

# The System of the Plan Compositional Principles of the Gothic Town Building in the Grand Duchy of Lithuania

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**Abstract**—In the XVI-XVII centuries, the territory of modern Belarus in the Grand Duchy of Lithuania had a widespread geometrical organization of the urban structures. In the base of regular formation there was a use of urban planning principles of Western Gothic of the XIII century. In the following centuries they have transformed according to the urban regions of different typology and have developed simultaneously with the Renaissance system of spatial forms. In this study, for the first time the analysis was performed and the principles of the creating of planning compositions of small urban settlements were found. Among the basic principles there is a paradoxical synthesis of the old Russian hierarchical structure of the fortified areas and the medieval German-French and Italian design of the formation of street network.

**Keywords**—urban planning; regular plans; Gothic; middle Ages

## I. INTRODUCTION

The Grand Duchy of Lithuania has existed in the late Middle Ages, Renaissance and Enlightenment. The evolution of the cities included urban planning of ancient Russian Genesis, as well as the regular urban development brought from Western Europe. Later they were associated with the Baroque, Renaissance and Classicism.

The geometrical layout of the cities of the XIII-XIV centuries has been called Gothic in the foreign historiography. This is connected with the concurrent development of Gothic architecture. There are common signs of Gothic planning forms, used in different countries:

- the general idea of the spatial organization of the city or its large area;
- regularity of the structure, widespread use of straight streets and other planning boundaries;
- often rectangular or square configuration of the city;
- orthogonal system of blocks;
- rectangular or L-shaped shopping square — the middle core of the city plan with eight or less streets, moving away from the corners; the streets were the extensions of the sides of the square; the placement of

the most important civil and religious buildings in the inner space of the square;

- the gravitation of compositional axis of the square not toward the center, but to its sides;
- the trend of joining two streets to the corner of the square not by all its width, but only by part, for maximum lengthening of the occupied side of the building area.

## II. THE HISTORICAL PROCESSES OF THE DEVELOPMENT OF REGULAR TOWN PLANNING OF MEDIEVAL GENESIS

The Gothic style in urban planning had originated in the South of France, where, according to Albert Brinkman (Berlin, 1920), its first manifestation was the city of Montauban [1]. By the beginning of the XIII century the numerous small fortified settlements, the so-called bastides, were constructed in the river valley of the Garonne. The primary paradigm there also was the French fortress city of Monpazier [2]. Pierre Lavedan (Paris, 1926), Marcel Poet, Joseph Gantner (Vienna, 1928), without denying the compositional factor, explain the origin of the rectangular plan by the legislative regulation of land plots during the settling of the burghers on the plane terrain [1].

In the XIII-XVI centuries the regular town planning of medieval origin spread throughout the Europe, sometimes existing simultaneously with the Renaissance forms. In Poland Gothic plans first appeared in Silesia and Pomerania and beginning from the XIII century moved East. The geometrized layout is peculiar to the territories of the ancient Russian Galician and Vladimir-Volyn principalities, for example, Lvov. In the ethnically Belarusian region rectangular layout had spread only in the second half of the XVI century, after the unification of the Grand Duchy of Lithuania and the Polish Kingdom into the Commonwealth.

As the customers of the creation of the regular structure of a settlement on free or engaged district there acted the Grand Duke and the richest magnates that held high administrative and military positions in the country. They received a brilliant education in universities, academies and collegiums of European capitals — Rome, Munich, Leipzig,

Bologna, Koenigsberg, Krakow, Vilna, had large library collections and was familiar with the achievements of world architecture.

The most famous representative of the Radziwill family, the owner of Nesvizh Nikolai Christopher, became famous for his special knowledge and patronage, a huge contribution to the development of urban planning. At his court there worked the Italian architect Giovanni Maria Bernardoni. In the 1580s-1590s he had created the first paradigm of the Renaissance city in the Belarusian lands - Nesvizh as an example of the Renaissance planning structure and spatial composition of the settlement.

The representatives of magnates of the names of Radziwills and Sapiehas had the title of the Prince of the Holy Roman Empire, given by the German emperors. Note that useful for exploitation a rectangular medieval layout to the greatest extent was distributed in Germany. In the ideological program of large feudal lords there was bringing their estates to the European level, the creation of progressive modern settlements.

For example, there is a reasonable assumption in the literature, that the author of Sapiehas castle of 1598-1606 in the city of Ruzhany — the residential capital of this family — could be a Florentine architect and sculptor Santi Gucci [3]. The plan of the first floor of the Ruzhansky castle almost completely repeats the plan of the lower floor of the Myshkovsky castle of 1585-1595 in the town of Grand Duke (Poland), built according to the project of this famous Florentine master [4].

Identical are not only floor plans, but also the organization of the surrounding urban space. Both buildings are located on a hill, have a large yard in front of the main facade, and the opposite facade faces the urban area located below. The difference lies only in the orientation of the axis of the castle complex: North-South in Ruzhany and East-West in Grand Duke [5]. Both castles, close to the time of construction, were striking examples of mannerism in the architecture of such buildings in the Commonwealth. It should be added that the creativity of S. Gucci in Belarus is known for his works in the Old Castle of Grodno [6] [7].

The invitation of Italian masters by large magnates for the construction of not only buildings, but also residence cities was quite common. These processes represented a remarkable interaction of the wealth of feudal authorities and the creative architectural forces. Probably, such interaction genetically comes from the Italian city-states of the Renaissance, and later from the States in the territory of modern Italy.

Sapiehas were the second largest magnates after Radziwills. Therefore, we can assume that they have implemented the concept of a new city by the project of the Italian master, creating a certain competition to Radziwills in cultural and socio-political terms. So, the author of the reconstruction of freely formed, irregular structure of Ruzhany of the XV century could be S. Gucci that had developed the project of redevelopment of the city after the design of the castle or simultaneously with it.

### III. THE PROPERTIES OF THE PLANNING ORGANIZATION OF URBAN SETTLEMENTS

The result of this study was to develop a scientific understanding of the regular urban planning of the XVI–XVII centuries as a phenomenon of national architecture in the context of the art of planning in Europe. Within the boundaries of the central region of the Grand Duchy of Lithuania there are revealed the typological, genetic, functional, structural, compositional and stylistic properties of small urban settlements as the achievements of the medieval culture.

Methods of creation and reconstruction of the cities were the following:

- the formation of a new or transformation of the existing settlement, which had a freely formed layout, and the organization of an integral regular structure throughout its territory;
- the reconstruction of the main square and adjacent streets on a geometrized basis with the preservation in the rest of territory the irregular structures of ancient Russian origin of different typologies;
- modification of the peripheral area on a regular basis with preservation of freely developed planning in the rest of the territory, including the public center.

The regular cities of medieval genesis were divided into groups according to the number of the lines of fortifications:

- the cities with two belts of fortifications, accordingly, around the citadel (Detinets), later the Top castle and the surrounding town, later the Lower castle; the regular rectangular structure is always formed outside the belts of fortifications, in the Posad of the ancient Russian city;
- the cities with a single line of fortifications around the castle (formerly Detinets) and a rectangular structure in the territory of Posad;
- the towns without a belt of fortifications with a rectangular structure.

It should be noted that in the period under consideration the influence of Western European architecture determined the loss of the East Slavic principle of the hierarchy of the city, reducing the importance of residential areas and their dominants according to the scheme: Detinets — the surrounding city — Posad. In the periphery of the settlements there appeared large-scale temples that exceed the buildings of the center and change the functional organization and the composition of the city as a whole.

A typical feature of the planning of residential areas is the elongated shape of blocks with a ratio of sides from 1:1 to 1: 7.6, caused by the placement of estates in the form of long strips with the front side on the longitudinal streets, as well as the extensive connections within the city and a small number of cross streets. By the primary patterns for the realization of such features there served the medieval cities of Europe.

The signs of Gothic town planning did not exclude the initial influence of the Renaissance, namely: the elements of centrality in the composition of the main square — the central placement of the dominant, the orientation to it of an

important street, leading to the square; and as a feature of mannerism — the trace of several almost parallel streets with their axes converging far outside the settlement.

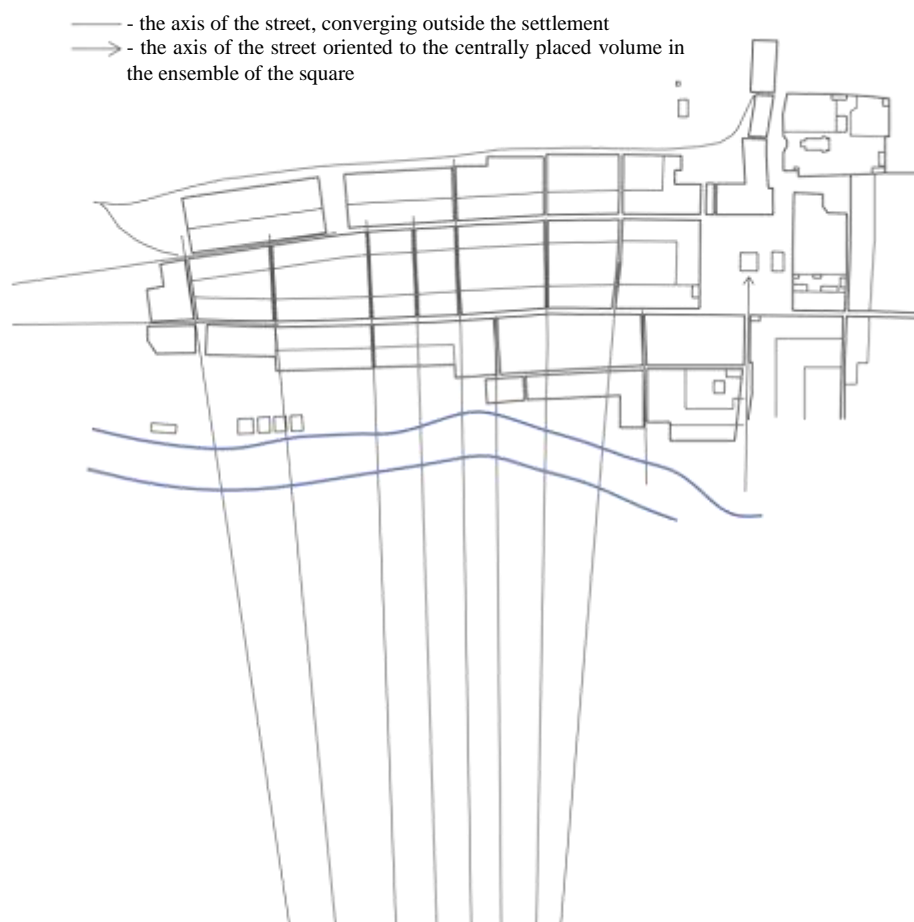


Fig. 1. The Renaissance elements of the composition in Gothic structure (for example, the town of Stolbtsy Novgorodskogo Voivodeship of the Grand Duchy of Lithuania).

For example, in the XVI century in city of David-Gorodok of Brest province the Queen Bona Sforza from Milan or, more likely, Albrycht Radziwill held the redevelopment of the city. The rectangular scheme of streets had closely surrounded the Upper and Lower castles from all sides, by its placement obviously repeating the zone of distribution of the ancient street network of the East Slavic character. Probably, the renovation had retained some of the old radial roads, which were cleared and entered the new correct scheme.

Judging by the plan of the city of 1798, the line of continuity in relation to the old Russian structure there was the wrong polygonal contour of the city, resembling a semicircle [13]. Perhaps the regular redevelopment of the early XVII century gave the city a rare, ordered polygonal shape. Another hypothesis can serve as a statement about the

creation during the reconstruction the rectangular shape of the settlement, which is characteristic to the Gothic scheme.

The correct outline of the plan, as was observed in other cities, had transformed in connection with the trend of gradual loss of regularity during the XVII-XVIII centuries.

Some of the streets of David-Gorodok were designed with the violation of a general parallelism. As a result, outside the residential area at different sides from it as a manifestation of mannerism it can be recorded the three centers, or zones of visual convergence of communication axes. This is also observed in the other towns, for example, Stolbtsy in the Novgorodsky province (see "Fig. 1" and "Fig. 2"). The entire structure of the settlement should be identified as regular, rectangular, but devoid from "rigidity", formal monosemantic, bearing elements of picturesqueness in the interpretation of the details of plan.

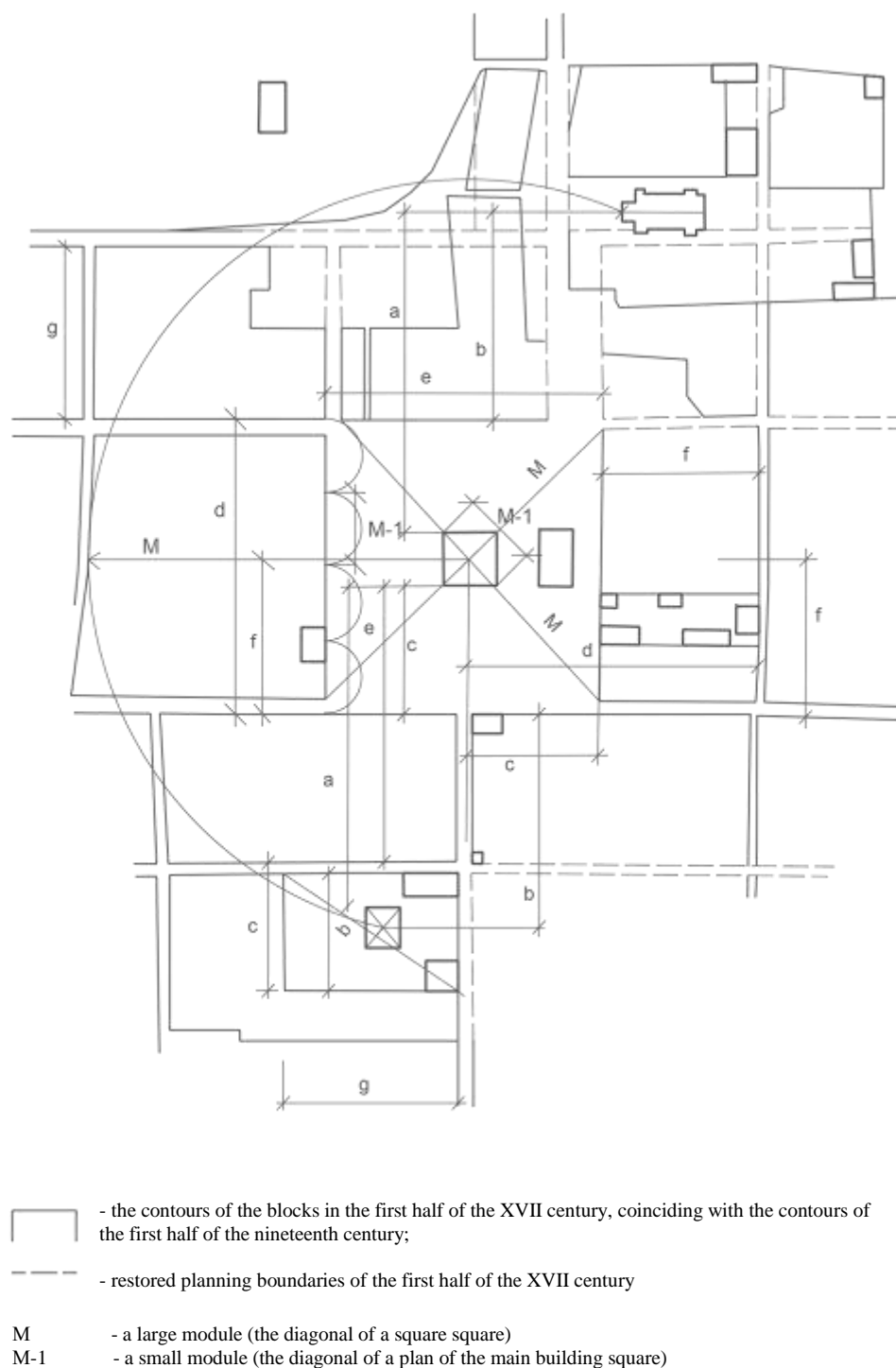


Fig. 2. Drawing of the fixing plan of the town of Stolbtsy in 1833 with the reconstruction of the lost elements of the plan of the first half of the XVII century. Proportional analysis of the planning composition of the public center.

There is also a remarkable property of some highways, which, being regular, with straight lines of blocks, were narrowed to the periphery of the settlement and had no external outputs. Probably, this rare feature was caused by the fact that the number of the inhabitants moving on this piece of the street, naturally gradually increased towards the

center, to the trade area. At the same time, the load of communication with pedestrian and horse-drawn traffic by the visiting population was not observed here, since the street did not have a continuation by the country road.

The comparison of planning structures of the cities in the second half of the XVI-first half of the XVII centuries with

the cities of the neighboring Moscow state and the Polish Kingdom reveals the peculiarity of settlements with regular planning of medieval genesis. Thus, the study has revealed the national feature of the Belarusian town — the combination in a single city structure the medieval castles with wooden and earthen fortifications in the territories of the old Russian Detinets and a roundabout city with a geometrized system of streets and squares of the Western European model in the territory of Posad. In addition, the organization of spatially open squares in the Gothic tradition is also a national feature of urban development in XVI-XVII centuries, unlike Western European closed regular squares and opens to the landscape irregular squares in the Russian cities.

#### IV. CONCLUSION

The result of the study is the functional, planning and compositional assessment of small towns and community centers as significant phenomena of material culture, including the pan-European urban planning ideology and the practices of diverse regional architecture.

In the XVI-XVII centuries the principle planning organization of the community center of small urban settlement with the regular structure of the medieval character was the diversity of the set of constituent urban elements, with their functional and compositional integrity forming the center. In this regard, the concept of the category of public center as a zone of concentration of socially important public facilities is clarified in the study for this historical period. The most complete and typical set of the town-planning elements for the center had included:

Upper castle (former Detinets) — the territory, in most cases in high relief, with palace, religious, civil, ordinary residential, economic and other buildings, surrounded by a line of fortifications;

Lower castle (formerly a roundabout town) — the territory, in most cases in high relief, usually exceeding the size of the Upper castle, with religious, civil, residential, economic and other buildings, surrounded by a line of fortifications;

complex of buildings, the multifunctional main square of a regular shape with a town hall, hotel, religious, commercial, residential and other buildings;

complex of buildings, the multifunctional synagogue square of regular outlines with religious, civil, residential and other buildings;

complex of buildings of a small, monofunctional pre-temple square of regular form with religious, accordingly Orthodox, Catholic or Uniate, and residential buildings; there may be several such urban elements;

public or industrial building or group of buildings located separately within the residential area of the city; several such urban planning elements are possible;

Complexes of residential and other buildings of streets — communication routes connecting the above elements of the public center.

In addition, the following principles of planning organization of the public centers are revealed (see "Fig. 3", "Fig. 4", and "Fig. 5"):

- professionally perfect choice of the location for the center in the urban landscape;
- differentiation of centers by the general nature of the structure depending on the relative position of the constituent elements, reflected in the typology: compact single-part, two-part, three-part; multi-part-linear, linear-nodal, T-shaped, cross-shaped, rectangular-branched;
- focus on creation of the architectural ensemble by the placement and further formation of a new regular area in the territory with a freely formed layout (orientation of the axis of the new square to the existing castle towers far away from the forum; disclosure of the space of a coastal square to the castle in the opposite bank; etc.);
- differentiation of multifunctional squares by the nature of the internal space (rectangular, trapezoidal and L-shaped configuration) and by the features of the composition of adjacent network of streets (types: "classic", symmetrical four-street, symmetrical six-street, asymmetric, H-shaped, adjacent, centrally symmetric, "sacral", complicated asymmetric);
- comprehensive geometrization of the planning composition, the embodiment of the idea of regularity at the large-scale level of the public center and its fragments;
- equality of the most important linear values of the plan, including the method of creating a plurality of paired dimensions of homogeneous or heterogeneous elements;
- the use of base, or "general " points of geometric construction, which determine the system of formal links between the elements of the center layout;
- the use of two modules — large and small, aimed to the ordering of the planning composition; in establishing the multiplicity of linear quantities there is the tendency to use the numbers four and five;
- "circular" regulation, the use of speculative circles, uniting the important points of construction;
- the use of concept the "living square" in the configuration of main urban squares, which was also common in other countries in the planning works of Middle Ages;
- the use as measures of length units known in the Grand Duchy of Lithuania — Lithuanian fathom and rod;



- the use of "consonances" — integer values of length measures, in the basic planning relations of the elements of the centers.

The regularities of the planning organization of small Gothic urban settlements revealed in the research allow asserting the action of the primary foundations of the national system of professional urban design in the studied

era with the subsequent implementation of design solutions. This system was carried out by the state power in the Grand Duke cities, and in private — by wealthy feudal lords, with the involvement of experts in the field of architecture and land surveying.

- graphic technique illustrating the modularity of the planning composition and other geometric features of the construction;
- outline of the internal space of the square occupied by the town hall and shops;
- the ruins of a stone building on surveying 1980

Z-base point;

A-module a (smaller diagonal area);

B-module B (West side of the square with the inclusion of street widths);

R1, R2, R3- the radius of the circles described from point Z;

C-large diagonal area

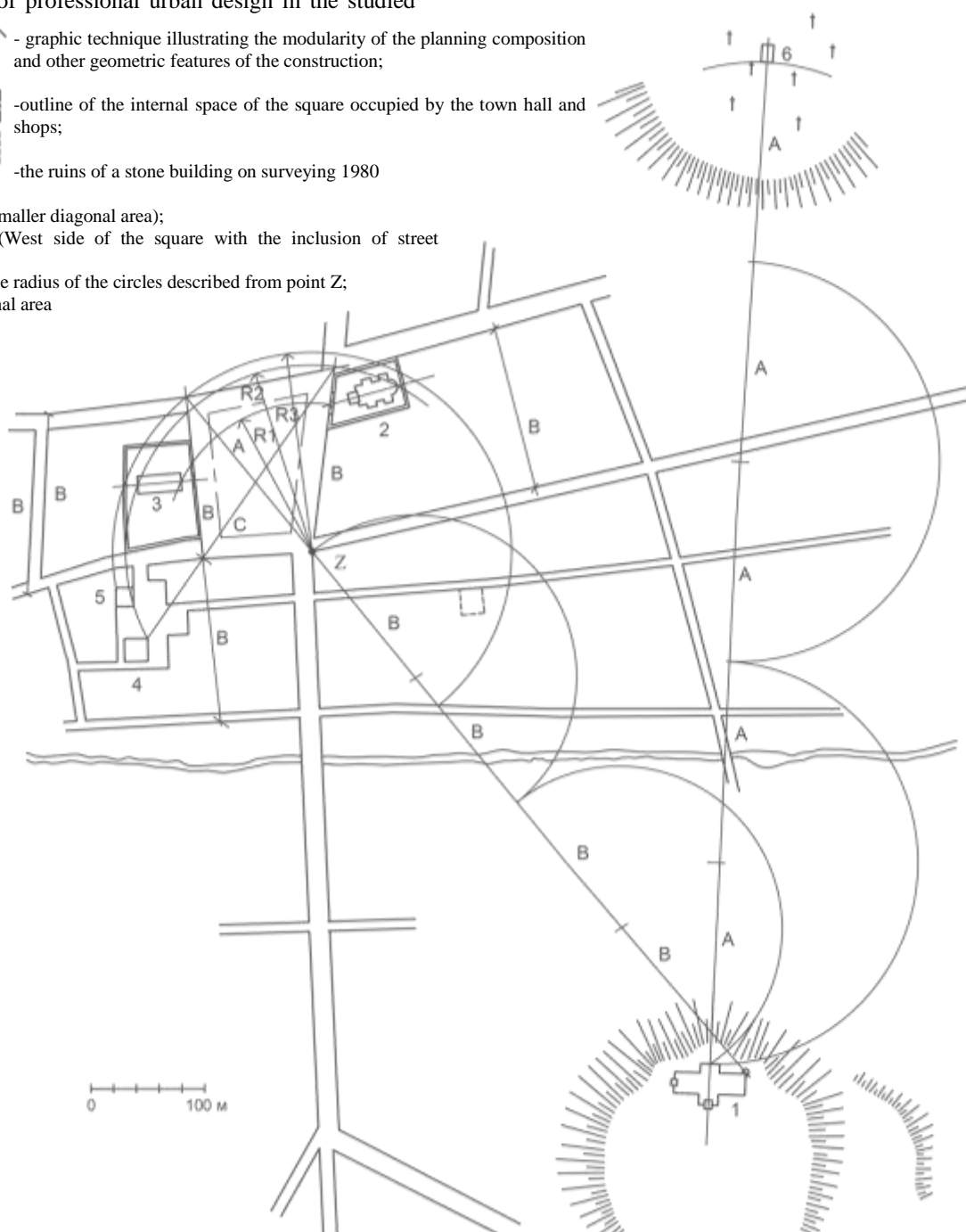
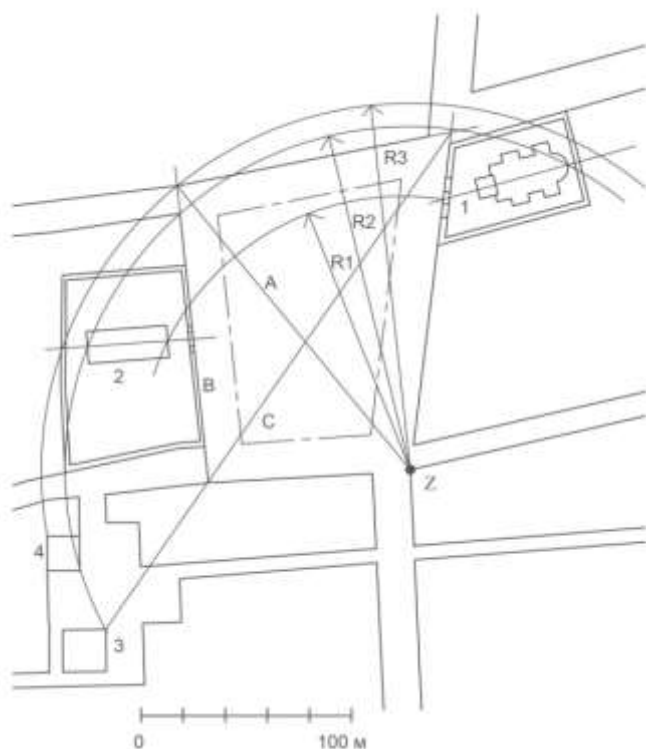


Fig. 3. The graphic reconstruction of the plan of the central part of the city of Ruzhany Novogorodskogo Voivodeship of the Grand Duchy of Lithuania at the beginning of the XVII century.

<sup>a</sup> 1-the main building (1598-1606) of the castle complex, presumably, arch. Santi Gucci, 2-Church of St. Trinity (1596, 1617) of the monastery of the dominicans; 3-probable outline of the walls of the parish wooden church of St. Peter and Paul (1568 on the site of the stone church of 1762-1779 monastery basilianov); 4-synagogue (on the site of the synagogue of the XVIII century.), 5-school (on the site of the school of the XIX century.); 6-cemetery church (on the site of the church of St. Casimir 1792).



- graphic technique illustrating the modularity of the planning composition and other geometric features of the construction;

-outline of the internal space of the square occupied by the town hall and shops;

Z-base point;

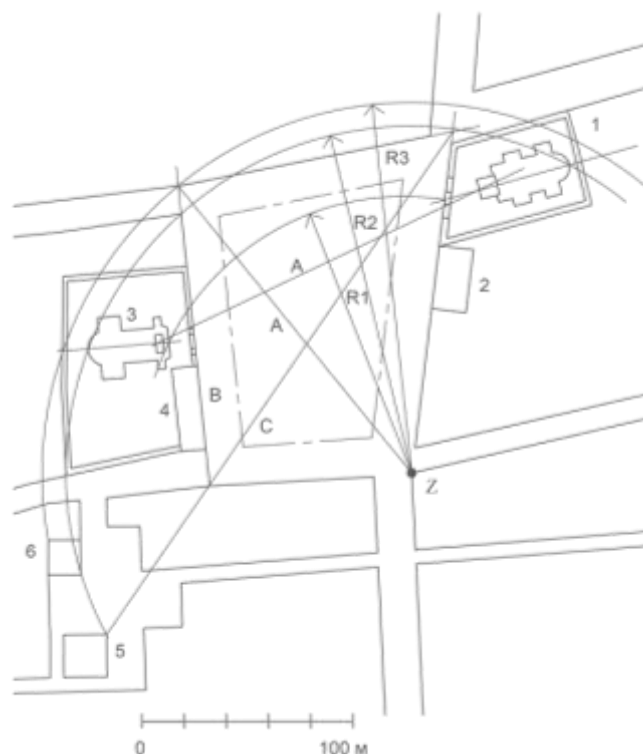
A-module A (small diagonal of the square);

B-module B (west side of the square with the inclusion of street widths);

R1,R2,R3- the radiuses of the circles described from point Z;

Fig. 4. Graphic reconstruction of the plan of the ensemble of Ruzhany squares at the beginning of the XVII century.

- a. 1-the church of St. Trinity (1596, 1617) of the monastery of the dominicans; 2- probable outline of the walls of the parish wooden church of St. Peter and Paul (1568 on the site of the stone church of 1762-1779 monastery basilianov); 3- synagogue (on the site of the synagogue of the XVIII c.); 4- school (on the site of the school of the XIX c.).



- graphic technique illustrating the modularity of the planning composition and other geometric features of the construction;

-outline of the internal space of the square occupied by the town hall and shops;

Z-reference point;

A-module A (small diagonal of the square);

B-module B (west side of the square with the inclusion of street widths);

R1,R2,R3- the radiuses of the circles described from point Z;

C-large diagonal of the square

Fig. 5. Graphic reconstruction of the plan of the ensemble of Ruzhany squares at the beginning of the XIX century.

- a. Dominicans monastery: 1- the church of St. Trinity (1598, 1617, 1768, 1779, 1787, 1850, 1981); 2- residential building (beginning of the XIX c.); Basilian monastery: 3- church of St. Peter and Paul (1568, 1762-1779); 4- residential building (1675, 1784-1788); 5- synagogue (the end of the XVIII c.) 6- school (XIXc.).

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