networks of transport and urban services were created. Moreover, the urban tissue was greatly altered by the demolition of the walls and the opening of new roads; the city was expanding [1].

In regard to architectural design and building activity in the period, many new public buildings were erected to house services and organisations, such as the Residency (1891), the Imperial Lyceum (1887), the Headquarters (1903), the City Hospital (1902), the Customhouse (1911) as well as the Papafeio Orphanage (1903). The erection of new public edifices was carried out by the different competing communities of the city as a way of demonstrating their presence and influence, not just in the city, but also in the wider area of Macedonia [2]. These novel architectural compositions shaped the new image of the contemporary city and became landmarks in the urban grid.

The Papafeio Orphanage was one of the most significant neoclassical public buildings of the Greek community of Thessaloniki at the time. It belonged to the group of buildings whose architectural forms symbolised the national identity of the community erecting them. Thus, it can be said that the Greek community used architecture both as a link to the capital of liberated Greece in Athens and to bolster its prestige in the city of Thessaloniki [3].

**ANALYSIS AND RESULTS**

The Papafeio Orphanage is situated on the periphery of the Toumba area of Thessaloniki, on a site of 29.5 acres, delineated by Papafe Street, K. Karamanle Street, Al. Symeonide Street and Katsimide Street. The erection of the Papafeio Orphanage was sponsored by the Ioannes Papafes’ bequest. Papafes, one of the most important national benefactors of the 19th century, was born in Thessaloniki (1792) and developed his financial activity in Malta. The bequest was equivalent to 4,000 French francs in the form of an annual income deriving from French government bonds. The beneficiaries and executors were the Greek Community and the Metropolitan who were responsible for the administrative organisation and running of the Orphanage [4].

The project was assigned to Xenofon Paionides, the foremost architect of the Greek community in Thessaloniki, after his design proposal was judged the most appropriate [5]. The foundation stone was laid on 12th March 1895, on a site of square meters, the property of the Greek Orthodox Church [6]. The building was completed at the beginning of 1903 and the first 57 occupants were accommodated in October 1903. The materials used for the construction included local stones, bricks and tiles produced by “Allatini” brickworks, zinc, marbles, glass, plaster, European iron beams and American timber, imported from Smyrna, for the floors and the openings. In addition, 9 lighting rods were installed [7].

The Papafeio Orphanage became famous throughout Greece, both for its welfare activities and for the education and skill training provided to its inmates in the fields of wood carving, carpentry, cabinet making, electrical installation, black smithery, machining craftsmanship, shoe-making and tailoring in the workshops inside the main building and in special areas of the site.
The Orphanage, with its extensive accommodation, was often requisitioned for military and political purposes during the first half of the 20th century, to meet special contingencies. Due to the fluctuating political conditions and frequent hostilities, the building functioned more as a military base and hospital than an orphanage. The institution reverted to its original and intended use in 1947, a function it still fulfils accommodating 70 children and retaining the constitutional structure stipulated by Ioannes Papafes in his will.

Its constantly changing use and the earthquake of 1978 all took their toll and resulted in the building having to be restored four times, in 1914, 1947, 1958 and in 1978 [8]. However, none of this compromised its structural system, nor any additions made that changed its typological and morphological characteristics.

Architectural analysis and documentation

The plan

The building has a symmetrical E-shaped plan and develops on four levels, the first, the second, and the third with the fourth level being the roof. The plan is organised in relation to a central North-South axis. It is articulated in three parts, a central section and two wings. The clear separation into three parts and the symmetrical organisation of the architectural elements around a central axis form the basic organisational elements of the plan.

The spatial entities

The different categories of space comprise three different entities; the primary spaces, the auxiliary spaces and the intermediate ones.

The primary spaces constitute public, communal and private areas. They are situated on the perimeter of the building, sometimes connected to each other with doors. The classrooms, the tutors’ offices, the infirmary, the director’s residence and the personnel’s dormitories are accommodated on the second level. The children’s dormitories and the ceremonial hall are placed on the third level. The ceremonial hall, the highest ceilinged room of the Orphanage, is situated in a prominent position, at the centre of the building.

The auxiliary spaces are public or communal areas. They contact directly with the intermediate spaces, communicating through the latter with the primary spaces. Most of them are situated on the first level and they contain the dining hall, the recreation and the storage area. In addition, there are some rooms which are locked today but they used to house dormitories of the personnel and workshops. Moreover, the lavoratories are placed at the middle of every wing, in the corner,
on every floor. The bathrooms are accommodated on the first level and have a small capacity in regard to the number of occupants that use them.

The intermediate spaces comprise the corridors, staircases, lobbies and the entrance. The corridor defines a circulation zone around the edge of the building. The main staircase is situated at the centre of the Orphanage and defines basic vertical movement as well as the spatial allocation of users. The two auxiliary staircases are used for service functions and are placed at the corners at the end of the wings of the plan; they allow lateral movements of users and auxiliary functions of the building.

The entrance

Figure 4: The central entrance of the building – southern elevation

Figure 5: The central entrance hall of the building at the second level

Figure 6: The primal staircase

The main entrance is placed on the central axis of the edifice. The volume that accommodates it is differentiated from the main body of the building, being both higher and projecting. The elements that compose the monumental entrance are the external flight of steps, the portico, the balcony and the pediment. The composition of these elements defines the transition from the external space to the internal one.

The primary spaces - The central entrance hall

The entrance is not only the transitional point; it also forms the transitional passage. The pillars of the portico are repeated in the main hall area. Such a repetition defines the central space of the building, the piano nobile, and extends the linear transition from the external to the internal area. This pathway ends at the monumental, primary internal staircase. At this point, the horizontal pathway followed by the users entering the building is transformed into a vertical movement allowing access to the upper floors via the main staircase.

The facades

As far as the facades go, the vertical organisation of the planes into three parts and the symmetry are accomplished by the definition of a central vertical axis. Specifically, at the main and rear façade (the southern and the northern ones), the central part is defined as the metacentre of the architectural composition and projects from the elongated main body of the building. What is more, the design of the facades suggests not only a vertical articulation in three parts but, in addition, organisation into three horizontal zones, in accordance with the principles of the neoclassical rhythm; basis, stem, coronation.

Thus, it can be said that the symmetry, characterizing the composition of the volume, the facades and the plan, the definition of axes, the articulation into three parts of the volume and the emphasis on centrality become the main elements of the typology of the building.
Morphology

The design of the facades emphasises the horizontal organisation in three parts which is achieved with the continuous rows of openings, the cornices, the horizontal decorative fillets, the balustrade of the balcony and the horizontal rustication (κυφώ σεις) at the level of ground floor. The succession of mass and void and the use of decorative elements form the facades.

The windows

The building boasts a variety of windows that can be placed in certain categories:

a) The first level - arched windows with segmented lintel course; the keystone is emphasised. (Figure 9)

b) The round-arched windows with pilasters. The arched lintel is in the form of torus mouldings and the keystone is emphasised. In some cases, the wall under the window sill is in the form of a frieze decorated with rectangular mouldings. (Figure 10)

c) The rectangular windows with architrave, frieze and cornice above the head of the window. The cornice at the head of the window is in the form of a decorated frieze. In some cases, the frieze and the cornice above the head of three continuous windows are unified. (Figure 11, 12, 13 and 14)

d) The smaller rectangular windows with architrave and a frieze and cornice above the head of the window. (Figure 15).

e) Windows with pilasters and piers. The cornice above the above the head of the window is identical with that of the façade. (Figure 16 and 17).
The decoration

The decoration is incorporated in the proportions of the elevations and corresponds to the morphology and the scale of the building. In addition, it is always related to the compositional elements and is embodied in the construction. The decorative elements of the architectural synthesis are columns, pilasters, Ionian pediments, cornices, fillets, rustification and window architraves. In addition, the entrance boasts decorative motifs, such as the balustrade of the balcony, the piers of the external staircase, the pediment, the decoration of the second level’s windows, which are not repeated elsewhere in the building.

Inside, the decoration can be identified mainly in the central hall of the entrance at the second level, in the corridor at all levels and in the main staircase of the building. The use of marble signifies the importance of these spaces. Furthermore, the black and white marbled floor of the corridor and the central hall, as well as the use of white marble for the staircase, decorate and differentiate these specific spatial entities. Moreover, the columns and the decorated openings at the central hall embellish and complete the formal atmosphere of the entrance area.

Analysis of the structure - pathology

The Papafeio Orphanage was built during a period (1895-1903) when new constructional methods and materials were introduced. The most important of the new materials was iron which was used in the manufacture of beams and columns. It replaced wood and became the basic constructional material for the erection of public and private buildings until the first decades of the 20th century when iron was supplanted by reinforced concrete [9].

Even though iron had been used in structures since the years of the antiquity, it was only during the Industrial Revolution that it was produced extensively, thanks to industrial standardisation, and quality was improved. Initially, it was used in the construction of fireproof industrial buildings; subsequently its use became more widespread and took in various building types. With its resistance to fire, iron was combined with the constructional materials of the era, brick and stone being, and was utilised to produce horizontal and vertical load-bearing elements, specifically beams and columns. The former could span large gaps or form elements of lintels. It is important to mention that most of the times iron was incorporated within the structure and was not visible.

In Greece, iron is found in buildings from the 1830’s in Athens, yet its use did not become standard until the 1870’s. Its use as a structural material stems from the professional activity in the country of foreign engineers and Greeks who had studied abroad and used iron in their projects thus popularising the use of the new material in most of the neoclassical, eclectic and industrial buildings of the era [10]. Since there were no local manufacturers producing iron, it was imported from Europe in the form of columns and beams of standardised dimensions and sections [11].

The Papafeio Orphanage was designed by the architect Xenofon Paionides, who having studied in Germany, Munich (1870-1880) [12] applied the European constructional method to the project.

Load-bearing elements

The vertical load bearing elements of the building are masonry walls and brick walls. Specifically, at the first level, the vertical load bearing elements are coarse stones masonry walls. The thickness of the external walls is 80 cm and that of the internal is 70 cm. The ceiling height is 3.50 m. The stone walling consists of Thessaloniki greenstone bedded with mortar. These walls were constructed with outer and inner surfaces of carefully placed large stones infilled with smaller stones. Horizontal zones of two rows of engineering fired bricks (solid units) were placed per 1 m,
height wise, so that the two external stone bodies of the walls could behave in a uniform way against seismic strain applied vertically to the wall. At the highest point of the first level-wall a zone of two rows of engineering fired bricks (solid units) was placed so that the floor of the second level could rest there (Figure 18, figure 20). In addition, at the dining hall (Figure 19, spots A and B) and in the space in front of the central staircase, columns made of engineering fired bricks (solid units) are placed instead of transversal walls. The type and method of constructing the vertical load bearing elements of the first level was investigated by removing the plasterwork of the wall in spaces housing auxiliary uses.

At the second level, the vertical load bearing elements are brick walls. The brick walls are made of mass produced fired bricks (21.5X10.0X7.5 cm) (solid units). The thickness of the external walls is 55 cm and that of the internal ones is 40 cm. The ceiling height is 5.30 m. In addition, it is very interesting to observe that the portico of the central entrance of the building has monolithic unfluted marble columns which rest on high square-shaped marble bases. These columns bear the load of the third level’s balcony. The type and method of construction of the vertical load bearing elements of the second level were investigated by means of holes at preselected places made with an appropriate tool. In this case, it was not possible to remove the plasterwork of the walls, since all the rooms of the second level are in use.
At the third level, the vertical load bearing elements are brick walls. The brick walls are made of mass produced fired bricks (21.5X10.0X7.0 cm) (hollow units). The thickness of the external brick walls is 55 cm and that of the internal ones 40 cm. The ceiling height is 5.50 m. The span at the end of the central staircase is bridged with a beam constructed by combining iron beams and bricks. It is supported by two monolithic unflutted marble columns which rest on high square-shaped marble bases. The type and method of constructing the vertical load bearing elements of the third level were investigated by removing the plasterwork of the wall in rooms which were not in use.

The horizontal load bearing elements of the building are the floors which are constructed by using I-section iron beams filled with segmented arched brick vaults and covered with mosaic, wooden floor boards, and marble slabs (40X40 cm and 25X25 cm). The floors of the balcony and that of the portico are covered with larger marble slabs (1.25X2.40 and 1.60X1.60 correspondingly).

At the first level, the horizontal load bearing elements of the building are floors (heavy type) which are constructed with I-section iron beams filled with arched brick vaults. The iron beams, (category IPN, width of flange 9cm and 8cm) are spaced 65cm apart. The internal angle between the web and the flange of the beams forms the abutment for the segmented arched brick vaults (the bricks are hollow units); the gap between the iron beams and the vaults is filled with mortar. Covering of mosaic (thickness 10cm) or of marble slabs is bedded on the mortar. The overall thickness of the floor of the second level was measured as 34 cm, (the measurement had as starting point the bottom flange of the iron beams and as end point the top surface of the mosaic floor covering). It has to be mentioned, that all floors of the ground floor were initially covered with marble slabs (25X25) (The information is taken by an old photo of the Papafeio Orphanage. The dimensions of the slates are defined if it is accepted that these slates are the same with the ones of the two upper floors).
Likewise, at the second level, as at the first level, the horizontal load bearing elements of the building are floors (heavy type) which are again constructed by I-section iron beams filled with arched brick vaults. The iron beams, which are of the same type as those of the first level, are spaced 67 cm apart. The overall thickness of the floor of the second level equals 30 cm. The floors of the second level are covered with marble slabs, wooden floor boards and mosaic. In the case of the wooden floors, the boards rest on wooden cross joists supported by and at right angles to the iron beams. The type and method of the construction of the horizontal load bearing elements of the second level were investigated by making opening at preselected places.

As at first and second levels, the third level the horizontal load bearing elements of the building are floors (heavy type) consisting of I-section iron beams filled with arched brick vaults. The width of the flange of the iron beams (category IPN) is 8 cm and they are spaced 85 cm apart. The overall thickness of the floor of the fourth level, which is not covered, equals 20 cm. The wooden roof frame of the building rests on the floor of the fourth level. The roof is not a part of the load bearing system of the building; it bears only its own load. It is covered with French type tiles and it is possible that it was constructed during the general repair of 1958. In addition, it was damaged by the earthquake of 1978 and repair work certainly took place then.
The lintels of all the windows and doors are arched and were constructed with fired bricks (solid units). When there was a need to bridge spans with beams, the latter were constructed by placing two iron beams in parallel and filling the gap between them with fired bricks.

**Staircases**

The building has three staircases, a central-main staircase on the central axis of the building, and two auxiliary ones. Investigations proved that the construction of the staircases, I-section iron beams filled with arched brick vaults, is the same with that of the floors. The arched vaults that are created at the central staircase are visible at the second level. At the first and second levels, the bottom face of the staircase is finished flat and that is the case for the auxiliary staircases at all levels. Furthermore, all risers and treads are made of marble and the metal railings are decorated elaborately. In addition, there are two external flights of steps; that of the entrance and a smaller one located on the central axis of the building. The staircase of the entrance was constructed by having the steps rest on an arched stone base.

**Pathology/Posterior interventions**

The building does not have serious problems of pathology due to the fact that it has been constantly used and conserved. The damages, which is of limited extent, consists of small cracks in the mortar, rising dampness from the ground in specific parts of the first level, partial weathering of the iron beams at the area of the portico and dampness in the upper parts of the third level walls due to roof leakage. The last time that extended interventions took place at the building was after the earthquake of 1978 and concerned damages to specific walls at the second and third levels; the damaged elements were repaired under the supervision of Y.A.Σ.Β.E.

Specifically, at the second level, a serious double-diagonal crack appeared in two transversal walls of the main body of the building (the walls are marked in red at the design of figure 34). These walls were repaired and reinforced by the application of steel mesh covered with lime and cement based rendering at both sides of the wall. The damage was more intense at the third level walls (Figure 35). Two of the walls at this level (positions A and B) were completely destroyed. This was because they had been constructed at a later phase without provision for structural bonding between them and the walls running perpendicularly to them. During the implementation of the maintenance study, the damaged walls were reconstructed and bonded to the transverse walls.
Furthermore, the longitudinal walls of the main body of the building presented pathology problems which took the form of movement away from the vertical. To prevent further movement, two reinforced concrete frames were designed (positions C and D).

In addition, the walls of the central ceremonial hall showed damages in the form of severe cracking and movement out of the vertical plane (positions E and Z). They were reinforced by the application of steel mesh covered with lime and cement based rendering at both sides of the wall. It is important to note that in all cases the application of plate was documented by using the metal investigating machine PROFOMETER 5. A steel plate working as a tension member, linked across to the width of the building with steel rods, was placed along all the external walls of the third level.

**Figure 34:** Second level plan- Application of two-sided reinforced plate at the damaged walls

**Figure 35:** Third level plan- The places of maintenance interventions by Υ.Α.Σ.Β.Ε.

**Conclusions**

All in all, the analysis and the documentation of the building led to the understanding of its structure. The construction of the building adopted the innovative structural systems used in Europe during the 19th century. What is more, the use of iron and prefabricated elements at the load bearing frame gave flexibility to the design and redefined the dimensions of the free plan. Thus, it can be said that, the Papafeio Orphanage, due to its history and its architecture but most of all due to its structure, holds an important position amongst the architectural monuments of the city of Thessaloniki.
References


[8] Ibid, pp. 20-25


