

## Castle building techniques in the Teutonic Order's State in Prussia based on examples of selected convent houses in the Chełmno Land, in the light of recent studies

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*Abstract:* The construction of fortifications by the Teutonic Order belongs to one of the most fascinating architectural and artistic phenomena, completed between the 2nd half of the 13th century and the 1st half of the 15th century. Brick castles were erected within widely planned and well-prepared building actions, with the result of which, several dozens of fortified structures across the historical Teutonic Order's State were erected. However, a number of problems concerning in particular the chronology of this process of castle building, the building stages and techniques applied, have been insufficiently recognized since the beginning of the 21st century. The situation has changed significantly at present, when some Polish centers started systematic archaeological-architectural research focusing on the fortified structures of the Teutonic Order. The centre at Toruń has been accomplishing, since 2005, a long-term scientific program, titled *The Castles of the Chełmno Land (Kulmerland)*, whose principal purpose is to answer those questions connected with the history of those brick fortresses erected from the 2nd half of the 13th century in the south-western part of the former Teutonic Order's State. The results of recent archaeological-architectural explorations in several sites from this area have delivered much data, which show that castles built in various period differed not only in their architectural forms, but also with building technique and its process. In the light of recent studies, it is difficult to agree, for instance with interpretations of the chronology of changing castle form (from irregular to regular ones) and the times of their occurrence.

*Key words:* Chełmno Land – Poland – Teutonic Order – architecture – building technic – castles – crusades – medieval archaeology

### Introduction

The construction of fortifications by the Teutonic Order belongs to one of the most fascinating architectural and artistic phenomena, completed between the 2<sup>nd</sup> half of the 13<sup>th</sup> century and the 1<sup>st</sup> half of the 15<sup>th</sup> century. Brick castles were erected within widely planned and well-prepared building actions, with the result of which, several dozens of fortified structures across the historical Teutonic Order's State were erected. Since 1927, when the work of Karl Heinz Clasen was published, there has been no doubt that the architecture of the Teutonic Order's castles, despite their general homogenous character, was changing with time (Clasen 1927). Our knowledge

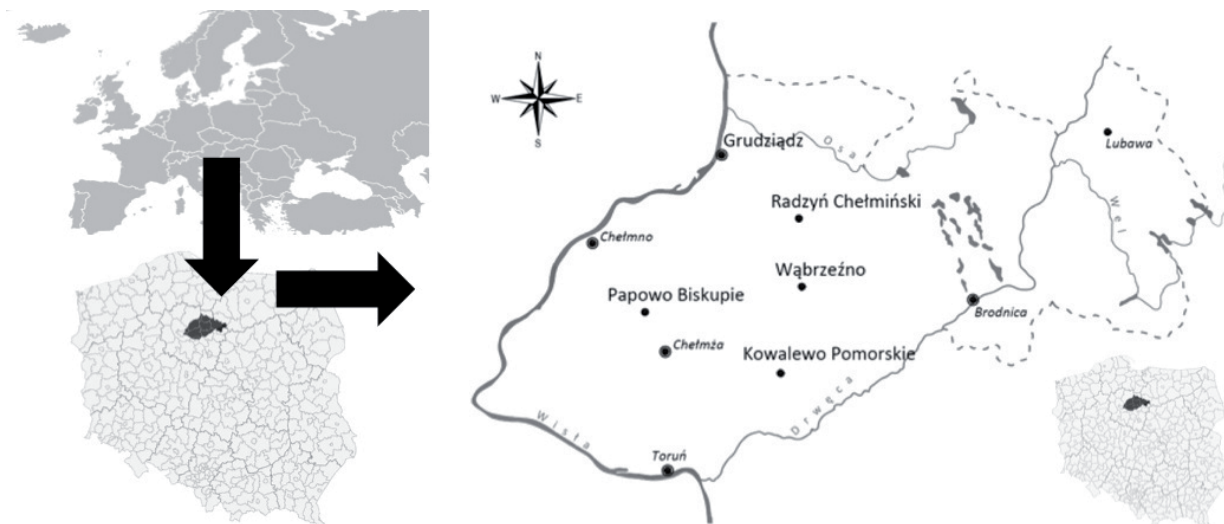


Fig. 1. Map of north Poland showing location of Chelmino Land (Kulmerland) (left) and castles location (right). – *Obr. 1. Mapa severního Polska ukazující polohu „ziemia chełmińska“ (ang. Chelmino Land, něm. Kulmerland) – historického regionu okolo města Chelmino (vlevo) a polohu jednotlivých hradů (vpravo).*

on the subject was completed and upgraded using the results of the latest research by Tomasz Torbus, some 20 years ago (Torbus1998). According to his research, older fortresses were characterized by irregular plans and from the end of 13<sup>th</sup> century, regular castle-like (the ‘Koventsburg’ form) structures were erected, which architectural features evolved with time. Early castles from the area of the Vistula Lagoon are distinguished by elaborate architectural details and not a complete four-winged plan (e.g. Brandenburg); a little later, the structures built in the Chelmino Land are more severe in character (e.g. Papowo Biskupie); the ones, built in the 1<sup>st</sup> half of the 14<sup>th</sup> century are characterized by a high artistic level and panache (e.g. Radzyń Chełmiński), the last examples – with a distinct simplicity of forms (e.g. Ragnet) (Torbus 1998, 55–247) (fig. 1).

However, a number of problems concerning, in particular, the chronology of these castles, their building stages and techniques applied, have been insufficiently addressed since the beginning of the 21<sup>st</sup> century. The situation has changed significantly at present, when some Polish research centers began systematic archaeological-architectural research on the fortified structures of the Teutonic Order. The centre at Toruń has been accomplishing, since 2005, a long-term scientific program, titled ‘The Castles of the Chelmino Land’, whose principal purpose is to answer those questions connected with the history of the brick fortresses erected from the 2<sup>nd</sup> half of the 13<sup>th</sup> c in the south-western part of the former Teutonic Order’s State (or Ordensland).

The results of recent archaeological-architectural explorations in several sites from this very area have delivered much data, which show that castles built in various periods differed not only in their architectural forms, but also with the technique and process of building. In the light of recent studies it is difficult to agree, for instance, with the statements of T. Torbus, particularly the chronology of changes in castle form (from irregular to regular ones) and the times of their occurrence.

## Grudziądz castle

Grudziądz castle belongs to those 13<sup>th</sup> century structures with irregular plan (fig. 2). Until archaeological explorations in the castle, it had been supposed, that building work on Grudziądz castle had started as early as the mid-13<sup>th</sup> century. This hypothesis was based on the assumptions only, because

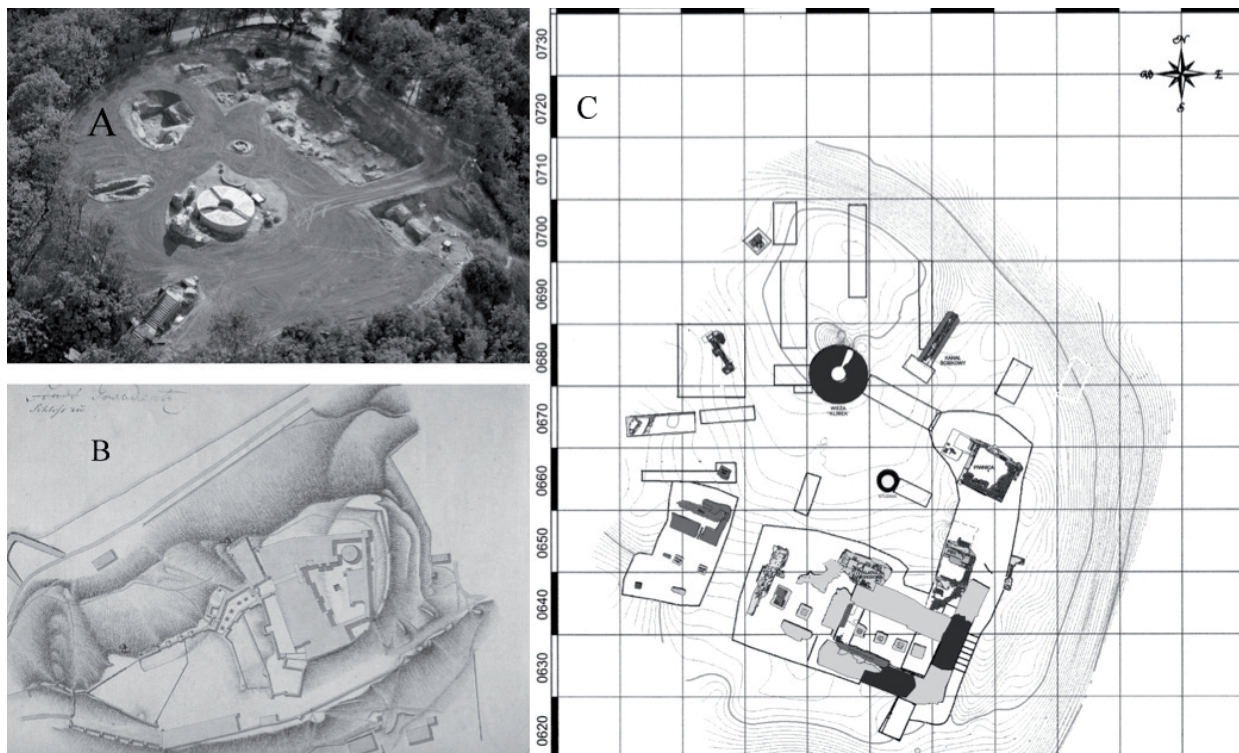


Fig. 2. The castle at Grudziądz – bird's eye view (A), the castle plan from about 1750 – original in Deutsche Staatsbibliothek in Berlin (B), general projection of the site with trenches and survey trenches location (C) (after Wiewióra 2012). – *Obr. 2. Hrad v Grudziądzi – pohled z ptačí perspektivy (A), plán hradu přibližně z roku 1750 – originál v Německé státní knihovně v Berlíně (B), celkový plán lokality s vyznačenou polohou zkoumaných ploch a vyměřených sond (C) (podle Wiewióra 2012).*

the only date mentioned in historical sources, and what is more much later – in the 16<sup>th</sup> century – is the year 1299, in which the ceremonial introduction to the newly built castle chapel was supposed to have taken place (for more on the subject see JózwiakTrupinda 2013, 49–50). Our knowledge of how the castle looked and the character of its accommodation was obtained solely from visitation descriptions and inventories, iconographical images and reports from the end of the 18<sup>th</sup> century and the beginning of the 19<sup>th</sup> century. The castle was regarded as one of the largest fortresses of the Teutonic Order's State, the seat of the commander, and after Royal Prussia was incorporated into Polish territory – the seat of the Grudziądz starosts (elderships). The castle was partly damaged in 1659, during the Swedish Deluge, and it was finally dismantled between 1796–1804, at the orders of the Prussian king Frederic William II (Szymański 1960, 73–104; Wolnikowski 1963; Torbus 1998, 80–84; 427–439; Froelich 2002, 5–34). Soon after the castle was pulled down, in the 2<sup>nd</sup> half of the 19<sup>th</sup> century, The Castle Hill was cleared and in the 80s of the 19<sup>th</sup> century, restoration works started – among others, the castle well was reconstructed as well as the wall fragments in the south-western corner of the castle, following the fashion of the 19<sup>th</sup> century style of romantic architecture. Very controversial, since the beginning of interest in the castle's history, was the question of a settlement preceding the castle's construction. Historical sources provided information about a stronghold settlement existing in Grudziądz, which is mentioned in several documents (Józwiak – Trupinda 2012). It is not established when exactly the Castle Hill was taken over by the Teutonic Knights and if the brick castle had a former wooden counterpart, nor when the building works started. There were constant arguments concerning its form and subsequent building stages.

The main purpose of the archaeological explorations in 2009 season was first and foremost to excavate the castle remains and recognize the settlement's character, layers' stratigraphy in as much of the Castle Hill as possible. This exploration included both area and survey studies – the preserved fortress relics were excavated, and surveys were performed to recognize cultural layers in selected parts of the site. The relics of cellars belonging to the southern castle wings with fragments of the staircase, joining the cellars with the yard and the eastern wall parts of the gatehouse were excavated. The next section of the relics of the western part, belonging to the southern castle wing was excavated on the western side of the road, where the cellar interior with a cross vault, the staircase and the stone pavement were discovered. Searching for the castle architecture relics, in the western and northern sides of the courtyard confirmed the assumption, signaled already in the 1940s of the 20<sup>th</sup> century, that only the buildings of the southern and northern wings were equipped with cellars. The first archaeological exploration of the castle between 1941–42, was performed by the town attorney Hans Jacobi. The results of the study were presented in his doctor's thesis completed and defended in 1943 in the Gdańsk Politechnic (Sławiński 1965, 248). Publication and scientific elaboration was printed in 1996, ed. by U. Arnold (1996).

Basing on information obtained during archaeological works, conducted in the high castle in 2009, in several explored survey trenches cutting the castle yard from the North to the South and from the East to the West, the conclusion was made that no signs of walls of the northern and western wings have been preserved. The works indicated that this part of the hill had been practically totally leveled, and the relics of the northern curtain dismantled completely. Survey trenches made in the site western part revealed a pillar fragment and the negative image of the demolished walls, preserved on the level of their foundations, which turned out to be relics of the 'parham' (zwinger – outer courtyard) walls surrounding the castle from the western part. The analyses of excavated layers and their stratigraphy registered in the western and eastern sides of the courtyard indicated, that around the 15<sup>th</sup> century that part of the hill was used as an area of renovation and building works (Wiewióra 2012; Zimnowoda – Krajewska 2012). The character of layers reported in this hill section indicated simultaneously that probably at the end of the 14<sup>th</sup> century, after the building collapsed in 1388, mentioned in written sources, the area was levelled for the first time. The building character changed as well – the relics of the western wing remains are situated much higher than the earlier walls of southern wing. In the trench situated at the eastern castle wing, neighboring with the relics of a household building, equipped with a stove, excavated during archaeological explorations, well preserved layers connected with the settlement preceding the Teutonic castle erecting were registered, revealing, among others, numerous fragments of clay pottery, dated from the 8<sup>th</sup> until the beginning of the 13<sup>th</sup> century, animal bones and other signs related to the functioning of the settlement (?), including also relics of buildings with furnaces. Analogous results were obtained in the southern hill section, e.g. in the south-eastern corner of the southern castle wing in the central cellar part of that wing, where well preserved fragments of a cottage with a hearth, dated from the mid-11<sup>th</sup> century was identified. In this way, assumptions of intense settlement, dated from the early Middle Ages, connected probably with a stronghold existing in that location, were confirmed. Archaeological exploration carried out, although in a limited range, within the former castle courtyard also revealed clear signs of wooden buildings; presumably the remains of the oldest Teutonic Order's fortress (castrum?). This fact is confirmed by fragments of pottery (greyware ceramics) dated from 2<sup>nd</sup> half of the 13<sup>th</sup> century, excavated from the trenches. Due to the limited range of research works in this place, it is difficult to define the form and function of excavated rooms.

The high castle (convent house), which is the best archaeologically recognized part of the castle complex was erected in several stages in place of older, timber-earthen, first Slavic and later Teu-

tonic Order's stronghold. It was built on a hill, rising about 40 m over the Vistula level. During the first stage of construction, the eastern part of the future central wing was constructed (southern) – the cellars and the first storey level, together with adjacent curtain sections. In the course of the following phases, a chapel was located in that wing part (figure 3). This castle construction was put on deep narrow foundations – 1,5–2 m, while cellar rooms were placed in shallow spacious foundation trenches. Wall foundations in this stage, likewise in the subsequent ones, were made of stones in layers and the higher wall from brick. The cellar staircase, which originally had its entrance from the north, was built during the second stage of construction (Wiewióra 2012, 369; Zimnowoda – Krajewska 2012, 154–155). Next, the wing in the construction was lengthened towards the West, so that it occupied all of the southern side of the high castle. The new part was made in another technique and it is distinctly narrower, than the older, eastern building section (Zimnowoda – Krajewska 2012, 155–156). Simultaneously, the works on the upper storeys of that wing and closing the defensive walls were carried out (northern circumferential wall section was built). That part of the fortress was characterized by much shallower wall foundations, which after the destruction and removal of the upper layers of the hill, did not leave any visible signs (Wasik 2015). In the turn of the 13<sup>th</sup> century, the constructive works on the central castle wing were

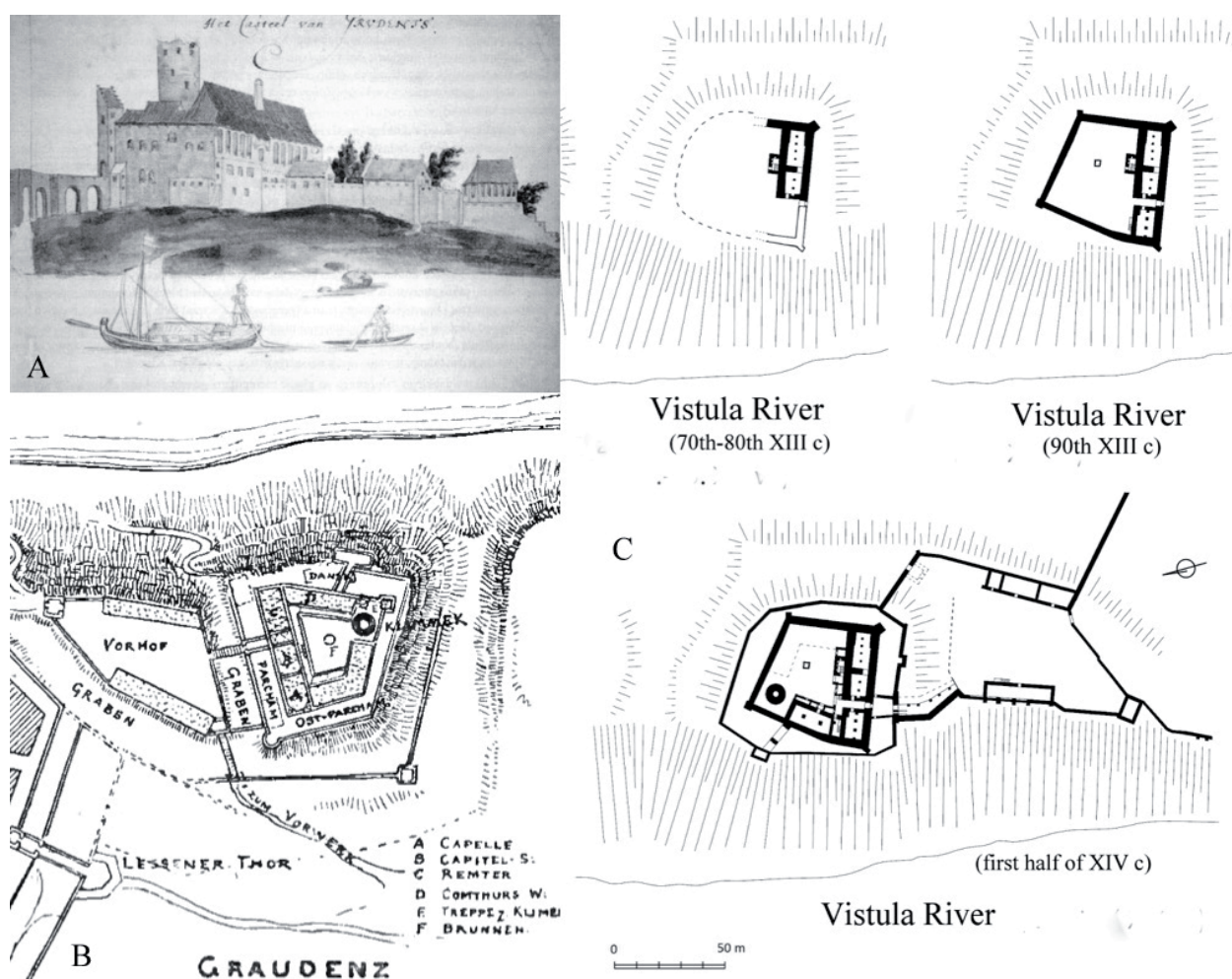


Fig. 3. The castle at Grudziądz – view of the castle from the west by A. Booth from 1629 (A), the castle plan (B) (after Heise 1894), reconstruction of the high castle building from XIII to XV century. Elaboration Wasik (after Wiewióra ed. 2012). – Obr. 3. Hrad v Grudziądzi – pohled na hrad ze západu od A. Boothy z roku 1629 (A), plán hradu (B) (Heise 1894), rekonstrukce budovy horního hradu z 13. až 15. století. Zpracoval B. Wasik (podle Wiewióra ed. 2012).

completed and the stage of building the lodgings giving the fortress its final shape, started. It was the time when the western wing, together with the gallery and cylindrical tower were erected. It was decorated with a glazed brick strip, made only to the level of the circumferential wall crowns from the side seen from inside the yard. It is also an indicator confirming the fact that the tower was built after the entire structure was enclosed with walls. More or less at the same time, the 'parcham', an area between the walls, typical for Teutonic Order castles, might have been arranged, as well (Wiewióra 2012, 366–371; Zimnowoda – Krajewska 2012, 156–157).

The landform must have influenced differences in building techniques in the construction of the high castle. Even until today, a clear height difference between the northern and southern part of the hill, where the southern wing was located, has been clearly seen. The castle courtyard dropped down towards the south, following the slope of the hill. Certainly, the subsequent southern wing (first the eastern part and next the western one) building stages, registered during archaeological-architectural explorations and constructing next sections of eastern, northern and western curtain wall, met with difficulties with marking out one continuous line of foundation trenches. The exploration did not register any signs of more intense earthworks, directed at leveling and raising the levels of the 'parcham' and the yard accompanying the constructive works. Probably only in the northern 'parcham' section, some earthworks were created, forming a sand embankment, whose purpose was to level the terrain recess, situated between the culmination of the hill, where the Klimek tower stood alongside the upheaval located in the area north-eastern part.

During the next decades of the 14<sup>th</sup> and 15<sup>th</sup> century, brick household buildings for the convent house (northern and eastern wings) were added and buildings in the 'parcham', being, among others, the commander's lodging (Wiewióra 2012, 373). The short description above gives us quite a complicated building process of an irregular commander castle (or convent), which had been started as a concept planned in details, but in practice turned out to be rather a chaotic building action.

### **Papowo Biskupie castle**

The character of building works taken up in erecting the castle in Papowo Biskupie, an example of early regular convent castle, is different (Arszyński 1958, 1–8; Frycz 1978, 44–46; Mroczko 1995, 181; Józwiak 1997, 130–132; Torbus 1998, 127; Dorna 2004, 260). Papowo fortress was probably built between 1278 and 1284. It is possible that the Grand Master Konrad von Feuchtwagen, staying in Papowo in 1279 visited the building site. The main works in the construction of the high castle were conducted between 1290 and 1300. The structure was built 'in cruda radice', in its original form, without any significant changes in later periods. We do not know how long the building process lasted, but it can be assumed that it was completed at the earliest in the turn of the 13<sup>th</sup> century or even in the 1<sup>st</sup> quarter of the 14<sup>th</sup> century. Some decorative elements of the refectory (older subject literature defines it as a chapterhouse – however, in accordance with the latest research on Teutonic Order castles, rooms with that name did not exist at all; Józwiak – Trupinda 2012), and the chapel associated with similar details used in Gniew (Torbus 1998, 127). In the 14<sup>th</sup> century, Papowo played a significant administrative and economic role in the structures of the Order's State. In the beginning of the 15<sup>th</sup> century, in 1411, the ward was damaged when the knight Janusz Borzogłowy invaded Papowo (Długosz 1985, 201–202). In 1416 the castle was visited by a renowned builder Nicolas Fallenstein, who also inspected at that time fortresses in Lipienko, Brodnica, Malbork and Sztum. The purpose of that action may have been the evaluation of the building's condition, defining indispensable building works and estimating probable costs of renovations. Between the 30<sup>s</sup> and 40<sup>s</sup> of 15<sup>th</sup> century, the castle in Papowo Biskupie required renovation, a fact confirmed by the visitations from the 40<sup>s</sup> of 15<sup>th</sup> century, from which we learn



Fig. 4. The castle at Papowo Biskupie – view of the eastern castle wall (A), castle bird's eye view (B). – *Obr. 4. Hrad v Papowo Biskupie – pohled na východní hradní zeď (A), pohled na hrad z ptačí perspektivy (B).*

that, e.g. northern wing was damaged, the roof over the western wing destroyed and buildings situated in the ward required redecoration. The castle was harmed during the military actions of 1454 (Haftka 1999, 224). It was also the first castle taken over by the Poles during 13-year war. From the 16<sup>th</sup> century onwards, the castle lost gradually its military significance and its steady decline began. In the 17<sup>th</sup> century the central castle was already uninhabited ruin and in its ward a manor was built, mentioned in the 17th century inventory lists of Chełmno bishops' property.

The convent house was not exceptionally constructed from brick, but almost completely of field stones (fig. 4). Brick served only for building porches finishing the walls, window and door jambs and vaults. The castle is on nearly square plan, with sides about 40–42 m (9 rods) with small

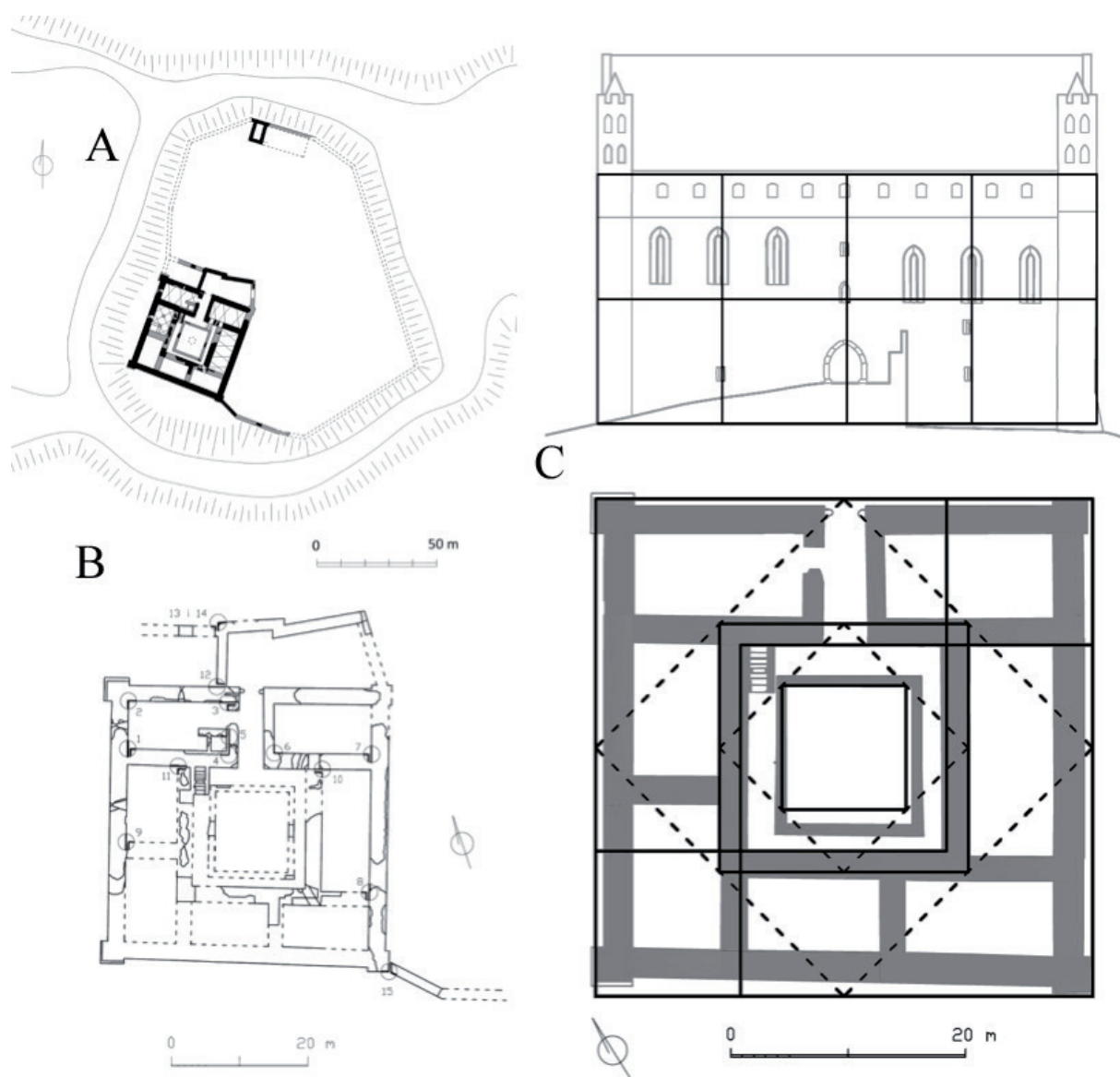


Fig. 5. The castle at Papowo Biskupie – reconstruction of the ground plan (A), projection of the high castle after excavation works (B), reconstruction of the castle design using a ad quadratum geometrical method. Elaborated by B. Wasik. – *Obr. 5. Hrad v Papowo Biskupie – rekonstrukce půdorysu (A), plán jádra hradu po exkavaci (B), rekonstrukce nákresu hradu za použití geometrické metody „ad quadrantum.“ Zpracoval B. Wasik.*

avant-corps turrets on the corners (Torbus 1998, 127–130; Wasik 2012, 19). The building was constructed in stages, and we can suppose that from the very beginning, building works of the high castle were fulfilled according to a general plan, including not only the rooms' composition, but all the façades heights. The projection and preserved façades analyses indicated, that first an architect made the castle design using a geometrical method known at that time in Europe as ad quadratum (fig. 5). Thanks to drawing subsequent squares, with sizes strictly depending on one another, he obtained a series of sizes indicating the proportions of wings' width and the yard's dimension, as well as their heights (Wasik 2013). The fact that the castle composition was planned in details from the very beginning is confirmed by readable evidence that built walls were simultaneously equipped with toothings for future division walls and pillars for vaults of designed rooms (Wasik 2012, 25).



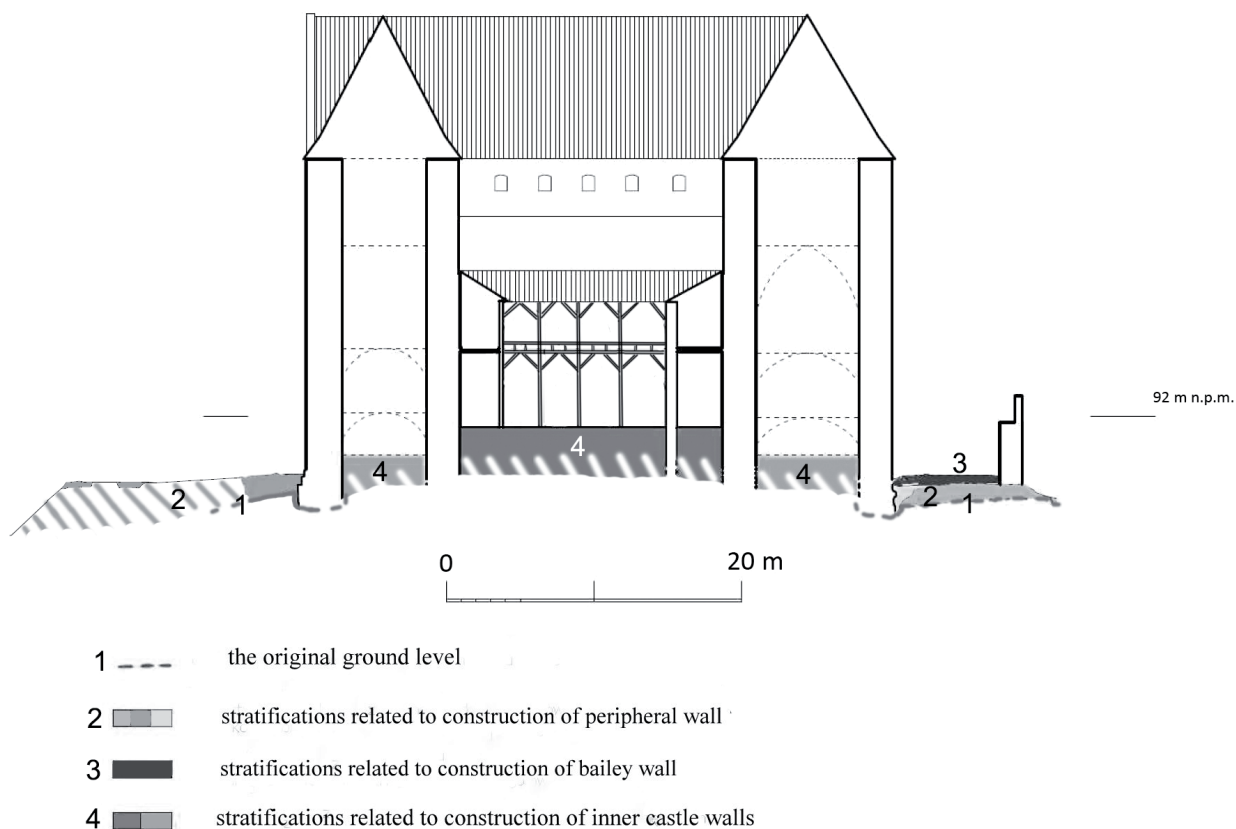


Fig. 6. The castle at Papowo Biskupie – cross section along the north-south axis with view to the stratifications and ground levels associated with the high castle building phase. Elaborated B. Wasik. – *Obr. 6. Hrad v Papowo Biskupie – řez podél severojižní osy s pohledem na rozvrstvení a úrovně základů související s vrcholnou stavební fází hradu. Zpracoval B. Wasik.*

The stratigraphic analysis of layers registered in survey trenches within and around the convent house delivered interesting observations (Momot 2012; Wiewióra 2007; 2013), which combined with architectural studies of walls, enabled reconstruction of particular constructing stages of that structure (fig. 6). First, the external circumferential curtain was built, following the plan: narrow foundation trenches were dug 1 m deep and the foundations were mortared, next after some parts of the wall were erected, the ground level around the building was raised, forming around the castle a flat terrace, 10–15 m wide. The clay embankment thickness at the wall is about 1 m, and at its external edge – at least about 3 m. During the second stage, in special places prepared earlier, the circumferential curtain of the walls of the central castle wing (northern) – walls of the subsequent wings, were added, starting with the main one, with a chapel and a refectory. The surface of the entire courtyard was raised and leveled then about some meters up (Wasik 2012). The attention should be turned to the fact that the scale of earthwork accompanying the building process was huge – it is estimated that about 4500 m<sup>3</sup> of clay were brought to the surface of the yard and around the central castle.

The researchers had high hopes to find the original elements of scaffolding excavated in the western facade of the high castle. Unfortunately, dendrochronological analyses indicated that all samples were of elm tree, which proves poor for dating (fig. 7).

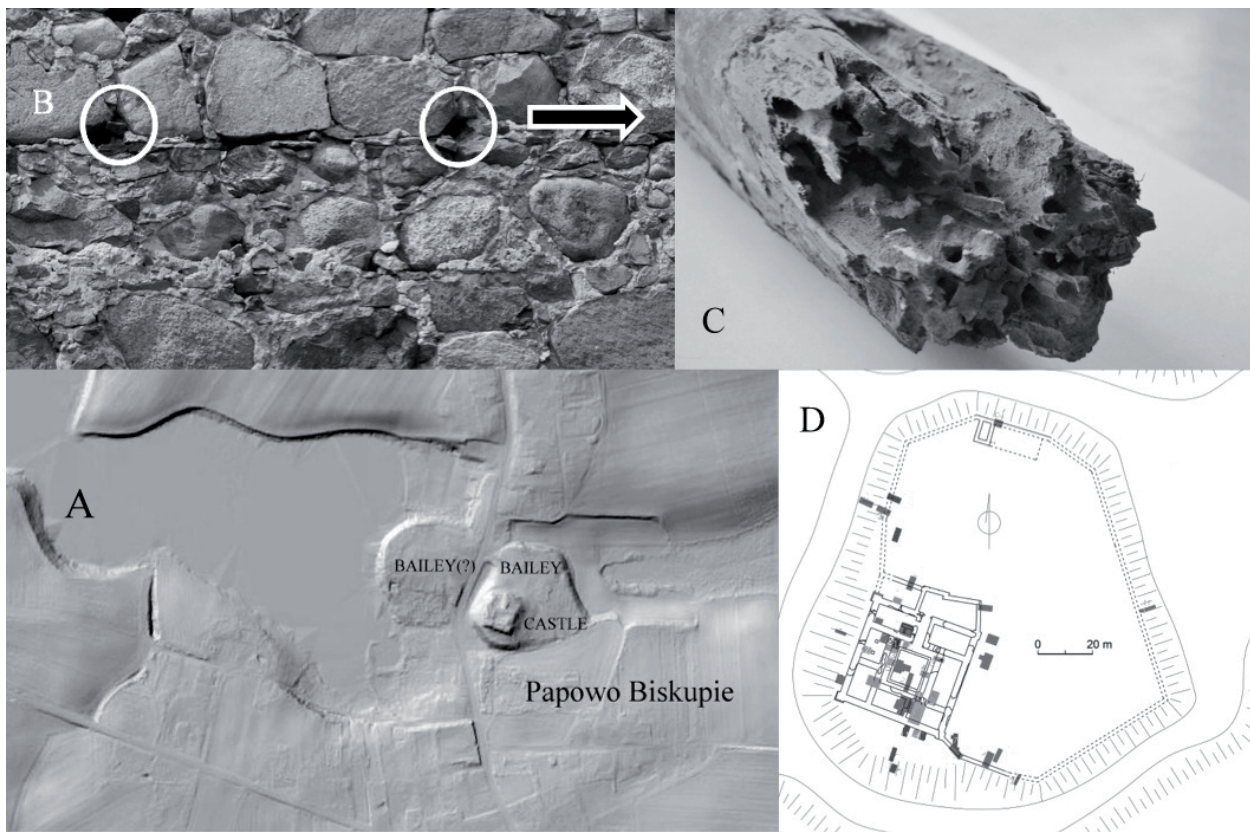
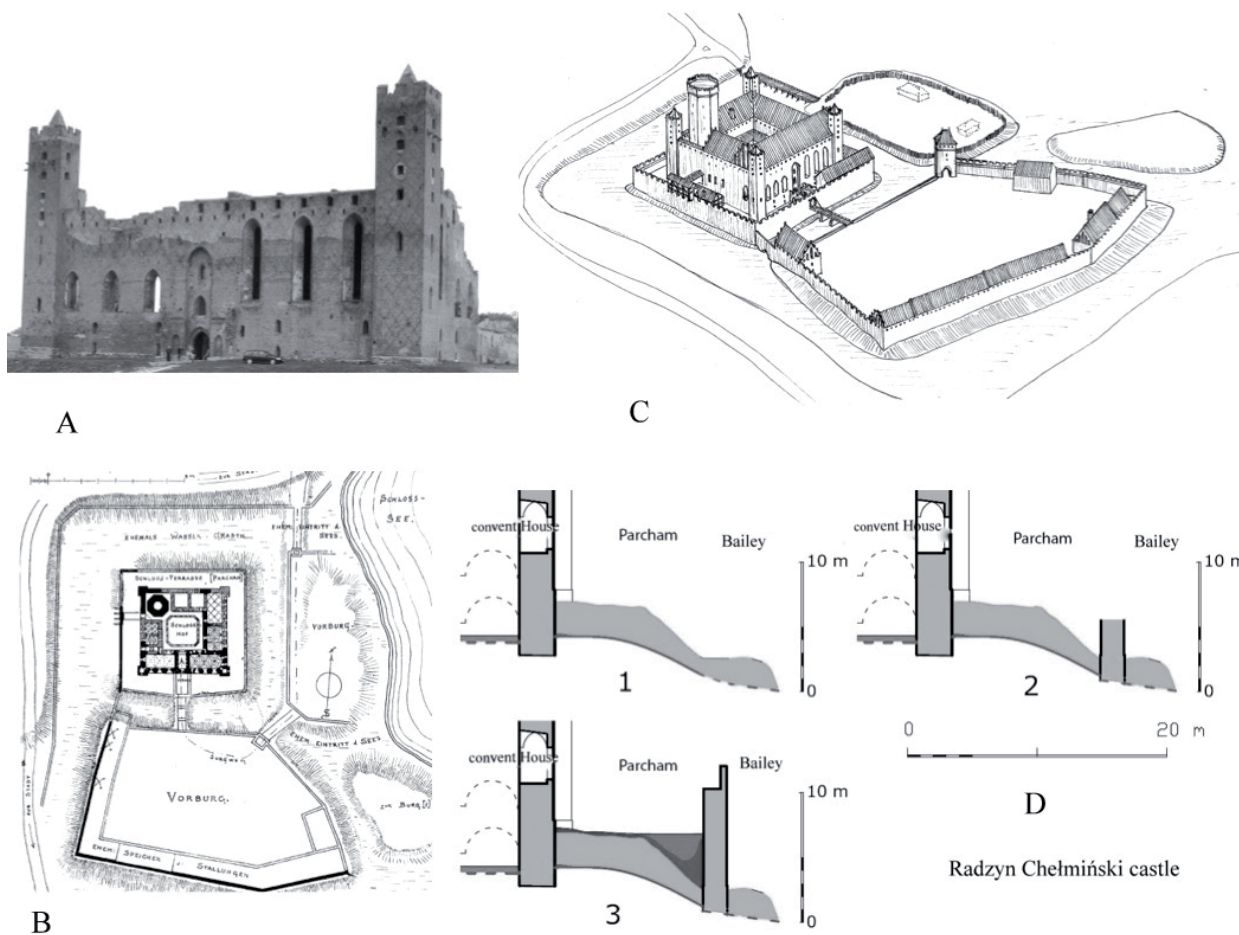


Fig. 7. The castle at Papowo Biskupie – location of the second bailey(?) (after LIDAR), view of the putlogs (B), the original elements of scaffolding (C), projection of the trenches in 2005–2008; 2012 (D). – *Obr. 7. Hrad v Papowo Biskupie – umístění druhého hradního předhradí (?) (LIDAR), pohled na otvory v hradní zdi po pozůstatcích lešení (B), původní části lešení (C), plán rozmístění ond během výzkumných sezón 2005–2008; 2012 (D).*

## Radzyń Chełmiński castle

Features similar to the characteristics discussed above were presented by building works performed in the classic convent castle in Radzyń Chełmiński. It is situated on an elevation in a valley, closed from the east by a lake, partly overgrown today (fig. 8) (Arszyński 1961, 43). In the Middle Ages, the shoreline reached the castle fortifications. Westwards from the castle, there were wetlands. It is not known, when the castle's construction started. In accordance with Conrad Steinbrecht and Johannes Heise, building took place between 1300–1310 (Steinbrecht 1888, 56; Heise 1894, 537–538), Bernhard Schmid moved it in time for the years 1305–1325 (Schmid 1939, 118), and that was also the opinion of Bohdan Guerquin, who assumed that building had started in the beginning of 14<sup>th</sup> century and completed by 1329 (Guerquin 1984, 270). The others supposed that the works had begun after 1270, but that hypothesis should be rejected at present (Arszyński 1961, 59–70; Torbus 1998, 601). Its completion is dated, in some researchers' opinion before 1329, whilst others move the date forward up until the middle of that century. Throughout the 14<sup>th</sup> century Radzyń castle was regarded as one of the most significant and wealthiest objects of that kind in all Teutonic State. After the ratification of Second Peace of Thorn, the castle was taken over by Polish authorities and became the seat of a starost's office. It was significantly destroyed later during the first Swedish Deluge. After Poland's first partition in 1772, it was slowly but steadily dismantled by Prussian authorities. The ruins were restored in the 19<sup>th</sup> and 20<sup>th</sup> century (among others, rubbles from the area were removed, cellar vaults were protected, the chapel got a new roof, next, in the



**Fig. 8.** The castle at Radzyn Chełmiński – view from the south-east (A), ground plan of the high castle and the southern bailey (after Steinbreht 1888) (B), reconstruction of the castle from XVII century (C), cross section along the east-west axis with view to the stratifications and ground levels associated with the high castle (parcham and bailey) building phases (D). Elaborated by B. Wasik. – *Obr. 8. Hrad v Radzyn Chełmiński – pohled od jihozápadu (A), přdnorys jádra hradu a jižního přehradí (podle Steinbreht 1888) (B), rekonstrukce hradu ze sedmnáctého století (C), řez podél jihozápadní osy s pohledem na stratifikaci a úrovně terénu související se stavebními fázemi jádra hradu (parkán a hradní opevnění) (D). Zpracoval B. Wasik.*

1960s, it was covered with reinforced concrete). The main castle was erected on the quadrangular plan measuring 49,4 x 49,6 m (Torbus 1998, 597).

The foundations and parts of the cellar walls were made of erratic stone and only small sections were completed with brick, while over-ground construction parts were built of brick. The convent building was closed in corners with four square towers with sizes – 5,20 x 5,30 m, moved forward over the façade. The north-western yard corner was equipped with an octagonal solid tower, with a diameter of about 12 m. The southern wing had the only entrance gate, leading into the yard (Arszyński 1961, 45; Torbus 1998, 598).

Architectural survey indicated that during the structure's construction in the 14<sup>th</sup> century, the architect had a precise design of composition and proportions of the structure using probably ad quadratum (Wasik 2013) method and wide scale earthworks (embankments) were conducted in parallel. Explorations conducted in seasons 2008–2009 indicated that around the high castle, there was flat 'parcham' and the ground was raised by 2,5–3 m, which was an impressive achievement (fig. 9). The builders formed a large artificial platform of clay, on which the walls were erected. External curtain walls were also made in accordance with the schedule prepared before: outside the

convent house and from the yard side – the walls were erected gradually, starting with the footing (laid brick after brick), made to a certain height. Next the leveling layers with a depth reaching up to 2,5–3 m were filled up from outside (fig. 10).

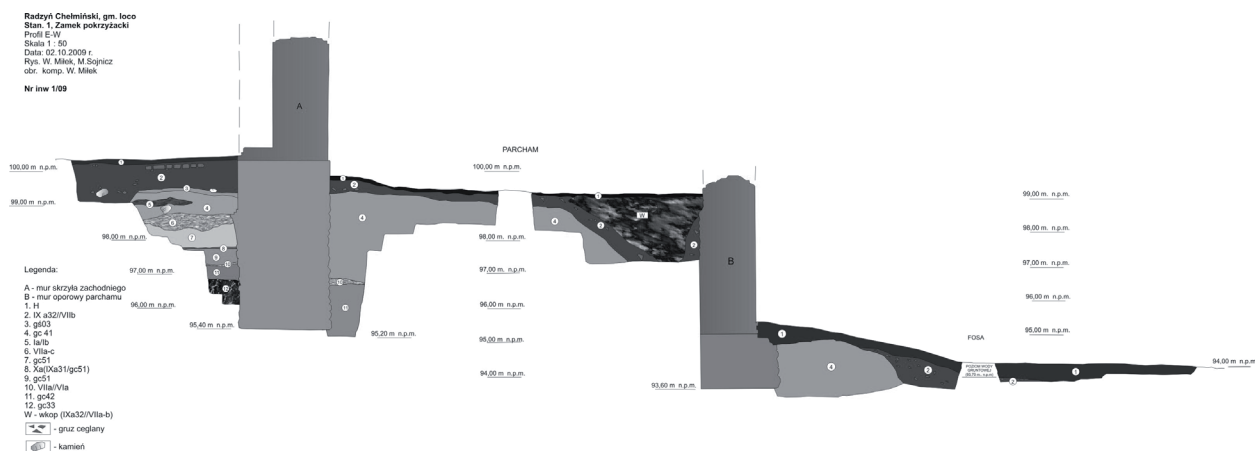


Fig. 9. The castle at Radzyń Chełmiński – cross section along the east-west axis with view to the stratifications and ground levels associated with the high castle, parcham, bailey and moat building phases. Elaborated by W. Miłek. – *Obr. 9. Hrad v Radzyń Chełmiński – řez podél jihozápadní osy s pohledem na stratifikaci vrstev a úrovně terénu jádra hradu, parkánu, předhradí a příkopu. Zpracoval W. Miłek.*

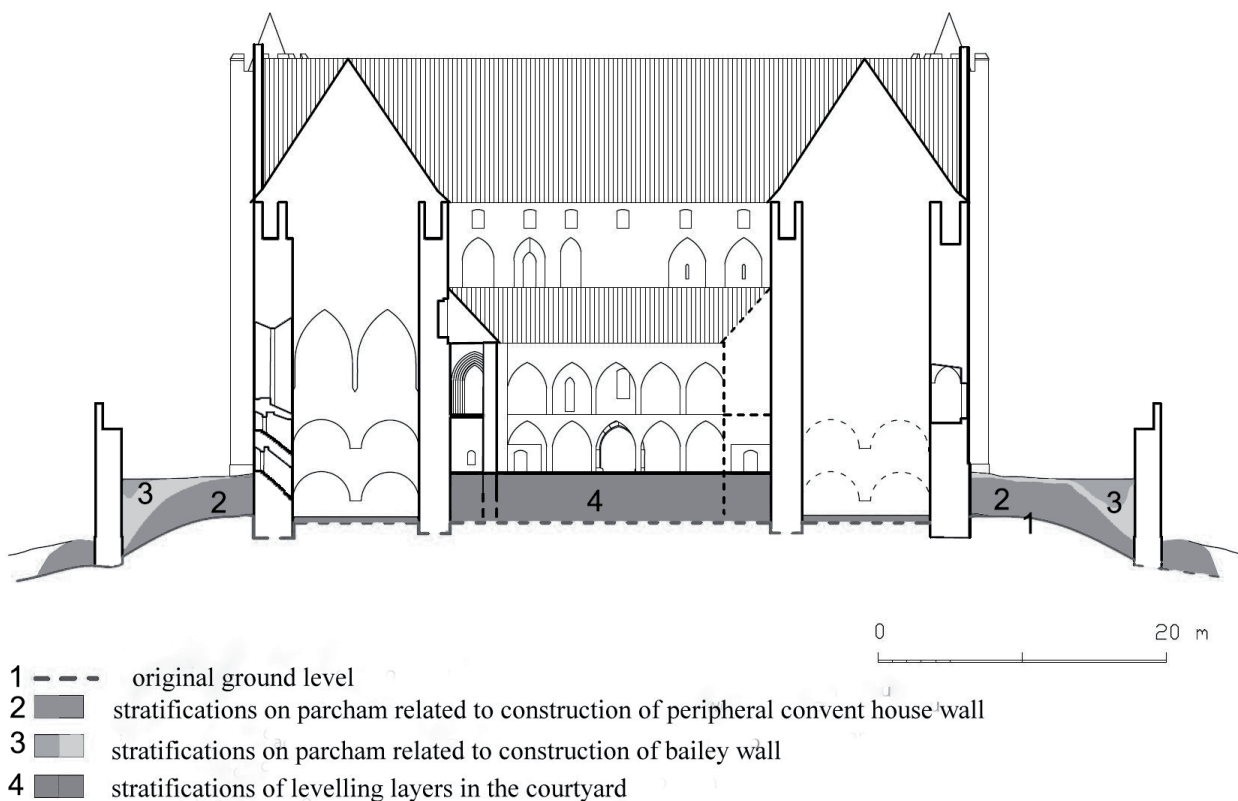


Fig. 10. The castle at Radzyń Chełmiński – cross section along the east-west axis with view to the stratifications on parcham related to construction of convent house courtyard and bailey walls. Elaborated by B. Wasik. – *Obr. 10. Hrad v Radzyń Chełmiński – řez podél jihovýchodní osy s pohledem na stratifikaci a úrovně terénu související se stavebními fázemi nádvoří řádového domu, předhradí a parkánu. Zpracoval B. Wasik.*

## Wąbrzeźno castle

The bishop's fortress in Wąbrzeźno related to Teutonic Order castles with its project, although its poorer building workshop and the lack of dynamism in design, demonstrated in smaller size reduced to three wings (with sides of about 37 m), differed it from perfect Teutonic Order structures (Wiewióra ed. 2014).

Wąbrzeźno is situated in Chelmno Land on a slight elevation, surrounded by three lakes (fig. 11). The first report concerning the castle appeared relatively late, in the list of bishops of Kulm, in the beginning of the 16<sup>th</sup> century. Its erection started presumably before 1311, by the initiative of bishop Herman von Prizna. The fortress might have existed in some form already in 1320<sup>s</sup>. Bishop Herman von Prizna must have started the building; during his times, the main building works may have been finished, however it is not known who completed it and when (Czaja 2005, 82). The castle in Wąbrzeźno was first of all a residence of a bishop, towering over the area and emphasizing the domination of bishop's authority over his estates (Rubehn 1869, 177–178; Sławińska 1961; Birecki 2005, 19).

Little is known about rooms situated inside the castle, although the most crucial lodgings are localized (UC, 348–349; Słownik geograficzny 1893, 155; Birecki 2005, 20). Inventories made in 17<sup>th</sup> century inform about St. Mark chapel, a sacristy, private chambers, cellars, warehouses, stores,

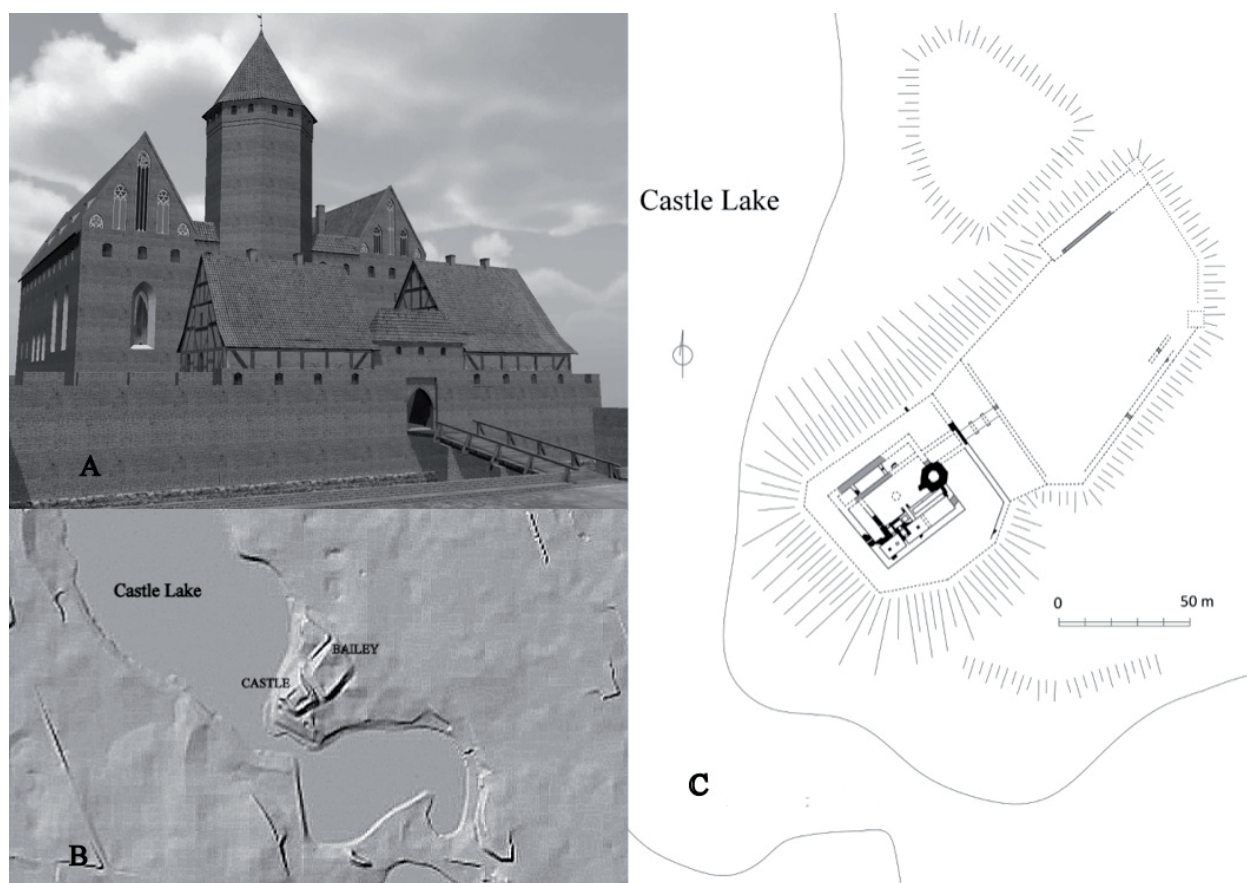


Fig. 11. The bishop's castle at Wąbrzeźno – hypothetical reconstruction of the castle east elevation with a gate and eastern park buildings in the first quarter of the 17<sup>th</sup> century (A), location of the castle (after LIDAR) (B), projection of the castle remains after excavation works (after Wiewióra ed. 2014). – *Obr. 11. Biskupský hrad Wąbrzeźno – hypotetická rekonstrukce východní části hradu s branou a parkánovými budovami v první čtvrtině 17. století (A), poloha hradu na LIDARovém snímku (B), půdorys hradu s vyznačením jeho pozůstatků po exkavačních pracích (dle Wiewióra ed. 2014).*

a kitchen and an armory (Inwentarz 1614, 84–88; Birecki 2005, 20–21). The castle was seriously damaged during the 13-year war (Rzeczowska – Sławińska 1965, 10; Baciński 2004, 3; Birecki 2005, 21). Between 1611–1613, it was subjected to unspecified building works, initiated by bishop Maciej Konopacki. It was undoubtedly the most prosperous period of the residence in modern times. The following visitations indicated, however, gradual damage to the structure, which led to the situation, that from the half of 17<sup>th</sup> century the bishops resided in nearby Sitno (Sławińska 1961; Birecki 2005, 22). Rapid castle degradation started at the moment of secularization of the Church's property. Consent to dismantle the castle was given personally by the Prussian king, Frederic II, in 1792. In 1856 the dwellers of Podzamek commune were authorized to use freely the building material from the castle and it was used, e.g. for local roads building (Baciński 2004, 36). Dismantling works were continued again at the end of the 19<sup>th</sup> century, and this way in 1898 only the northern circumferential wall still existed (Heise 1887–1895, 21; Sławińska 1961; Birecki 2005, 22).

According to the researchers studying this castle history, the object was erected on an artificially raised hill (Sławińska 1965, 8–27; Birecki 2005, 19; Czaja 2005, 82). That information, not confirmed by any evidence until 2010, had been repeated in the scholarly literature for a long time (e.g. Guerquin 1984, 324). Recent study results indicate clearly, that the hill on which the castle had been erected is a natural formation, created probably during the last glacial period. The level of anthropogenically untransformed layers was deposited relatively shallow, which in turn influenced the mode of the castle wall foundations. No significant leveling works, known from earlier Teutonic Order castles descriptions, were registered, while on the contrary, earthworks were created during the deepening of the moat and the construction of the circumferential wall.

Research starting in 2010 was conducted in the south-western part of the southern wing and in the south-western and south-eastern corner of the western wing. The examination included the castle yard, at the passage joining the cellar staircase with the yard and north-western castle corner, fragment of cellars of southern wing. The eastern 'parcham' was also examined (figure 12). The exploration focused mainly on recognizing and excavating the relics of the walls, reporting levels of former cellars and measuring particular rooms (Majewski 2010; Wiewióra 2010; 2011a; 2011b). The exploration of season 2011 was took the character of a survey and due to the limited time of works the research was directed first of all at recognition of the ward and the moat. 10 survey trenches with a total surface of about 100 m<sup>2</sup> were made in order to trace any construction around the main entrance gate, in the eastern part of a high castle, on both sides of the moat and within the ward, situated on the eastern moat side. During these works, the crown of brick wall, matching the eastern boundary of the 'parcham', being simultaneously the façade of western moat slope was registered (Wiewióra 2011a; 2011b). The exploration of ward area, stretching on the *plateau*, clearly distinguished from the rest, west from the upper castle, enabled to identify the household and habitable building character, confirming information from modern illustrations and visitations reports.

All the space of Wąbrzeźno fortress consisted of the upper castle – bishop's residence and the ward – measuring 70 x 120 m. Both structures are situated towards each other on the south-west, north-west axis, separated by a dry moat, partly deepened during building works. The ward of lengthened rectangular shape is densely wooded now. The entrance to the area is situated from the town side. The elevation with the upper castle was surrounded by defensive walls.

The upper castle had three wings: south-eastern, south-western and north-western, built up with three- and two-storey buildings, topped with warden gallery. The southern wing had a brick gallery, but there is no evidence of such constructions – wooden or brick in other castle wings (Guerquin 1984, 324). From the north-east, the yard with a well is closed by the eastern curtain with an octagonal tower, erected in the middle of the wall, protecting the entrance gate (Rzeczowska – Sławińska 1965, 22; Kajzer – Kołodziejki – Salm 2001, 532).

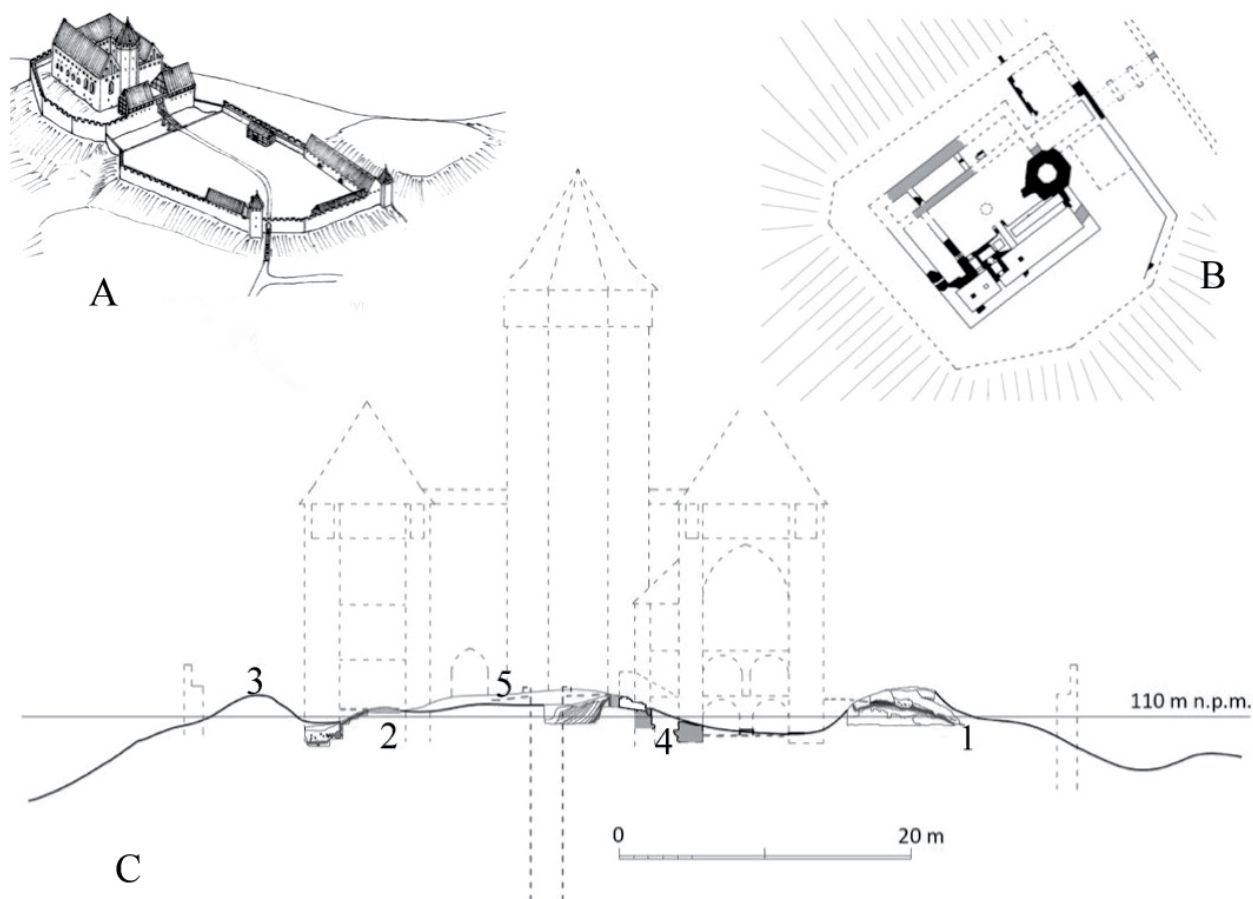


Fig. 12. The bishop's castle at Wąbrzeźno – reconstruction of the castle in 17th century (A), projection of the high castle after excavation works (B), cross section along the north-south axis with view to the east; stratifications and ground levels associated with the high castle building phase (C) (after Wiewióra ed. 2014). – *Obr. 12. Biskupský hrad Wąbrzeźno – rekonstrukce hradu v 17. století (A), plán jádra hradu po archeologickém výzkumu (B), řez jádrem hradu podél severojižní osy, pohled k východu; stratifikace vrstev a terénních úrovní během stavebních fází jádra hradu (C) (dle Wiewióra ed. 2014).*

Observations made during research of 2010–2011 seasons give a clear picture that the construction of circumferential curtains, internal wing walls and the main tower were conducted simultaneously. Stone foundations were put into narrow trenches and in the southern wing, which was the only part equipped with a cellar, wide spatial foundation trenches were made. Having completed the buildings mentioned above, a gallery was added to the southern wing. No uplifting earthworks or leveling the ground level accompanied those works – the yard surface remained slanting, between the walls, the area also was left inclined. More effort was put in shaping the hill, where the ward was situated (Wasik 2014).

As was remarked before, Wąbrzeźno's building workshop was of a worse quality than in neighboring Teutonic Order castles. It is characterized, among other things, by the inconsistency of brickwork (wendic and gothic bonds together), irregular brick composition inside the walls (particularly in the 'parcham' walls), as a result of which mortar overlap other parts frequently, the stone plinth is practically absent, what made the wall vulnerable to moisture and the poor quality of the production of several architectural details (e.g. rib fittings) is evident (fig. 13). The characteristics listed above indicate, that the Chełmno bishop, having smaller finances at his disposal than the Order, was forced to employ worse specialists to build his residence, imitating a Teutonic Order fortresses.

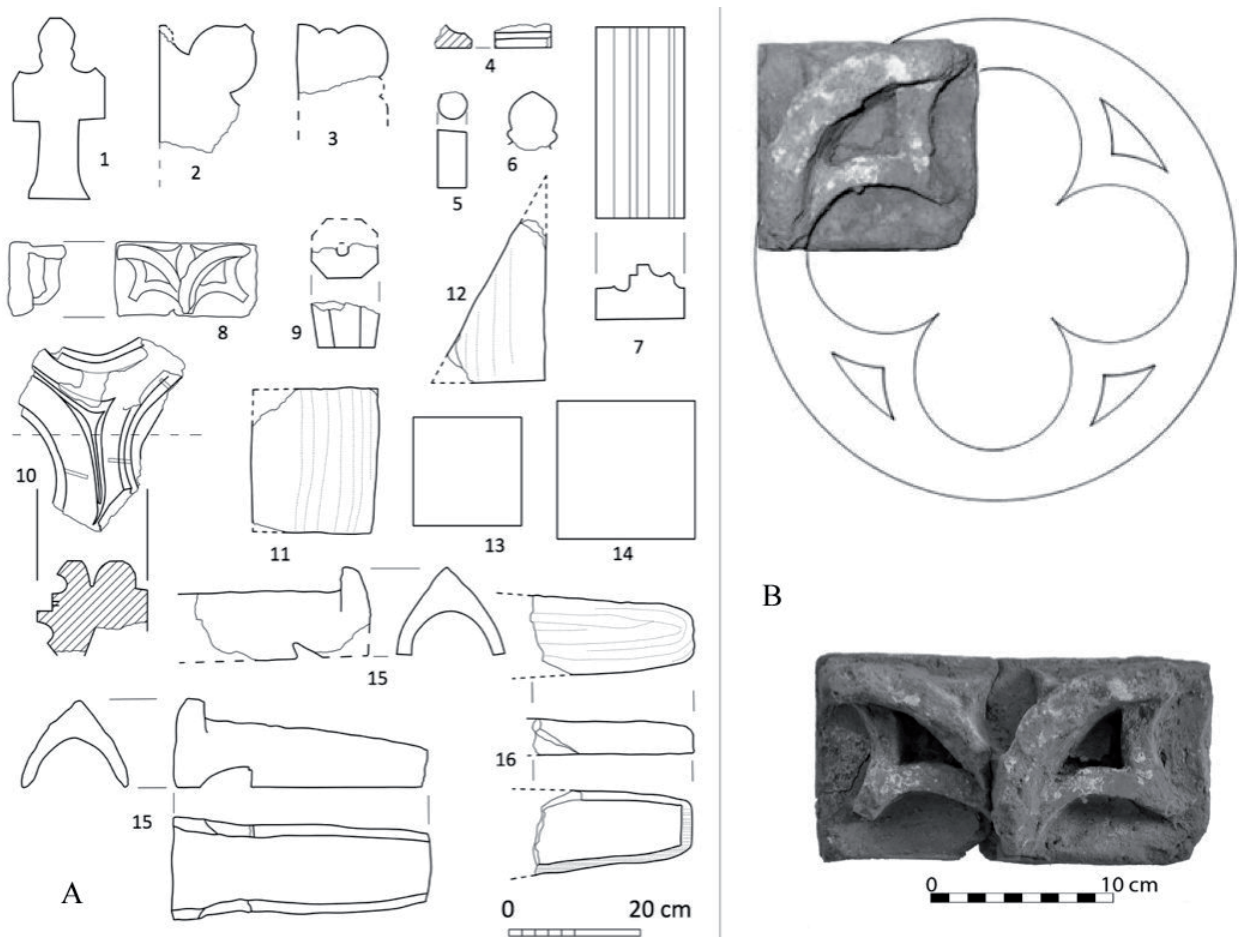


Fig. 13. The bishop's castle at Wąbrzeźno – medieval architectural details (A), fragment of the frieze from the castle (B) (after Wiewióra ed. 2014). – Obr. 13. Biskupský hrad Wąbrzeźno – středověké architektonické detaily (A), fragment vlysu pocházejícího z hradu (B) (dle Wiewióra ed. 2014).

## Summary

Archaeological-architectural research conducted within four structures, brought not only new information concerning the fortresses forms, particular rooms functions, their locations in the castles space or the material culture of their inhabitants, but first and foremost, it verified many questions and opinions functioning till then on defensive architecture of Teutonic Order. The new information compared with, often incorrect data, functioning in the subject literature (frequently from the end of 19<sup>th</sup> century), designs and plans, delivered precious data completing the picture of that architecture.

Crucial from the building technique point of view were the facts concerning subsequent erecting stages and characters and ranges of building works: initial preparatory works, building castles walls and the other elements creating fortified complexes ('parcham', ward, etc.). All data completed until now show, that the scheme conception suggested by T. Torbus concerning the development of the Teutonic Order's castles, which he divided into older irregular castles, erected from the 2<sup>nd</sup> half of the 13<sup>th</sup> century, and the younger structures – regular castles built within the range of the Order's State area (Prussian Ordensland) from the end of the 13<sup>th</sup> century to the 13<sup>th</sup> /14<sup>th</sup> c were not confirmed completely.



It is true, that the oldest brick castles (e.g. Grudziądz) were built in complicated political situations, during the most intense fights with the Prussian tribes. Due to those facts, using the simplest irregular building forms referred fully to the possibilities and logistic needs of the state. The example of Grudziądz castle is interesting for a few reasons. First – it turned out, that the building activities were not accompanied by larger earthworks, the area of the ‘parcham’ and the yard was neither raised nor leveled. Only in the northern ‘parcham’ section it was reported that limited leveling works (sand embankment) were performed in order to fill up the depression between the hill top, where the Klimek tower was erected, and the natural terrain elevation in the north-eastern part. Second – the study results clearly demonstrate that building works were fulfilled in stages: first a building of the main southern castle wing was erected, which functioned as the only one in all the upper castle structure until the end of 13<sup>th</sup> c. Later, in the 14<sup>th</sup> and 15<sup>th</sup> century brick structures of convent household-service functions and habitable parts in the ‘parcham’ were systematically added. What is worthy of attention is the fact that, both in Grudziądz, and the other castles of that type we can observe that with time, the following builders tried to adjust ‘the irregular’ plan to new possibilities and current ‘fashion’ and designed next built structures’ character, reminding ‘regular’ constructions. Besides, most of the so-called irregular castles may have been built, not as T. Torbus had wished, within one building action, till the end of 13<sup>th</sup> century, but at least during several decades, and the youngest construction were added in the times when classic ‘regular fortresses’ were being built in the region. Excavations in Grudziądz, therefore, confirmed that this irregular object had been erected gradually, not during one constant building process, but as a sequence of smaller or bigger building actions, fulfilled up until 15<sup>th</sup> century.

The other situation is reported in cases of the castles in Papowo Biskupie and Radzyń Chełmiński. The first had been from the very beginning the effect of a carefully planned building process, supervised probably by one builder/architect, who carefully designed the compositions of all rooms and the facade height. The building of Radzyń castle was performed probably in similar way, where the main works were preceded by careful and logistically complicated leveling works to raise the surface and adjust it to building purposes (the upper castle), to all requirements, planned by the architect during the design preparation.

Wąbrzeźno castle research results brought information that the former residence of the Chełmno bishops, from the 2<sup>nd</sup> half of 15<sup>th</sup> century, similarly to other fortresses discussed above, inhabited by Polish starosts, indicated that leveling works could have been as intense as in Papowo and Radzyń, although the fortress was erected in the 1<sup>st</sup> half of the 14<sup>th</sup> century and is qualified as an example of younger Teutonic Order defensive structures. Architectural details confirmed the poorer quality of the building workshop and leveling works were performed only in a part of the yard and more intensely within the ‘parcham’, moat and the ward area.

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### **Bogusz Wasik – Marcin Wiewióra: Stavební techniky hradů v řádovém státu německých rytířů v Prusku založené na příkladech vybraných řádových domů v oblasti „ziemia chełmińska“ (historický region okolo města Chełmno)**

Konstrukce fortifikací Řádu německých rytířů patří k jednomu z nejvíce fascinujících architektonických a uměleckých fenoménů dob od 2. poloviny 13. století do první poloviny 15. století. Cihlové hrady byly postaveny v rámci široce plánovaných a dobře připravených stavebních akcí, jejichž výsledkem byly desítky opevněných staveb na území řádového státu. Nicméně je nutné konstatovat, že mnohé problémy týkající se zejména chronologie vzniku jednotlivých hradních staveb, stavebních fází a technik výstavby, nebyly dostatečně poznány až do počátku 21. století. Tato neuspokojivá situace se zlepšila v současné době, kdy se rozbíhá systematický archeologicko-architektonický výzkum zaměřený na opevněné struktury Řádu německých rytířů. Od roku 2005 je řešen na archeologickém ústavu toruňské univerzity Mikuláše Koperníka dlouhodobý vědecký projekt s názvem Hrady Chełmińska, jehož hlavním cílem je odpovědět na tyto otázky spojené s historií těchto cihlových pevností stavěných od 2. poloviny 13. století v jihozápadní části bývalého státu Řádu německých rytířů. Výsledky nedávných archeologicko-architektonických výzkumů v několika

místech této oblasti přinesly množství poznatků, které ukazují, že se stavby hradů v různých obdobích lišily nejen po stránce architektonických forem, ale také v užití stavební techniky a jejího procesu. Ve světle nedávných studií je tak obtížné shodnout se například s výklady chronologických změn hradních forem (od nepravidelných k pravidelným) a tím i s dosud stanovenou relativní chronologií jejich vzniku.

Archeologicko-architektonický výzkum provedený na čtyřech lokaliích přinesl nejen nové informace týkající se forem opevnění a staveb, osvětlil i funkci jednotlivých prostor, jejich rozmístění uvnitř hradu, ale přispěl i k hlubšímu poznání materiální kultury. Zejména však otěstoval mnoho dosavadních otázek a názorů, které se týkají architektury Řádu německých rytířů. Výzkumy přinesly nová data a informace, které byly konfrontovány s nepřesnými a neúplnými informacemi, které se stále objevují v literatuře (a často pocházejí ještě z konce 19. století) a pomohly tak dokreslit obraz této architektury.

Zcela zásadní z pohledu stavební techniky byla zjištění týkající se stavebních fází, etap výstavby a charakteru a rozsahu stavebních prací, a to od přípravných prací, budování hradeb a jiných fortifikačních prvků opevněného komplexu (parkánu atp.). Všechny dosud získané informace ukazují, že schematické pojetí navržené T. Torbusem týkající se vývoje hradů Německého řádu, který je rozdělil na starší nepravidelné hrady postavené od druhé poloviny 13. století a mladší struktury – pravidelné hrady postavené na území Řádového státu od konce třináctého století do přelomu 13. a 14. století, nebylo zcela potvrzeno.

Je pravda, že starší cihlové hrady (např. Grudziądz) byly postaveny za komplikované politické situace, během nejintenzivnějších bojů s Prusy. Z toho důvodu odpovídalo i použití nejjednodušších nepravidelných stavebních forem, které pouze odpovídalo dobovým možnostem a logistickým potřebám státu. Příklad hradu Grudziądz je zajímavý z několika důvodů. Zaprvé se ukázalo, že stavební aktivity nebyly doprovázeny většími terénními úpravami – terén v oblasti parkánu a nádvoří nebyl ani zvýšen, ani vyrovnán. Zjištěno bylo jen, že v severní části parkánu proběhlo menší srovnání terénu (písečný násep) aby se zaplnila prohlubeň mezi návrším kopce, kde byla postavena věž zvaná Klimek, a přírodním vyvýšením terénu v severovýchodní části. Zadruhé – výsledky studie jasně ukazují, že stavební práce byly vykonávány po etapách: nejprve byla postavena budova hlavního jižního křídla hradu, která byla jako jediná funkční ve struktuře horního hradu až do konce 13. století. Později, ve 14. a 15. století, byly do parkánu systematicky přidávány další cihlové stavby plnící funkci provozního zázemí, ale i funkci obytnou. Za pozornost stojí také fakt, že jak na hradě Grudziądz, tak na ostatních hradech tohoto typu můžeme pozorovat, že s postupem času se jednotliví stavitelé snažili přizpůsobit „nepravidelný“ půdorys novým možnostem a současným tendencím a navrhovali později postavené stavby tak, aby svým charakterem připomínaly „pravidelné“ struktury. Kromě toho, většina takzvaných „nepravidelných“ hradů, která měla být postavena v jedné stavební akci do konce 13. století, jak se domníval T. Torbus, byla postavena minimálně během několika desetiletí, přičemž nejmladší části byly budovány v dobách, kdy se již stavěly klasické „pravidelné“ hrady. Vykopávky na hradě Grudziądz potvrdily, že tato nepravidelná stavba byla stavěna postupně, ne během jednoho nepřetržitého stavebního procesu, ale jako řada menších či větších stavebních akcí trvajících až do patnáctého století.

Rozdílná situace je zaznamenána na případech hradů v Papowo Biskupie a Radzyń Chełmiński. První byl od samého počátku pečlivě plánovanou stavební akcí, na kterou pravděpodobně dohlížel jeden stavitel/architekt, který pečlivě navrhoval celou dispozici i výšku průčelí. Stavba hradu Radzyń byla pravděpodobně provedena podobně a hlavním stavebním pracím předcházely pečlivé a logisticky komplikované terénní úpravy, kdy došlo ke zvýšení terénu a jeho úpravě pro následnou stavbu horního hradu, a architektem byly během vypracování návrhu stavby zohledněny i všechny další požadavky.

Výsledky výzkumu na hradě Wąbrzeźno přinesly informace o tom, že bývalá residence biskupů ve městě Chełmno od druhé poloviny patnáctého století, podobně jako ostatní výše diskutované objekty, ukázaly, že zde terénní úpravy mohly být stejně intenzivní jako na hradech Papowo a Radzyń, ačkoliv hrad byl postaven v první polovině čtrnáctého století a řadí se mezi mladší příklady opevněných staveb Řádu německých rytířů. Architektonické detaily se však vyznačují horší kvalitou zpracování a terénní práce byly provedeny pouze na části nádvoří a intenzivněji pak v oblasti parkánu, hradního příkopu a křídla hradu.