BRICK CASTLES OF PANEMUNĖ REGIONAL PARK: ASPECTS OF REGENERATION

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Abstract. The regeneration of brick castles of Panemunė Regional Park in Lithuania was influenced by the political, economic, and social environment. The motives of their regeneration was the function of state border defence, installation of fortifications for the occupation of new lands, function of defence of the state internal and transit trade routes, function of the protection of noblemen's property, and the function of strengthening of the territorial control. Two characteristic castle development tendencies were revealed: one witnessed further development under local construction traditions, while another reflected the examples of the European construction. The architecture of castles was shaped by the military tactics, development of military technique, local terrain, the wellbeing of the castle owners, their hierarchical role and demands, construction traditions, and the development of construction technology. The architectural forms varied from dungeon to palace. The changing social demands encouraged the choice of new solutions for castle regeneration in order to increase the comfort level conditions and cost-effectiveness of the premises.

Key words: castles, castles' regeneration, architectural heritage, architectural history, microclimate

1. Introduction

The review of literature and archival material on the castles, which used to be located or still remain in the territory of Panemunė Regional Park (Fig. 1) on the bank of Nemunas (Memelis) river, shows that up to the beginning of the 15th century the regenerated castles maintained their names and the destroyed were rebuilt in the same or even other location. Later on the names of the castles changed according to their owners or land name. In most cases the castles were reconstructed by using the

remains of the destroyed building. Due to theirs specific function (defensive, residential, administrative) its structure required a solution of construction technique and aesthetic issues. The architecture of rebuilt buildings reflected the changed needs of owners and society. Vytėnai and Raudonė castles, located in Panemunė Regional Park territory, were maintained under similar social, economic, and natural conditions. Their functions were defensive, residential, and administrative. Their regeneration reflected the spirit of the times; their outlook combined different cultural layers. The castles changed together with the era defying the unified construction plan. Often they regenerated in a short period of time embodying the artistic stiles of the era. Gothic, Renaissance, Classicism, and Baroque style elements were mixed up. Buildings' composition differed by residential and observation towers' diversity - from one giant main tower in medieval times, to numerous towers and turrets of various forms, giving the castle complex originality. The plans of the entire complex were in line with terrain features. In the cause of time new elements of defensive or other function appeared in various distances from the castle centre. The changed social needs caused not only the changes in architectural castle forms but also inspired novelties in the microclimate of the premises.

Written sources say that scientific researches on historical aspect of castles along river Nemunas have been carried out since the nineteenth century (Balinski, 1836; Sulimierskiego *et al.*, 1888). With foundation of restoration productive workshops in the middle of the twentieth century in Lithuania, archaeological-architectural studies were conducted (Čerškutė and Jurkštas, 1959; Pinkus, 1960; Simonavičius, 1960; Umbrasas and Šeibokas, 1955). Archaeological, architectural, historical studies were continued after restoration of Lithuania's independence, often initiated by new reconstruction and adaptation projects (Glemža, 2010; Mendelevičius, 1991; Žalnierius, 2005), as well as by examining ancient times military and defence system in Lithuania or by referring to the castles of Panemunė as a network of defensive system (Kirill, 2008; Batura, 2008; Bieszk, 2010). In 2012 Vilnius Gediminas Technical University launched a scientific project "Innovative methods of regeneration of architectural heritage: castles of Panemunė" which aimed to provide innovative brick architecture heritage regeneration methods of Panemunė castles based on the scientific research and application for simulation-based needs of the society.

The object of this research – to review the regeneration of the brick castles of Panemunė Regional Park on influence of changing social needs. The brief description of Panemunė castles evolution since their founding to nowadays highlighting the main periods of evolution served to achieve the aim of the research.

2. Method

The methods used in this study were the cognition of castle regeneration, the analysis of the resources, and the comparison of different periods of the development on analytical basis. Research review was composed of three work phases:

- Data collection: acquisition and organization;
- Data analysis: processing and modelling;
- Data synthesis and dissemination.

Fig. 1. A map of the Panemunė Regional Park with the identification of the described castles. Source: personal communication

Chosen criteria are availability of data, the scientific substantiation. Archival material and published literature were collected and research was conducted on site. While adapting Panemunė castles for new purpose - cultural and educational needs, indoor microdimate played an important role. Based on European studies published results, more attention was given for this part.

3. Discussion of the Results

State-protected Panemunė castles of national significance, unique with their archaeology, important for their history and sacrality, rare for their architecture and landscape, are included in the Register of Cultural heritage. Evolving from the Middle Ages, they regenerated with changing needs of society. "Regeneration" means renovation, revitalization, preservation of a decayed building or part of the building, while adapting to the changing needs of people. It covers the meaning of restoration, reconstruction, recovery, rebuilding and conservation. In this article regeneration of Panemunė castles covers the period from the Middle Ages to the present day.

3.1. The Middle Ages

Individual defensive objects on the banks of river Nemunas began to develop even before the formation of the state, and some of them started to develop at the beginning of our era. The first palaces in the current Panemunė Regional Park were built on the mounds with clayey slopes, filled at the top of the highest hill in the district, but mostly on natural headland of the river with steep shores and on the coast, creating chain-defensive system. The castle complex consisted of mound, foreworks, baileys (territory along the castle), settlements and other simultaneous objects remote up to 1 km or more away from the mound. In the chronicles of the Order in XIII-XIV century, describing the

Lithuanian castles, the foreworks, baileys and the foot of the villages are usually referred to as "vorbung" (Abramauskas, 2012).

In the area of invasion during the fight with the Teutonic Order – down by the river Nemunas through which it was possible to get into the depth of the country, Motte – new residence–fortress type castle of Lithuanian dynastic nobility appeared, so far known only in Western Europe. Motte was based on the tower - the oldest fortified residence type of placement, which guided the humankind in Ancient Egypt, Babylonia, and the Central Asian cultures. Fortifications consisted of a large tower location (Motte), and lower more entrenched place – bailey. Originally wooden tower stood on a natural hill surrounded by moat. The tower, called the dungeon, was both defensive and residential building. Motte with a wooden tower was replaced with Stone dungeon which was prevalent in masonry building of noble castles in the whole of Europe during the Middle Ages and early Renaissance.

Raudonė and Vytėnai castles according to tradition were assigned to the period of fighting against the Crusaders (Pinkus, 1960). Some authors attribute castle Christmemel, built by Crusaders in 1313, which stood until 1328 and later was restored to Vytėnai castle in Panemunė Regional Park, other authors' associate Vytėnai castle with Fridberg castle (Balinski, 1836). Still some authors attribute Vytėnai castle to Königsburg castle, which stood in 1405-1406 (Bieszk, 2010). Some castles - Mottes were designed for building new fortifications, as the Bayerburg castle built in 1337, which was associated with Raudonė castle (Marburgietis, 1999) in an effort to take over Nemunas waterway control using the fortification equipment (Jankauskas, 2008), not compromising the Lithuanian trade relations, but laying the way to reach the country's central region instead. Archaeological research has revealed that the materials used for subsequent Vytėnų castle construction was from castle named Christmemel that used to stand in the same place (Žalnierius, 2005). Until sixteenth century in written sources Raudonė castle is mentioned as a royal manor, which belonged to Grand Duke Sigismund Augustus (Sulimierskiego *et al.*, 1888).

The sixteenth century was a turning point in the art of fortification of the Grand Duchy of Lithuania. In order to improve the protection system, former fortifications were changed by the new security structures - bastions. However, according to the literature sources even under the changing political circumstances on the bank of river Nemunas, red brick Vytėnai and Raudonė castles were built without strengthening them by bastions (Jurginis, 1971), although the castles in defensive range of Nemunas river were secured, and shelters converted into crew location where Elder resided (Jankauskas, 2008).

The role of nobility in Grand Duchy of Lithuania increased in 1564-1566 with the administrative reform. This led to the regeneration of the first castles, built near river Nemunas as defence installations against Crusaders. The importance of these buildings declined after the Battle of Grunwald (1410). In XV-XVI century the castles evolved, showing the buildings owner's assets and power. There were two buildings characteristic trends: one witnessed the

further development of local building traditions, while the other reflected the European construction examples. In former castles a high stone wall highlighted the composition, later (XIV-XV century) defensive buildings were characterised by monumental towers, protruding out of the walls, and residential palace, in construction the elements of Gothic style appeared, more attention was focussed on the facade proportions and perfection of the shapes (Minkevičius, 1988).

3.2. The Period of Economic Prosperity

Regeneration of the castles intensified in the sixteenth and seventeenth centuries when river Nemunas became a trade route. Such a favourable political and economic situation had increased the demand of residential and representational premises for the castle owners. Previous plan structure of the dungeon no longer met the needs of the nobility. This had triggered construction of the complex of buildings with the dungeon inside of it. The structure of the noble castle became more complex, new buildings were delivered next to the dungeon within the fenced area. Dungeon halls were illuminated with open windows instead of torches. Heated stones were used for the heating of premises. The passage leading from dungeon to the palace was blocked with oak doors which were coated in metal plates. The towers and extensions which were delivered to the dungeon led to the digestion of architectural complex. Dungeon, turning from angular to round, improved buildings defensive function. The progress of the noble castle construction was characterized by strengthened castle palace with a courtyard. Later, the main defensive and residential function of the buildings was the palace; the tower played a monitoring role and in some cases was turned into security point. Palaces with the towers in the corners were associated with the local castle building tradition, though their plans and volumes have common features with the Dutch, Flemish and Polish laconic rectangular plan palaces, which had towers in the corners.

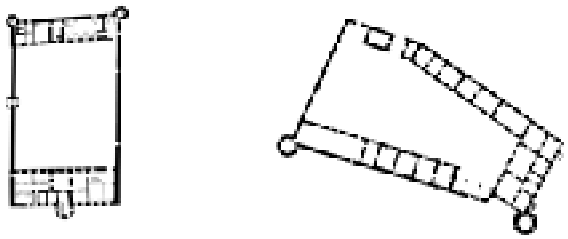

Fig. 2. Raudonė (left) and Vytėnų (right) castles ground floor the end of XVI c.–beginning of XVII c. According to the result of project "Innovative methods of regeneration of architectural heritage: castles of Panemunė". Source: personal communication

According to the discovered archival material, at the end of the sixteenth century Raudonė castle consisted of two segments: the southern residential and the later built north outhouse. Both ends of the housings were connected by the eastern and western defensive walls with embrasures, in the centre of the South façade was a cylindrical tower and two defensive towers to the north-east and north-west (Simonavičius, 1960).

In the beginning of the seventeenth century ensemble of Vytėnai castle consisted of residential eastern and northern outhouse buildings, western defensive wall with embrasures and southern defensive wall with arcades with two attached buildings: one-storey and two-storey and two defensive towers in the southwest and southeast (Simonavičius, 1961). In Research Council of Lithuania funded science project "Innovative methods of regeneration of

architectural heritage: castles of Panemunė", since 2012, researchers from Vilnius Gediminas Technical University revealed features of evolution of Vytėnų and Panemunė castles' plans during their scientific researches. Based on archival material and nature studies building layouts of several periods were restored (Fig. 2, Fig. 3, Fig. 4). The residential housing plan scheme was very similar in both castles. Closed rectangular plan structures evolved to open "U" - shaped structure.

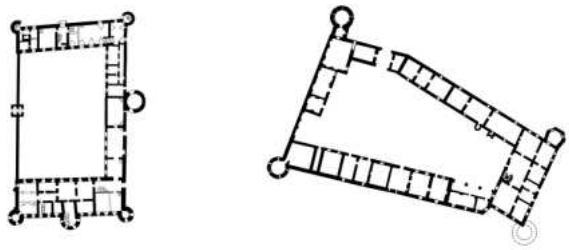

Fig. 3. Raudonė (left) and Vytėnai (right) castles ground floor middle of XVII c. According to the result of project "Innovative methods of regeneration of architectural heritage: castles of Panemunė". Source: personal communication

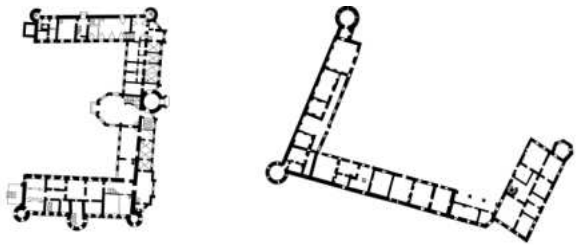

Fig. 4. Raudonė (left) and Vytėnai (right) castles ground floor XIX c. According to the result of project "Innovative methods of regeneration of architectural heritage: castles of Panemunė". Source: personal communication

Artistic form of the castle reflected the spiritual and material needs and capabilities of the society and the building manager.

The thickness of the walls of buildings, brick bonding method, enfilade room layout, basic constructions, windows, shooting holes, and decoration of facade revealed the Renaissance style of the castle, though the castle architectural forms had Gothic inheritance.

Renaissance style elements harmoniously combined Gothic elements that harmonized perfectly in the environment. Biased castle architecture attachment to the environment created a building architecture and environmental harmony - one of the most important features of their architecture.

The second half of the seventeenth century brought Baroque style to the architecture of Panemunė castles; Renaissance architectural solutions developed a dominant Baroque architecture plan and structure of volumes. The rise of economy in Classical era (middle eighteenth century) resulted in more active social life, more intensive reconstruction of the buildings, during which console cornices, toothed gusts, bricked and hewed new forms of window surrounds were added to the castle housing and towers, new and rebuilt existing castles wings delivered from Classical style.

Until XX century the indoor microclimate of residential premises in castles was maintained by stoves and fire place heating system. Household premises generally where not heated, the ventilation of the premises was organised naturally: fresh outdoor air was infiltrated through cracks in the building envelope, windows and doors; through the special ventilation channels the exhaust air was extracted outside naturally by the differences in pressure.

As in some European countries, in Lithuania monument protection took place in two directions: on the one side

works of art were protected, on the other side everything that reminded feudalism was destroyed. Many monuments of medieval architecture were destroyed. Artistic values, that had meaning in new society, had analogy at the end of the eighteenth century and in nineteenth century.

3.3. Regeneration of the castles from the Middle of the Nineteenth Century

In the middle of the nineteenth century along with classicism in Lithuania, romanticism began to manifest, colliding with features of classicism. Architecture was developed by the same European ideological program, distinguishing by their own regional Lithuanian classicism features: characterized by rational artistic forms, more modest building exterior and interior decoration. Because of the changing traditions, new forms changed the old ones. Gradually reconstructing abandoned Raudonė castle eastern block was widened, Plan of the South building was changed and cornices were added for all buildings and towers, the top of tower become crenelated (Fig. 5).

Fig. 5. Raudonė castle. N. Ordos aquarelle, XIX a. middle. Source: Vilnius County Archives

After the abolition of serfdom in Lithuania in 1861 the decline period of Panemunė castle began (Fig. 6).

The situation deteriorated further during the war, when part of the castle buildings was destroyed, a lot of damage was caused by fires. Since the beginning to the middle of the twentieth century the regeneration of the castles had a fragmentary outcome: roofs, decaying walls, windows, and doors were repaired, facades were renewed, and the building environment was cleaned.

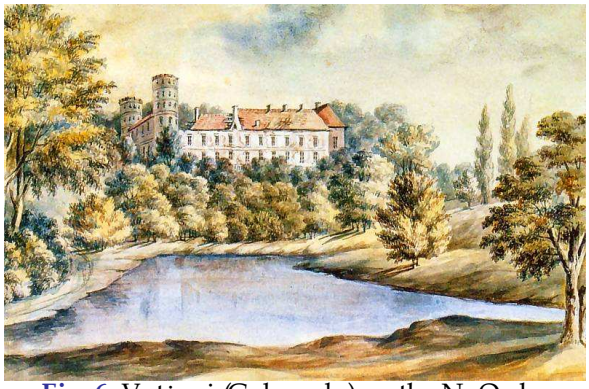

Fig. 6. Vytėnai (Gelgaudų) castle. N. Ordos aquarelle, 1873-1883. Source: Vilnius County Archives

Historical and architectural studies of the palaces were performed, as well as a number of conservation and restoration works were done. According to Vytėnai castle conservation project in 1955, the attention was drawn to maintaining the remaining forms of fourteenth century stone castle ruins (Umbrasas and Šeibokas, 1955). In the fifties of the twentieth century the regeneration and adaptation projects started in order to expand cultural and educational institutions in Raudonė and Vytėnai castles. According to the reconstruction and adaptation for school project in 1959, Grand Tower and the southern block of Raudonė castle that was destroyed during war in 1944 was rebuilt (Čerškutė and Jurkštas, 1959) (Fig. 7). The changing needs of society resulted in Raudonė castle's adaption for high school purpose (Fig. 8).

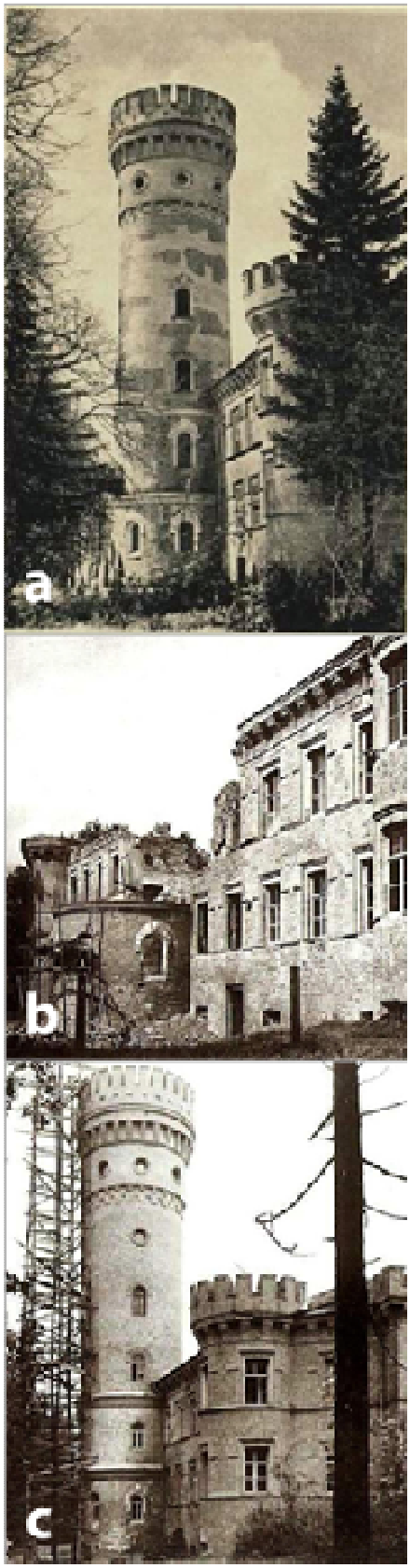

Fig. 7. Grand Tower and the South building restoration of Raudonė castle: a - 1941, b - situation after the Second World War, c - situation at the ending of reconstruction in 1968. Source: Vilnius County Archives

In 1981 for the regeneration of Vytėnai castle, which was owned by Vilnius Art Institute, a conceptual design of restoration and adaptation was prepared with all engineering systems, restoring the west wing, west and north-west towers, north wing cellars (Mendelevičius, 1991). As in Western Europe during this period restoration of Panemunė castles regeneration was carried out by restoring the complex of buildings and its environment by adapting it for new purpose.

When changing the purpose, the work was performed to meet new functions. While adapting these buildings to new function in order to create comfortable microclimate conditions the central heating was instilled. Air exchange in premises was organised by natural ventilation systems with air infiltration through cracks, windows, doors and air extraction was extracted by differences in air pressure. Heat was produced in individual boiler houses.

Fig. 8. Raudonė castle. Source: Genytė, 2012

Once Vytėnai castle regeneration in 2010 was started, adjusting it for tourism purposes, the north-west and south-west tower and western part of the castle building were restored (Fig. 9), while northern housing basement circuit was marked, thereby restoring the former castle structure with an enclosed yard, parks with ponds are being restored (Fig. 10). Great attention was paid to the

interiors, occasionally highlighting the historical, architectural and artistic value (Glemža, 2010).

In practice of the monument restoration, the historical knowledge of construction techniques was more used since the eighth decade. Just like in Europe, in the twenty-first century issues of castles regeneration were studied by summarizing works of historians, archaeologists, architects-restorers, and engineering historians.

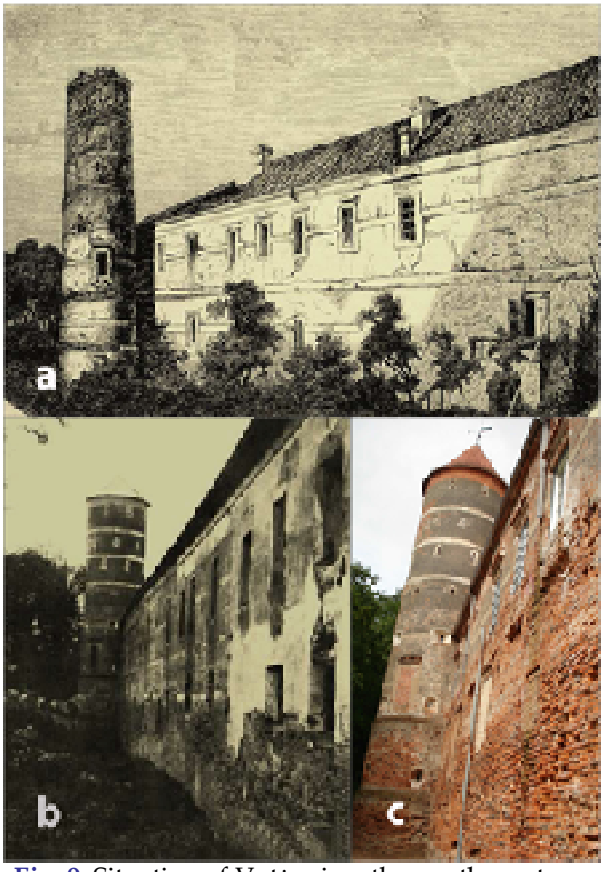

Fig. 9. Situation of Vytėnai castles south-western tower and southern housing: a - 1864, b - 1957, c - 2010. Source: Vilnius County Archives

As technology changed, the design process changed as well (Genytė, 2011). Creation of 3D, virtual models to better understand former structures, based on analogues of historical, archaeological or architectural studies and iconographic material. Since Lithuania joined the European Union, castles' regeneration has been carried out in accordance with legal acts regulating the architectural heritage and in cooperation with foreign specialists.

3.4. Innovative Solutions for the Castle's Regeneration: Microclimate

The change of social needs and evolution of new technologies forced to evolve new solutions for castles' adaptation to new functions. Increasing indoor comfort demands and the requirements for the preservation of the castle buildings as a heritage site as well as the treasures inside the buildings induced the search for improved microclimate solutions depending on the function of the premises: museums, dining rooms, hotels, conference rooms, and the like.

Fig. 10. Restored western wing with north and south-west towers of Vytėnai castle: a - 2012, b - 2013. Source: Genytė, 2012, 2013

As the scientific analysis of cultural heritage shows, the buildings were influenced by many factors: outdoor and indoor microdimate conditions (Karoglou *et al.*, 2007; Ghedini *et al.*, 2003).

Thermal indoor microclimate conditions in heritage buildings referred to two important requirements: the preservation of works of art and the comfort of visitors to these buildings and/or those working inside them. Unfortunately, different works of art have different internal parameters which make the management and control of the indoor thermal microclimate difficult (La Gennusa et al., 2005, 2008; Camuffo et al., 2001, 2004).

Furthermore, heating, ventilation and air conditioning systems need to be more energy and economically attractive. These complex problems require complex modelling of the current situation, and similar solutions' monitoring (Bellia *et al.*, 2007; Bencs *et al.*, 2007; Camuffo *et al.*, 2010; Spolnik *et al.*, 2007).

4. Conclusion

The review of the bricks castles' in Panemunė Regional park regeneration in the Middle Ages revealed the localization problem of the buildings. The castles regenerated in the same or even other location and remained the same name. Most castles were built on the ruins of the former castle, using remains as building material.

Military tactics, development of military equipment, local terrain, economic situation, hierarchical role and needs of the castle keepers, building traditions, development of construction machinery and other reasons changed the architecture of Panemunė castles under the influence of political, economic and social conditions.

Two characteristic trends of castles' development were revealed: one witnessed the further development of local building traditions, while the other reflected the European construction examples. The structure of noblemen castles became more complex, it changed from dungeon to palace, emphasizing the castle owner's wealth and power. The basic defensive and residential functions of the castle were concentrated in the palace, while the tower played a monitoring role, in some cases turning to security point.

Panemunė castles evolved in harmony with nature, harmonically integrating architectural elements of the environment. The biased merger of the castle architecture with nature created harmony of the castle architecture and environment.

After the abolition of serfdom in Lithuania, the stagnation period of red brick Panemunė castles began. The regeneration became fragmental. Due to the changing needs of society they were started to use for public education and cultural purposes.

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