Construction of cities of Volga-Kamsky region of mid-XVI-XVII centuries

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Abstract. The article reveals the main methods of construction of medieval cities of Volga-Kama region of the XVI-XVII centuries on the example of regional city-fortresses (Sviyazhsk Simbirsk, Korsun, Alatyr, Kurmysh, Laishve, Tetyushi, Tsarevokshaysk, etc.). Statistical materials on Volga cities and villages of Kazan province were used for the study. The analysis of territorial zoning of watch wooden forts of Volga-Kama region was carried out. The basic planning, compositional and constructive methods for constructing cities of the studied region in the context of historical, architectural, archaeological and archival sources are revealed.

The significance of the results for architecture lies in the study of regional architectural objects. The method of research can be used in scientific restoration and reconstructive work, in museum practice. The technique of study will find application in the educational process of architecture students when collecting, systematizing and analyzing historiographic, archival, archaeological and natural sources on the cities of Russia and Kazan Krai, when using the system of proportion of a certain historical period, when recreating the architectural image of the reconstructed object within the established chronological, stylistic and territorial framework.

Keywords: city, fortress, grad, plan, composition, constructions.

1 Introduction

The object of the research of this article is medieval cities-fortresses of Volga-Kama region. The question of the process and specifics of the formation of the cities of the Kazan region of the XVI-XVII centuries is certainly important in the study of the history of regional architecture.

The interdisciplinary nature of the problem defines architectural research of cities in historical, architectural and urban planning, archaeological and cultural aspects [1-2]. Certain historical and archaeological and ethnocultural studies of the cities of the Volga region are presented in the works of A.G. Sitdikov, I.L. Izmailov, L.A. Vyazova, E.V. Ponomarenko [3-4]. Scientific graphic reconstructions of lost cities and settlements of Kazan Krai are essential, allowing to recreate objects of historical and architectural heritage and to save them in virtual space for subsequent generations. Issues of reconstruction of historical, cultural and architectural objects of Tatarstan were touched upon in the works of R.H. Khramchenkova, L.H. Kadyirova, K.I. Musina, G.R. Akhmetshina. The authors set separate tasks of reconstruction of historical and cultural landscape in the context of design students training [5-8]. Issues of preservation of regional architecture are relevant in the museum and tourism sphere. This is evidenced by the world and regional experience of studying museum practice [9-11]. There are studies on the development of the museum and tourism sphere of the Republic of Tatarstan in the context of the history of culture and in the context of the history of the region in the works of L.I. Galimov, B.M. Eidelman, L.R. Fahrutdinova [12-15].

Separate information about Russian medieval cities and their objects is available in historical and
architectural literature. It describes the preserved ancient wooden and stone towers and churches. E.V. Khodakovsky considered Russian wooden architecture on the example of church architecture of the Russian North and revealed the most common space solutions in church wooden architecture. At the same time, in the collective monograph, the historical wooden architecture in Europe and Russia is presented using archaeological and archival sources [16, 17]. W.K. Brumfield explores the history of Russian architecture and the problem of preserving the ancient architecture of the Russian North [18, 19]. Sergey Zagraevsky gives typological forms and basic classification of ancient Russian temples of XI-XVII centuries [20]. Some studies consider the designs of the vaults of churches of Europe and Russia of the later period in the context of restoration projects [21-22]. However, this literature does not comprehensively consider the techniques of building medieval cities-fortresses of Volga-Kama region of the XVI-XVII centuries.

Wood is not a durable material; therefore, the medieval cities of Volga-Kama have practically not survived. Considering the ancient manuscript and graphic materials of the XVI-XVIII centuries about the cities of the Volga-Kama and other areas of the Russian state, it is advisable to identify the main methods of their construction.

2 Materials and methods

The method of research will require the involvement and analysis of historiographic, archaeological and archival sources across the medieval cities of Volga-Kama region.

Most medieval county cities of Volga-Kama region of the XVI-XVII centuries can be classified as a type of small watch fortresses with a wooden structure. Only the Kazan Kremlin had woodcam designs in the late XVI century. To the limestone wall from the rear side were attached wooden structures [23]. The Kazan fortress of 1675 is described as a «stone city» with 13 towers and the adjacent territories as a «wooden city» [24].

Grad Sviyazhsk, built in 1551, was the first stronghold of Moscow in the possession of the territories of the Kazan Khanate. The city is located on a hill near the Sviyaga River. The spatial position influenced the addition of Sviyazhsk planning shape. Repeating the outlines of the mountain, the fortified walls of Sviyazhsk acquired, close to the semi-circular shape, a planning configuration. According to the book of Sviyazhsk in 1565-1568, the city included the Sviyazhsk fortress, adjacent territories – «posad» and settlements («slobody» – territory outside the fortress). The documents point to the square at the main Christmas Gate, two monasteries, six churches, streets and dead ends, as well as to the service yards and yards of the clergy (total number of buildings 375) [25, p. 338-389]. Following the rules of the city the plan of Sviyazhsk was first outlined on the ground, and then a priest was invited. The planned sections of walls, church and residential zones were consecrated [26]. In order to establish the location of yard areas, different reference points are used in written documents: town, portal places, «vezhi» – towers, river, swamp, other yards and various indicators. Street places and yard zones are marked: «the shooting yard is empty, and against it three places are empty» [25, p. 338-389]. The words «against», «behind», «below», «between», are used, which is likely to indicate an irregular layout. At the same time, some ordinary elements are often described in the city plan: «And from the Tatars yard to the big row... Yes from the big row to the left to the marsh....» [25, page 367, 384, 385]. Apparently this, the location of yards according to «dlinniku i poperechniku» – i.e. breakdown of yard plots in the ordinal system in Russian cities XVI-XVII centuries [27]. Relying on the layout of Sviyazhsk XVIII century, there is a fan layout formed by the aspiration of streets to the south-eastern planning node - Trinity-Sergei Monastery [28]. On the eastern side of Sviyazhsk, outside the fortress, bargaining was located. In the surrounding area are craft and trading yards with 700 houses. On the three streets of «posada» there were four churches («posad» – the territory near the fortress) [29, p. 15]. Outside the «posadskoj» territory, near the Sviyaga River, 5 settlements were arranged – «slobody», in the form of significant settlements [25, p. 387]. In general, there is an irregular planning system of the ancient fortress city of Sviyazhsk.

Plan of Sviyazhsk, of course, was displayed on his composition. Massive defensive walls together with eighteen fortress towers formed a dominant composition in the environment. The successful
placement of the fort on the mountain greatly enhanced the visual perception of the fort. According to the images of Sviyazhsk of the XVIII century, the prevailing cult buildings had an axial location and completed the composition on two sides of the city. So cult dominants created a three-component silhouette composition of the fort. Temples on the territory of «posada» were located on the mountain northeastern slope of Sviyazhsk, also forming visual dominants.

At the same time, written books contain information about the construction of the Svoyazhsky fortress, in particular, about the fortress walls of the «gorodnyami», about the shape of the towers and the presence of «oblamnyh» ledges in the defensive fortifications [25, p. 338-389]. «Gorodni» – log cabins tightly joined to each other, loaded with earth and stones. «Oblamy» – a ledge for the introduction of battle at the foot of the walls. The towers in the Sviyazhsky fortress had a quadrangular, hexagonal and octagonal shape. At each level of the defensive walls and towers there were special holes for firing – strelnicy [29, p. 9, 12].

Sviyazhsky adjoining territories were fenced with a picket fence «tyn» – vertical sharp beams [29, p. 14]. «Tyn» was used not only in suburban fortifications, but also in the Volga-Kama fortresses themselves. This is evidenced by the scribe records of Kurmysh 1623-1626 [30, p. 10]. The traveler A. Oleary in 1638 recorded that the Tetyushsky grad is surrounded not with a wall, but with a «chastokol» (a piling wall) - «tyn» [31, p. 197]. The Rospinsy list of 1702 announces the information about the Talskaya fortress as part of the Simbir protective line of the mid XVII century with reinforcement «tyn» (RGADA, F. 396, Op. 3, d. 53, l. 66).

The location of the forts corresponded to the best landscape-natural and fortification situations. For example, Arsk was located on a triangular section formed by the mountain shore of the Kazanka River and the ravine [32]. Alatyr was erected on a high plot among two rivers [33, p. 12]. Kurmysh was located on the high bank of the Sura River [30, p. 2]. Similarly, the Tetyushshkaya fortress rose above the Volga level by almost 152 m. A large part of the Cheboxar fort built at the Volga Bank settled in the zones of three mountains, and the smaller one was in the lowlands [34]. The location of Laishev was formed by the coast of the river Kama and a steep ravine [35]. The forms of plans for fortified cities were formed according to natural conditions - rivers, mountains, ravines, etc. Thus the direction of the protective walls of Arsk was developed, prominent on the plans of 1789 and 1796, near the river and ravine. The fortress plan received the outline of an irregular triangle. So the fortifications of the XVI century Tsivilsk were formed, the wrong quadrangular configuration of Alatyr and Tsarevokshaysk and the shape close to the trapezium of Cheboxar and Kozmodemyanska [36, p. 12]. The guard forts Korsun, Urensk and Tagai of the mid XVII century received rectangular outlines [37, p. 15]. Many Volga-Kama cities of the XVI-XVII centuries consisted of a fortress, adjacent territories – «posad» and settlements – «slobod». Such zoning of the territory corresponded to the class differentiation of residents. The military and nobles usually lived in the fortress. On the adjacent lands lived peasants and artisans, obliged to pay taxes – «tyaglo» [38].

All kinds of sources deliver fragmented information about the internal layout of the forts of Volga-Kama region XVI-XVII centuries. They set out the main composition of the structures on the territory of the cities. These are temples, casemates, house buildings, as well as numerous yard areas. Periodically streets make a reservation. Various pointers are present to establish the location of the yards. For example, Laishev written records of 1567-1568 describe the presence of two wooden churches on the city square between the Nikol and Water Gates, the existence of a large street, the court of a priest at church buildings, and a church between the fortress and the «posad» [25, p. 392-395]. In addition, on the unsystematic plans of Cheboksary, Kozmodemyansk, Tsarevokokshaysk, Tsivilsk and Laishev 1789, sections of different irregular shapes are observed, separated by unsystematic streets. The plans of Arsk in 1789 and 1796 show some structures in the city center. Similar fragmentary data on the internal layout of the forts of Simbirsk, Korsun, Kurmysh and Alatyr of the XVII century are also contained in topographic descriptions of the cities. In particular, in the topographical statement of the Simbirsk province of the second half of the XIX century, it is mentioned that in the territory of Simbirsk in 1648 there was a military yard, an earthen chamber – a place to guide the construction of fortresses, horse house a customs plot and shopping plots. In the central zone of the fortress was
Trinity Cathedral. It also talks about Sennaya Street in the direction of the northern Simbirsk wall [39]. Written records about the city of Korsun in 1685 contain information about the adjacent territory – «Posad». Close to the Korsunka River, military courtyards were located, as well as monastic land with three churches. On the other side, near the river Barysh, there was a church with plots of clergy and yards of gunners. Here are listed more than once «dlinniku i poperechniku» of yards [40]. Between the yards was a shopping area. The location of the trade area at the entrance to the city is described in the XVII century books of Kurmysh: «against large fortress gates, 25 trading floors...» [41, 496-500]. Apparently, such a location was occupied by the Alatyr bargaining of the XVI-XVII centuries, as statistical sources say about the residence of traders on the «Posad» lands of the Alatyr fortress. It is also known that a church, a military house, boyar houses, barns were built in Alatyr [33, p. 14-17]. Trading areas were also in the adjacent territories of Kozmodemyansk and Kasimov [42, 43].

Suburban squares with churches created a dominant composition near the walls of cities. For example, in the adjacent territories of the city of Kurmysh were located the Christmas Monastery and the Trinity Monastery. A cathedral and a small church were erected directly in the city [30, p. 9-11]. This formed a diverse visual perception of the city. The cathedral temple was in all likelihood the prevailing vertical dominant in the Kurmysh complex. According to historical and statistical data of 1844 on the Simbirsk province, a similar vertical dominant in the form of a church was in the Urensky city of the mid XVII century [41, p. 496-500]. The urban environment of Kozmodemyansk of the XVII century was dominated by the Trinity Church and a stone chapel built by the military in 1698. Other buildings of Kozmodemyansk were residential chopped development [31, p. 19-20]. A. Oleary also described wooden buildings in the Volga cities of the XVII century (44, p. 149). At the same time, in individual town books describes a small number of stone structures. Thus, in Sviyazhsk there is a stone temple, a forge beat and a cellar [45]. The Economic Notes of 1796 list stone church parishes in Tsarevokshaysk and a residential stone house XVI century. The surrounding lands («posadskie» land) became the location of three churches and various military and craft houses [36, p. 13]. Along with this, the Witsen engraving of 1682 depicts the Cheboksary city with numerous wooden churches, similar in shape to a defensive tower. At the same time there is a diagonal or triangular system of placement of accentuated cult constructions, as well as on images of Kazan, Sviyazhsk, Laishev, Yadrin and Civilsk of XVII-XVIII centuries. In the same way, the graphic sources of the XVII century, displaying, for example, Kozmodemyansk, Tetyushi, Cheboxary and Kasimov, make it possible to make sure that during the period under review the city and fortress had an identical concept, since the spatial perception of cities is dominated by massive defensive walls and towers.

For the study of the construction of wooden forts of Volga-Kama of the XVI-XVII centuries there are many sources, because the main construction methods were used in the construction of defensive structures, as well as cult objects and residential buildings. The basic formation in the wooden town planning was a rectangular cut – four horizontal logs connected in the corners. Each row of four logs was called – «venecz». Such system has also developed in multifaceted configurations of serfs. Mostly in the Volga-Kama cities, constructions with the remainder – «v oblo» were used. [44, p. 148-155]. Angular fastening was performed with the help of semi-circular recesses in brims [46, p. 9-11].

The walls of the fortified cities of Volga-Kama of the investigated period were erected by the method of so-called «taras». In this way, based on the data of the «stroelnoj» book of Simbirsk of the XVII century, forts were built as part of the Simbirsk defensive feature in 1650 (Simbirsk defensive line). Guard fortresses of the Old Zakam fortified line of the specified period were also built, according to the writing documents of N. Gladkov [47, 48]. «Taras» fortifications consisted of two parallel chopped walls connected with a given pitch by transverse walls. These structures are filled with earth and stone components. Part of the fence between the two transverse walls was called «tarasa». Above the «tarasynmi» walls there was an upper level of fighting stroke with a «oblamnym» ledge covered with a double-edged sling roof [49].

The structural construction of wooden defensive towers was also conditioned by the nature of the building material. Towers were shaped with four, six or eight faces of the «vencevoj» structure and possessed several tiers (two to five). Similar towers are shown on XVII century engravings by A.
Olearia and N. Witsen depicting the cities of Kostodemyansk, Tetyushi and Cheboxara. Square towers protruded beyond the defensive walls with two or one side. The hexagonal towers came out on three or four sides, and octagonal towers came out three or five. Overlapping towers – «bridges» were made of wood and fastened in «vencovyh» grooves [50].

The defensive towers were covered with a high pyramidal roof – «shatyor». Similar coatings are visible in engravings of the XVII century Volga-Kama cities Tetyush, Cheboxar, Kozmodemyansk and the Lower Volga region: Samara, Saratov, Tsaritsyn. «Shatyor» was erected in the same ways as the walls, only without residues, under the name «in the paw». Often, such coatings were built in a «v rezha» way – in a quarter of a tree, with a clearance. «Shatyor» often ended with a watchtower – the so-called «smotrilnej» frame construction [46, p. 32; 51].

3 Results

Thus, by identifying the main techniques of construction of the cities of Volga-Kama region of the mid-XVI-XVII centuries it is possible to indicate the following patterns of their creation. First of all, the planning boundaries of the fortified cities were determined by the topographic situation. Planning forms of cities evolved according to natural conditions - water flows, mountains, ravines. Most of the fortresses were located on elevations (for example, the location of Simbirsk, Sviyazhsk), on elevations between the rivers (the location of Alatyr, Kurmysh), on high banks of rivers (the location of Arsk, Tetyush, etc.). There were the following planning configurations of defensive fortifications: regular (configuration of the fortifications of Simbirsk, Korsun, Urenyska, Tagaya), «poligonalnye» – that is, regular polygonal (configuration of the fortifications of Arsk, Alatyr, Civilsk, Laisheva) and irregular (forms of fortifications of Sviyazhsk, Tetyush, Cheboksary. The organization of the urban complexes of Volga-Kamya was dominated by a three-part planning structure: fortress - «posad» - «slobody» – (territory outside the fortress) (in Kazan, Cheboksary, Alatyr, Laishev, etc.). Territorial zoning was consistent with the class differentiation of residents (accommodation in the fortresses of the military and noblemen, accommodation in the «posad» of artisans, peasants).

In the internal planning system of fortified cities, an irregular structure is noted with the location of yards according to «dlinniku i poperechniku» - i.e. breakdown of yard plots in the ordinal system. Quarters of various shapes (stretched, square, irregular) separated by unsystematic streets in Cheboksary, Kozmodemyansk, Tsarevokshaysk, Civilsk, Laishev were noted. The presence of pivotal streets connecting the entrance towers and oriented in the direction of the city walls (Laishev, Simbirsk, etc.). The location of churches in fortresses and outside the fortress at the city gates (in the «posadskoj» territory). Placing trades on the «posade» at the entrance zones of cities (in Alatyr, Kurmysh, Korsun, Kozmodemyansk, Kasimov) and in the zone of intersection of urban and «posadskoj» territory (in Sviyazhsk).

When analyzing the compositional organization of the Volga-Kama fortress cities of the middle of the XVI-XVII centuries, a significant influence of natural conditions on the spatial structure of cities was noted, in particular the prevailing arrangement of ensembles on hills in the direction of rivers and in areas of confluence of water flows (location of Sviyazhsk, Arsk, Alatyr, Kurmysh, Tetyush). Defensive structures in the form of horizontal lines of fortress walls and vertical towers created a visual accent in the environment. Location of dominant cult buildings on a diagonal or triangular arrangement system. It is noteworthy to add the composite structure of cities with dominant visual landmarks - cathedrals and churches, and a mass of separate closed spaces (typical enclosure of courtyards and squares at churches with fences and gates). The formation of the initial compositional structure of urban complexes in the «posad» territory through the location of dominant religious buildings, retail space and courtyard buildings close to the entrance fortress wall (in Korsun, in Kurmysh, in Kozmodemyansk, Tsarevokokshaysk, etc.).

By identifying the main constructive methods for constructing the Volga-Kama cities of the XVI-XVII centuries, the prevalence of «vencovoj» structure can be noted – four horizontal logs connected in the corners, each row of four logs – «venecz». Constructions with the remainder – «v oblo» were used, without residues – «in the paw», «v rezha» way – in a quarter of a tree, with a clearance.
Application of stone city fortifications with facing material made of limestone stone with laying of wooden ties (strengthening of Kazan fortress). The use of several types of protective wooden fences in fortified cities: «tyn», «gorodni», «tarasy». The use of «oblama» – a ledge for the introduction of battle at the foot of the walls. Towers shaped with four, six or eight faces of the «vencovoj» structure. The defensive towers covered with a high pyramidal roof – «shatrom».

4 Discussions
The obtained data allowed identify the volume-planning, compositional and constructive methods for constructing of the lost medieval cities-fortresses of Volga-Kama region in the context of historical-architectural, archaeological and archival sources.

Russian cities in the territory of Volga-Kama region emerged as military fortifications and places of distribution of Orthodoxy. By the end of the XVI-XVII centuries, many Russian fortresses were formed in the annexed territories of the former Kazan Khanate.

The topic of the study is caused by the absence of a comprehensive architectural study of the cities-fortresses of the Volga-Kama region of the Russian period. There are gaps on the topic under consideration in the general history of Russia architecture. It is necessary to fill the lack of scientifically based information about architectural and spatial organization of cities-fortresses of the Volga-Kama region in the theoretical course on the history of Russian architecture. Similar studies of fortification structures of other regions of the Russian state are available, in particular in the works of A.V. Opolovnikov, N.P. Kradin, V.V. Kostochkin, G.V. Alferova, N.F. Gulunicki, G.J. Mokeeva, T.S. Proskuryakov, V.I. Pilyavsky, Y.S. Ushakov, I.A. Ryabushina and others.

The technique of research of medieval Volga-Kama cities can be used in scientific restoration and reconstructive work, in scientific work of students of architects. In particular, in the collection, systematization and analysis of historiographic, archival, archaeological and natural sources on the cities of Russia and Kazan region, in the use of a system of proportion of a certain historical period, in the reconstruction of the architectural image of the within the established chronological, stylistic and territorial framework.

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