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RENOVATION OF THE HISTORIC OLSZTYN VILLA CASABLANCA

RENOWACJA ZABYTKOWEJ OLSZTYŃSKIEJ WILLI CASABLANKA

Abstract

The paper outlines the details of the design and difficulties that had to be overcome in the course of the renovation and adaptation of a rich German factory owner's residence from 1912, which in 1988 was entered into the register of historic buildings of the Warmia and Mazury region.

Keywords: renovation, adaptation, historic villa

Streszczenie

W artykule przedstawiono szczegóły projektu i trudności związane z realizacją renowacji i adaptacji willi bogatego niemieckiego fabrykanta z 1912 roku, wpisanej w roku 1988 do rejestru zabytków województwa warmińsko-mazurskiego.

Słowa kluczowe: renowacja, adaptacja, zabytkowa willa

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1. Introduction

Among the historic monuments of the Old Town in Olsztyn there are three gothic buildings which are by far the oldest and the most important. The co-cathedral of St. Jacob the Apostle dates from the second half of the 14th Century. The castle of the Chapter of Warmia Bishopric was built between 1346 and 1353. The Upper Gate marks the area of the medieval town in the east. On the southern outskirts of the Old Town, stands a remnant of the medieval defensive wall. On the other side, to the north stands the Villa Casablanca at No. 5, Zamkowa Street. The villa was entered into the register of historic buildings of Warmia and Mazury province under the symbol A-1731 on the basis of the Provincial Heritage Monuments Protection Office decision of 14 September 1988.

The historic villa is located in a place of significant historic value within the borders of the castle free usage area, surrounded by a mill ditch at the end of the 19th Century, mentioned for the first time in the incorporation charter of 1353 [1]. This area lies within the borders of the Old Town which was entered into the register of provincial historic buildings (entry A-435) in accordance with the Provincial Heritage Monuments Protection Office decision of 17 September 1957. Again, it was entered into the register once more (entry C-160) as a cultural superimposition of the Old Town according to the dictates of the Provincial Heritage Monuments Protection Office's decision of 2 July 1992.

The villa (situated close to the bridge over the River Łyna, on the west side of an access road to the castle, surrounded by the garden and a large park) is located on the site of the 17th Century burgrave palace rebuilt for the first time in 1758 and subsequently, in the second half of the 19th Century [2].

This 19th Century building, known to us only from old photographs, had two floors – the ground floor and a usable attic, covered with a double-pitched roof [2].

By the end of the first decade of the 20th Century, it was a residence for high ranking German officers from the local garrison such as Major – General Alexander Menze and Major August von Schönebeck. Later on, the building was purchased by German entrepreneur Wilhelm Ernst Harich (owner of a printing house, a book store, a library, a stationery store, and the publisher of 'Allensteiner Zeitung') and was partially dissembled and extended. W.E. Harich lived in the villa from 1913 till 1940 [3]. The next owner (from 1945) was his daughter Else Loeffke, a widow of the chairman of a regional court in Olsztyn.

After the liberation of Olsztyn, the building was the residence for the governor of Olsztyn Province. After 1950, it was passed on to the Polish Army as a garrison club and library. From then on, the villa became known as Casablanca among local residents. After moving the garrison club to Saperska Street in the 1990s, the villa was left empty as a part of Military Property Agency's estate. In 2004, the building was bought by new owners (Olsztyn entrepreneurs) who decided to return it to its past greatness.

2. Description of the manufacturer's villa

The longitudinal axis of Harich's villa was laid in an east-west direction. In front of the northern façade, there is a small square divided by a lane of old lime trees (Zamkowa

Street). From this street ran the old access road to the castle (Fig. 1). The northern side of the building stands on a high escarpment that separates it from the park (Fig. 2).

The east elevation is directed towards the castle located just across the River Łyna, while on the west, it faces the garrison church (built in 1914) that is situated behind the park (Fig. 3).



Fig. 1, 2. The front and back elevations of Villa Casablanca, before the renovation in 2006

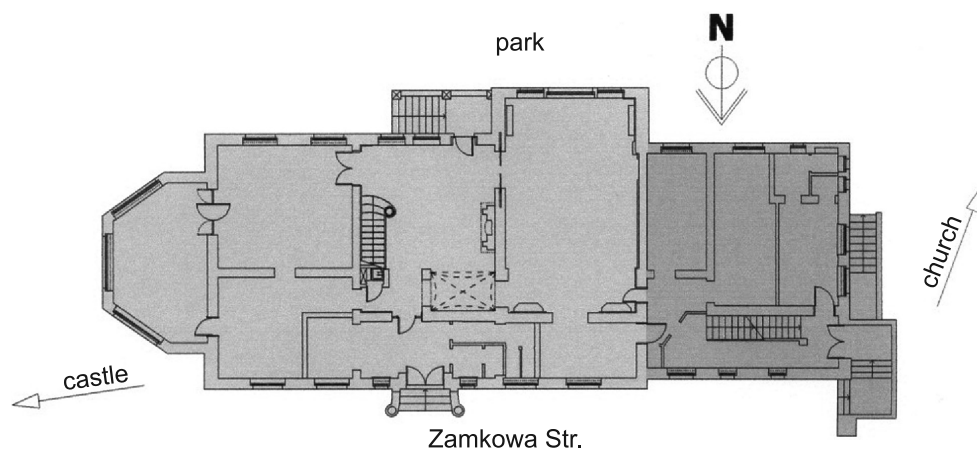


Fig. 3. Schematic view of the first floor and the building orientation

The present plan of the building was created by joining two parts – the 19th Century building plan based on a rectangle and a slightly lower wing based on a square adjoining it from the west of the building (Fig. 3).

As a result of the enlargement, in 1912 the residence became a three-storey building, including cellars beneath the entire building and a usable attic. From the east, the building was enriched with an avant-corps and a terrace, and from the south, with a loggia and an extended terrace [4].

The brick walls were put on an 80 cm high foundation made of field stones. Above the basement, under the terrace and loggias, a brick ceiling on steel beams was applied

(Fig. 4). The beam ceilings of the higher floors were made completely out of wood with a plastered soffit. The ceiling above the mansard loft in the higher wing of the building is made of wooden beams based on the external stud walls and on longitudinal steel binding joists, and additionally, on a central steel column (Fig. 5). An entresol in a fireplace ballroom and an entry hall are covered with a groined vault (Fig. 6), whereas the dining room on the representative ground floor is covered with a wooden, coffered ceiling (Fig. 7).

The entire building is covered with a mansard roof separately built on each part of the building – a hipped roof covers its central portion and a three-sloped roof covers the lower extension (Fig. 2). The wooden purlin roof braced by the stay-brace system is supported by two rows of wooden posts (Fig. 8).



Fig. 4, 5. The brick ceiling above the basement and the timber ceiling (above the attic) supported by steel binding joists and a steel column, 2011

The single and double-span rafters are supported by the purlins and the cap beam of a mansard roof. The roof is covered with plain ceramic tiles on wooden boarding. The roof has some dormer windows (Fig 1, 2).

The characteristic architecture of the beginning of the 20th Century, i.e. eclectic references to the past epoch styles are still seen in the interior arrangement [5]. The functions of the buildings, namely representative, residential and maintenance functions are clearly separated by the diverse interior arrangement. The residential and maintenance parts are located upstairs in the central part of the building and in the lower wing.

The presentable function of a building is the most explicit. On the transversal axis of the ground floor, there is a two-storey high, stately living room (Fig. 9). In the living room, there is a stone polychrome fireplace and lushly ornamented stairs (leading into the gallery – an orchestra balcony and a few steps further on, it opens to the living room entresol). There are doors to the terrace, garden and the rest of the representative rooms which are planned in enfilade.

The longitudinal walls of the fireplace living room are wood paneled, and the door lintels are ornamented with reliefs. The transversal walls are covered with a fabric and a stucco frieze with plant motifs on the upper portion. In the southern two-storey high wall there are wooden, stained glass windows equipped with an opening system and external roller blinds.



Fig. 6, 7. The groined vault covering the entresol in the fireplace ballroom and a coffered ceiling above the dining room on the ground floor, 2011

The living room has wooden radiator covers with a decorative grate and the glazed sliding door leading to the dining room, all of which are preserved. The walls of the dining room were laid with dark, carved oaken paneling. Mensal furniture composed into it (Fig. 7).



Fig. 8, 9. The timber roof structure and the view from the entresol over the two-storey fireplace ballroom with stained glass windows, 2011

On the ground floor, there is one more presentable interior (No. 4 in Fig. 3), on its flat ceiling there is a stuccowork ornament presenting acanthus leaves. The room opens itself to the view of the castle and the River Łyna, that can be admired from the three-sided avant-corps (Fig. 10).

On the second floor of the main part of the building, there are two rooms on the eastern side of the living room (both equipped with a door leading out to the terrace) and residential rooms on the western side accessible from the corridor leading to the staircase located in the lower wing of the building. In the attic, there is a spacious hall with a steel column supporting the ceiling and cubbyholes in the roof's slants.

Access between floors in the villa is provided by the staircase situated in the lower part of the building, one way brick stairs in the cellar and dog-legged ceramic stairs on steel beams on the rest of the floors.



Fig. 10, 11. The eastern Casablanca elevation before renovation (2006) and the main entrance after the renovation (2014)

The appearance of elevations was diversified much like the interior of the building [5]. The façade, rusticated in its corners, is the most distinguished feature. The main entrance, made as a portal, is closed at the top with a semi-circular arch (Fig. 11). The windows of the front façade are rectangular with a semi-circular arcade on the ground floor (Fig. 1). The window above the entrance door is especially richly decorated and has a small balcony. Stone stairs equipped with banisters finished with stone spheres lead up to the entrance to the building (Fig 11).

On the other elevations, one can find early modernistic solutions (commonly used no sooner than in the 1920s), such as: diversified sizes, proportions and window division and their unsymmetrical arrangement (Fig. 2), three-sided avant-corps with a terrace (Fig. 10), and diversified roof shapes [6].

3. The condition of the building and the restoration recommendations

The most extensive damage noticed by the present owners when taking the building over were caused by leaking insulation layers, the failure of the rain water drainage system and losses of roof sheeting (Fig. 12, 13).

The result of flooding was partial fungal infection of the roof structure (which were also infested with wood pests) and floor damage.

The dampness of the walls, escalated by recurrent freezing and thawing, caused numerous seam failures as well as the powdering and flaking of plaster. Areas of the walls striped of plaster were infested with micro-organisms. The destruction of the walls increased because of the cement plaster that was applied in the mid-twenties of the 20th Century being too permeable to water vapour [5].

Some parts of the plinth walls were also damaged due to rain water gathering caused by failure of the original sewer system. In the second half of the 20th Century, the plinth walls were fixed with terrazzo but it also did not help and finally went off especially around the main entrance and around the drain pipes (Fig. 14–16).



Fig. 12, 13. The condition of roofing and guttering before renovation, 2008

The cornice under the roof and the stuccowork details around the windows (covered with sealing cement, and few layers of emulsion paint) were constantly soaked with water which resulted in many seam failures and chipping. The terraces and the walls beneath lacked tight horizontal waterproofing. The most exposed elements of the elevations and the external stairs were also severely damaged by rain water (Fig. 16).



Fig. 14–16. The damage to walls caused by soaking, 2008

The windows of the attic and the maintenance areas of the building were almost completely destroyed, while the almost one hundred-year-old windows of both the ground (Fig. 17) and the first floor were accepted for restoration. Above the windows, there are the roller blind boxes, unfortunately, no remaining roller blinds were found.

The interior is quite well preserved with historic ceilings, stairs, panelling and fireplaces (Fig. 18). However, the stuccowork decoration of the representative chambers, the art nouveau window bars in the roof windows and the historic carved doors all needed thorough renovation.

Building restorers from Olsztyn carried out a comprehensive examination of Villa Casablanca in order to create the general renovation concept, with guidelines for the functionality and usability of the building's layout as well as a program of the methods and technology for the implementation of the conservatory [7].



Fig. 17, 18. The splendid window in the dining room (2006) and the historic fireplace during the restoration process, 2011

The most significant conclusion arising from the analyses of historic, artistic and utilitarian value of the building and its contemporary condition was the decision to start the renovation according to the Venice Charter requirements [8]. It should be carried out with all due respect to the original substance of the structure and building materials with the possibility of a modern conservatory and construction techniques where traditional techniques prove inadequate.

It was established (according to Article 5 of the Venice Charter) that implementation of a new utilitarian function in the building is useful and desirable. It would not only help to preserve the building, but would also bring considerable social benefits (a hotel with a restaurant located in the city centre). The range of adaptation cannot be unlimited because it cannot deprive the villa of its characteristic interior decor, its functionality and usability of the building's layout and its original elements [8].

A technological-executive program was prepared including detailed technological-executive solutions and works schedule related to conservatory procedures. After the approval of this program by the conservatory administration, it became the legal and methodological basis for the renovation of Villa Casablanca [9].

Solving the rain water drainage issue, the structural repair of the roof, the replacement of the roofing (new timber and tiles), the protection of terraces and balconies against damp, replacing old plaster and the terrazzo layer and rebuilding the main entrance stairs were considered the main tasks to fulfil.

At the same time, the restorers opted for removing some of the internal walls of the building (but not original walls that created an additional toilet in the main hall, and secondary division of the cellar) and the opening up of previously filled-in doors and windows. They also decided to restore all the original elements and colours of the villa's décor [5]. An additional task was to find a worthy place for the relocation of mazewas from the Jewish Cemetery that were used for strengthening the slope on the park side after the war [6].

4. The design of the villa adaptation into a conference centre/hotel complex

The architect behind the design of the renovation and adaptation of the historic Casablanca villa into a restaurant, club and conference centre all in one with guest rooms, is the Olsztyn architect, Anna Mikulska-Bąk [10].

According to the assumed concepts, the building has a cubature of 6154.0 m³ and utility floor space of 1191.3 m². It consists of one usable cellar level and four above-ground storeys including three usable floors: the ground floor; the first floor; the attic. Additionally, there is a fourth floor of technical rooms located in the attic (Fig. 19).



Fig. 19. Longitudinal section of the Villa Casablanca, 2010. The red line indicates the cellar floor level before the deepening of the basement

In the basement level there is a restaurant of 159.40 m², a kitchen with technical and storage facilities and toilets for guests and staff. Under the existing terrace, a new room was designed which is equipped with the biggest air ventilation unit (the air intake and outlet

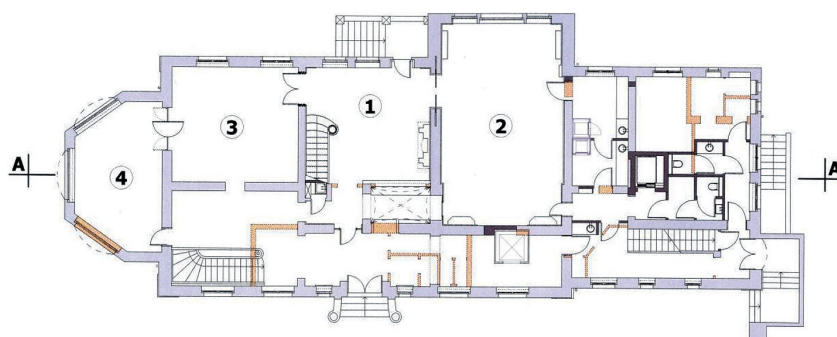


Fig. 20. A ground floor plan: 1 – fireplace ballroom; 2, 4 – conference halls; 3 – secretary office. Existing walls and ceilings – grey; walls devoted for demolition – orange; new walls and ceilings – black

for the gastronomy facilities are located in the retaining wall separating the terrace from the escarpment descending to the park).

The ground floor consists of: 48.40 m² fireplace ballroom; conference halls of 39.30 m² and 66.30 m²; an office of 30.50 m² (rooms numbered as 1, 2, 3, 4, in the Fig. 20); sanitary and catering facilities for serving the conference halls.

The first floor is dedicated to two large conference halls of 65.90 m² and 40.90 m² each, a suite of 40.60 m², sanitary facilities, a terrace and a loggia.

On the first attic floor, under the mansard roof, the designer projected three luxury suites and a maintenance room with a total floor space of 182.70 m², while on the second floor of the attic, there is a boiler room, a ventilation room and a server room.

5. Range of restoration and modernisation works

The renovation of the Villa Casablanca combined with its functional modifications required changes to the original structure, which determined the necessity of applying an appropriate methodology to the proceedings [11].

The decision of locating a restaurant in the cellar required the removal of some of the walls and the lowering of the floor level, hence lowering of the foundations. In the foundation design (proceeded according to Eurocode 7 [12]) there were many elements that had to be considered, and namely the relocation of bearing walls and bigger load of the building as a result of the functional changes and the allocation of the ventilation channels under the floor of the cellar (Fig. 21).



Fig. 21, 22. The works of deepening the cellar, 2011

In order to make the usable height of the underground rooms greater than 1.0 m, the cellar walls were partially undercut and founded on the monolithic walls and the strip foundation (Fig. 22). Work was conducted with a high degree of diligence in order to avoid damaging the ceramic, segmental ceilings above the cellar.

The sectional strengthening of the foundation was made alternately from both sides of the walls. The excavated wall segments were cleaned of debris and the brims were hammered to the required level of the designed floor and finally, after setting up reinforcement bars,

they were filled with concrete of C16/20 class. The reinforcement of the foundation was conducted successively after reaching the required strength in the previously repaired foundation sections.

The foundations were covered with a damp proof course. The foundation walls and cellar walls were isolated with waterproof plaster and a cover against mechanical damage.

In the cellar and on the ground floor, the design assumed the demolition of parts of the load bearing walls and the replacement of them with a column-rafter system. The pillars were shaped in the grooves previously made in the walls, and they were designed as reinforced concrete columns (in accordance with Eurocode 2 [13], these were made with C 16/20 class concrete, and steel bars 34 GS), adjusting the dimensions of their cross-sections to the walls thickness. Steel double binding joists (designed acc. to Eurocode 3 [14]) were made of a rolled steel profile of varied dimensions depending on the length between the bearings, and on the designed doorways and window openings as well as on the load of the structure. The walls were demolished below the binding joist not earlier than after finishing placing all of the joists within one tract on all the floors.

One of the main renovation principles was to keep the historic ceilings: ceramic one supported by steel beams above the cellars and a wooden ceiling above the higher floors, including a coffered ceiling above one of the rooms on the ground floor.

Simultaneously, factors such as the increased load of the ceilings, ensuring proper fire protection and sound insulation, changes of the support conditions and breaking through ceilings in order to install lifts and a new chimney for a gas pizza oven should also be considered.

In the main part of the building, where the historic value of the ceiling is considerable and the strength of the wooden beams is insufficient (calculations made acc. to Eurocode 5 [15]), the cross-sections of the beams were reinforced by fixing additional timber elements on both sides of the beams (Fig. 23). The gaps between the beams were filled with mineral wool – additionally, fiberboard was used as sound insulation. Fire protection was guaranteed thanks to the paneling of the ceilings with fireproof materials (this protection was applied only from the upper side due to the need to preserve the original stuccowork of the ceilings).

In the lower part of the building, because of the installation of lifts and the demolition of a part of the bearing walls as well as large load changes, new R-C I-bars ceilings were designed (Fig. 24). These ceiling slabs are made of C16/20 class concrete reinforced with 34 GS steel, resting on the steel I-bars which were put in previously prepared chases in the old masonry bearing walls or new steel binding joists replacing some of the areas where the walls were demolished.

In the building, two service lifts have been installed (providing transit between the cellar and ground floor) and two passenger lifts. The panoramic lift that is situated in the main hall (Fig. 20) includes self-supporting, steel shaft construction. A foundation base plate was laid below the shaft.

The second passenger lift, situated in the lower wing of the building, was equipped with a monolith shaft (20–24 cm thick shaft walls made of C16/20 class concrete reinforced with mesh reinforcement of 34 GS steel) that goes through all the new monolith ceilings (Fig. 19, 20).



Fig. 23, 24. The timber ceiling beams strengthened by additional wooden elements from both sides, and a new R-C ceiling based on steel beams, 2011

The original, presentable, wooden staircase from the conference hall in the ground floor was restored (Fig. 25), as well as the ceramic stairs on steel beams in the maintenance area of the building. On the ground floor, to the left of the main entrance, a new staircase leading to the restaurant was made (Fig. 20).

The stained glass window in the ballroom (Fig. 26), as with most of the windows and interior doors (including a two-winged sliding door, hidden in the wall), was renovated. In the publication [16], there is a detailed description of the complex conservatory concerning the historic windows of Villa Casablanca.



Fig. 25, 26. The historic staircase and the stained glass window in the ballroom after the renovation, 2013

The ceiling above the ground floor, decorated with coves and friezes, was meticulously restored, as was the wall decorated with ornamental paintings. The wooden radiator covers were also reconstructed on the basis of preserved examples. In the ballroom (now a conference room), renovation of the polychrome fireplace and fragments of the decorative wall fabric covering was carried out.

The roof structure required only minor repairs, but the roofing was completely replaced (the colour of the new plain tiles perfectly matched the original).

The old, damaged plaster of the diverse structure covering the external walls, which was successively repaired by applying more new layers in the past, was removed, and after scrupulous stratigraphic studies, the original colour of the elevation was restored.



Fig. 27, 28. The front and southern Casablanca elevations after the renovation, 2014

The surroundings of the villa were cleaned up. The historic Jewish mazewas from the park side slope were moved to the funerary house at Zyndram of Myszkowice Street, and the slope was strengthened and planted with new greenery (Fig. 27). In front of the building, the street was cobblestoned, and a car park and a new descent to the square were built (Fig. 28).

The building and its surroundings (where the traffic was forbidden during the renovation) was ready for use in August 2013.

6. Difficulties related to the renovation execution

The renovation and adaptation of a historic buildings to a new utilitarian function is an interdisciplinary undertaking requiring the cooperation of specialists from many different branches of industry and science. It is also complicated due to the bothersome conservatory orders that were sometimes difficult to harmonize [7, 17] and the new design postulates that require a high – standard of work quality [11].

The main difficulties of the restoration of the Villa Casablanca in Olsztyn arose from the fact that the functions of this historic building completely changed, with numerous elements under conservatory protection and the necessity of ensuring the safety, durability, serviceability and reliability according to present norms and legal requirements [11]. Also significant was the fact that after many years of lack of maintenance and operation, the technical condition of the building was rather bad.

The new functional-utilitarian program required extra floor space for a restaurant, storerooms, ventilation and server control rooms. Locating them in the basement required the cellar to be deepened by the means of lowering the foundations of the building and the creating of an additional cellar under the avant – corps terrace.

Laying new foundations in an historic building is extremely difficult due to the danger of damaging the walls and the historic ceilings that in the course of exploitation, underwent

the process of ageing. Nevertheless, this approach is very often used in practice [18] because it allows some extra floor space to be obtained in a deepened cellar and gives an opportunity to create new foundations calculated with consideration to the new steady and changing loads of the building including climatic loads, according to the Eurocodes in force.

Harich's villa was a residential building with rooms of small floor spaces (apart from two representative lounges). The decision of adopting the building to gastronomic/conference functions (large rooms) required some of the load bearing walls to be demolished which could endanger the substance of the original structure.

An introduction of elevator shafts, the pizza oven chimney and mechanical ventilation ducts required making openings in the ceilings and creating fragments of new ceilings that were partially supported on existing load bearing walls. Procedures like these, especially in an old building, are not always problem – free. Sometimes they go wrong, the example of another Olsztyn historic building, the Dyplomat Hotel, suffered interference in the wall structure causing broad, local damage that brought repairs to a halt. The work was restarted after the immediate reinforcement of the walls [19].

7. Conclusions

The successful adaptation of the historic Villa Casablanca into a hotel with a restaurant and conference halls proved to be an opportunity to preserve the building and bring it back to its former splendor. As a result of this costly undertaking (with the enormous financial means of the investor as well as EU subsidies from the Regional Operational Program for Warmia and Mazury), the initial goals concerning the expected economic benefits, protection of the natural environment, social aspects, and cultural heritage were achieved [20].

First and foremost, the villa's adaptation saved a building of historic value, precious for the local community and for local art historians. The realization of the conservatory building works in this building was also a valuable experience for local companies specializing in such enterprises.

Due to the successful renovation, the whole surrounding area of the villa, previously bleak and neglected, was reshaped as a neat, pleasant spot.

Assigning the villa as a public utility building, not only made the building available for local residents and tourists, but also created additional employment. The fact that the building makes a profit for private investors is also important. The renovated Villa Casablanca (and its surroundings) is at present, one of the favourite meeting places for the inhabitants of Olsztyn.

References

- [1] Rzempołuch A., *Architektura i urbanistyka Olsztyna 1353–1953*, Wydawnictwo UM, Olsztyn 2004, 109-112.
- [2] Bętkowski R., *Olsztyn, jakiego nie znacie, 650 lat Olsztyna*, Wydawnictwo Imago Mundi, Olsztyn 2010, 188-189.
- [3] Rzempołuch A., *Casablanca nad Łyną: O zabytkach inaczej*, Spotkania z zabytkami, nr 5, 2007, 21-23.

- [4] Achremczyk S., Ogrodziński W. i inni, *Olsztyn 1353–2003*, Ośrodek Badań Naukowych i Towarzystwo Naukowe w Olsztynie, 2003, 272-273.
- [5] Chodkowska W., *Dokumentacja historyczno-konserwatorska zabytkowej willi położonej w Olsztynie przy ul. Zamkowej 5*, 2004, 1-17.
- [6] Dzieciatkowska J., *Proponowany program prac konserwatorskich elewacji willi „Casablanca” przy ul. Zamkowej w Olsztynie*, 2007, 1-13.
- [7] Smólski J., Stępień P., *Kryteria konserwatorskie doboru rozwiązań inżynierskich w zabytkach architektury – w świetle doktryny i praktyki konserwacji*, Materiały IV Konferencji Naukowo-Technicznej Rew-Inż., 1998, Kraków 1998, 63-72.
- [8] Karta Wenecka 1964, Narodowy Instytut Dziedzictwa, www.nid.pl, dostęp 15.07.2014 r.
- [9] Ustawa z dnia 23.07. 2003 r. o ochronie zabytków i opiece nad zabytkami (Dz. U. z 2003 r. Nr 162, poz. 1568 z późn. zm.).
- [10] Mikulska-Bąk A., *Przebudowa i remont zabytkowego budynku w Olsztynie przy ul. Zamkowej 5*, Projekt budowlany – architektura, 2012.
- [11] Runkiewicz L., *Metodologia postępowania przy naprawach i wzmacnianiu w ramach odnowy obiektów zabytkowych*, Materiały VII Konferencji Naukowo-Technicznej Rew-Inż., 2006, Kraków 2006, 199-208.
- [12] PN-EN 1997-1:2008. Eurokod 7. Projektowanie geotechniczne. Część 1: Zasady ogólne.
- [13] PN-EN 1992-1-1:2008. Eurokod 2. Projektowanie konstrukcji z betonu. Część 1-1: Reguły ogólne i reguły dla budynków.
- [14] PN-EN 1993-1-1:2005. Eurokod 3. Projektowanie konstrukcji stalowych. Część 1-1: Reguły ogólne i reguły dla budynków.
- [15] PN-EN 1995-1-1: 2010. Eurokod 5. Projektowanie konstrukcji drewnianych. Część 1-1: Postanowienia ogólne. Reguły ogólne i reguły dotyczące budynków.
- [16] Kowalczyk M., *Problematyka konserwacji zabytkowej stolarki okiennej na przykładzie budynku przy ul. Zamkowej 5 w Olsztynie*, *Renowacje i zabytki*, nr 4 (48), 2013, 80-85.
- [17] Rozporządzenie Ministra Infrastruktury z dn. 12.04.2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie. Dz. U. nr 75 z 2002 r. poz. 690, z późniejszymi zmianami.
- [18] Janowski Z., Janowski M., *Problemy projektowe związane z adaptacją budynków zabytkowych na cele użyteczności publicznej*, *Czasopismo Techniczne 2-B/2009*, 139-150.
- [19] Deja B.M., *Remont i adaptacja zabytkowej olsztyńskiej kamienicy na budynek hotelowy*, *Czasopismo Techniczne 3-B/2011*, 19-33.
- [20] Radziszewska-Zielina E., Śladowski G., *Evaluation of historic building conversion options in the context of sustainable development*, *Technical Transactions 1-B/2014*, 153-164.