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METHOD OF DESIGNING RESIDENTIAL COMPLEXES IN VORONEZH WITH THE USE OF BLOCK-SECTIONS OF COMPLEX CONFIGURATION

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Statement of the problem. Improving the architectural and artistic appearance of the new development of the city, its individualization has long been an urgent problem. In the 1960s and 70s, many houses were built in Voronezh according to standard projects, which made the development of new areas of the city monotonous and of the same type. New districts in different cities of our country have lost their identity, have become similar to each other.

In Voronezh, the monotony and monotony of new built and under construction areas such as Shilovo, Otradnoye and other microdistricts have created a problem that again needs to be solved. The development is very monotonous and impersonal, because it is conducted according to standard (re-used) projects with a very limited list of standard sections.

Results. The methodology of the approach to design proposed by the authors of the projects of residential complexes allowed us to implement a number of objects of mass development quite interesting, not similar to each other. The article analyzes several residential complexes of mass development built in Voronezh, the architectural originality of which was achieved through the development and use of block sections of complex configuration.

Conclusions. The use of sections of complex configuration can help urban planners working on projects of new residential complexes to find original space-planning solutions that ensure the uniqueness of the development of Voronezh. The architectural and artistic quality of the new districts, provided that they are unique and diverse, will be worthy of the historical center of the city of Voronezh.

Keywords: problems of mass development, quality of construction, block sections of complex configuration, organization of development.

Introduction. Since the 1960s the issues of uniformity of mass construction of this country's cities have attracted a great deal of attention of architectural critics [1, 2, 4, 11, 20]. A. V. Ikonnikov and A. E. Gutnov, V. L. Glazychev and other famous Russian architects [3, 4, 5, 6, 7, 8, 9, 10, 12, 13]. mentioned this in their work.

The problem of monotony in building new residential areas of Voronezh is still urgent. Considering that the new master plan of Voronezh provides for a significant rise in the reconstruction in the central areas, the problem of uniformity and scale of construction is only exacerbated [19, 26, 27]. M.G. Barkhin [1, 2] and M.V. Posokhin [18] speculated on the reconstruction of the city. The image of the urban environment concerned Le Corbusier [15, 22] and Oscar Niemeyer who are the leaders of modern architecture. The architect's creative method was analyzed by the Voronezh scientist Yu. I. Karmazin [14]. These works should help city planners to address difficult problems of reconstruction of the central areas of our city. The aim of the article is to analyze several residential complexes built at the turn of the century and to identify the impact of the block-section design method on the architectural quality of these objects.

Nowadays when residential areas are being constructed on an unprecedented scale, it is almost impossible to achieve an individual image of each individual building [16]. The design technique set forth by the authors shows that achieving a variety of architectural and artistic approach to the design of residential complexes is possible by using block sections of complex configuration providing different methods of building layout [3]. Recently sections of complex configuration have almost not been used in mass construction. This considerably limits the compositional possibilities of construction making it more uniform [17]. Note that in the new series of large-panel residential buildings used by the Voronezh Housing Construction Plant (hereinafter DSK), there are no even corner block sections. In this regard, the construction of new districts Shilovo and Otradny (developer — DSK Voronezh) is formed by large-panel houses consisting of regular block sections placed meridionally, and occasional monolithic buildings. The absence of angular, rotary and other sections of complex configuration in the DSK nomenclature considerably limited the designers' compositional capacities.

1. Formation of a block-section design method in Voronezh. The historic development of the city has witnessed multiple examples of the construction of residential buildings of complex configuration. Voronezh is known to have been severely destroyed during the war with only 1/10 of the housing stock surviving the attacks. The city was included on the list of 15 historic cities of the USSR, which were rebuilt following the government's a special decree. The project of the general plan of revival of the city was performed under the direction of the known Soviet architect, academician L. V. Rudnev [1]. The city was rapidly rebuilt, and soon its center gained its current features of the «Stalin's Empire» [9, 18, 21, 23]. During the reconstruction of Voronezh following the war, repetitive layouts of ordinary sections were

frequently used, but corner, rotary and other sections of complex configuration were invariably designed individually depending on the urban situation. In the 1960s, in the wake of the struggle against architectural excesses, the use of houses of complex configuration was abandoned. Representative houses were built in four or six block sections with no architectural detail. The block-section design method started its revival as late as in the 1970s [8, 10]. In the outset, houses were built in compliance with the projects by the Moscow Central Research Institute of Integrated Design of Residential and Public Buildings (TSNIIEP). Those were large-panel ordinary and end sections with "swallow tails" (a form of combination of balcony and loggia) providing an evacuation transition to the adjacent block sections. As the apartments in these houses were a lot larger and more comfortable than those in the typical "Khrushchevs" built in the previous years, Voronezh residents called them "Czechs", apparently because foreign goods were of better quality and in shorter supply (the developer of ordinary and end sections, "Czechs" is a Moscow design institute TsNIIEP housing). In 1972, the Voronezhgrazhdanproekt Institute planned corner block sections from the products of this standard all-Union series 111-90 (in 1972, there were no typical corner and swivel sections in the TsNIIEP number). These block sections started to be actively built in the Northern district of the city. In the 1980s, the Voronezhgrazhdanproekt Institute, along with the technologists of the Voronezh DSK, prepared projects for several block sections of the zonal series 90, which were approved by Gosstroy RSFSR for mass construction in the cities of the Voronezh region (Fig. 1).

Row block-section 90-05

Fig. 1. Zonal series 90. Authors of the project: S. A. Gilev, engineers: V. V. Pankin, G. I. Zavgorodniy, Voronezhgrazhdanproekt Design Institute

Similar works back then were designed throughout the country on the initiative of the founder and first president of the Russian Academy of Architecture and Civil Engineering (RAASN)

AG Rochegov [8, 10, 13]. Zonal series 90, developed in Voronezh, went on to become one of the first regional mass construction projects approved in Russia for the task of individualizing the appearance of the city. Note that in the 1980s, more than 80 % of the housing was planned to be built in large-panel structures. The new series of residential houses enabled one to reduce the range of reinforced concrete products used at the Voronezh DSK and provided a greater originality of mass construction of Voronezh making it stand out from other Russian cities in Russia back then. However, not all the designed block sections were mastered by builders (sections of different storeys, T-shaped block sections, facade options, frame structures of the first floor and remained unrealized).

The houses of this series are still being built these days without any significant changes. I.e., the architectural diversity, which was planned at the design stage in the 1980s, has become the monotony of the new modern construction of the city of the 21st century [19, 24]. Note that some of the brick houses during the period of domination of large-panel construction were built in compliance with individual projects, but that did not have a major impact on the architectural quality of mass construction. In the 1990s, the volume of brick construction rose with the active development of monolithic structures for residential buildings. This greatly expanded the capacities of architects in the design of mass construction of the city [22, 25].

2. Residential complexes designed using block sections of complex configuration in Voronezh. In the 1980s, individual projects were largely constructed from brick. For the first time in Voronezh, T-shaped block sections of “beam structure” were included in the project of the embankment of the residential district № 27 of the left bank. The latitudinal sections commonly consisted of four apartments on each floor, as the strict requirements of the time for the insolation of apartments (at least three hours) did not allow them to be oriented to the north of the horizon. The residential houses of the embankment were composed of block sections of five and six apartments on the floor. The length of the sections was comparable to regular block sections of latitudinal orientation, which allowed for a higher density of construction. That was achieved due to the protrusions of the block sections in the southern direction where there were two two-bedroom apartments on the floor. Protrusions, consoles, the general step character of the composition of residential houses allowed a fascinating town-planning ensemble to be designed which was distinct from the curb of the right bank and the Chernavsky bridge of Voronezh. The apartment house located on the corner of the complex closer to the Chernavskaya dam looks particularly impressive. The highest part of the building, facing the geometric center of the city on the right bank, ends with a traditional spire. In

this building, T-shaped sections of different storeys are interlocked making up a memorable, extraordinary image of a residential building. Architectural techniques in the construction of the complex are associated with both Russian constructivism of the early 20th century [13] and the stepped nature of the skyscrapers of the "Stalin's Empire" [9, 18] (Fig. 2).

Fig. 2 Construction of the embankment in the district № 27 of the Left Bank of Voronezh.

Author of the project: S.A. Gilev , Co-authors: A.K. Zabnin, S.M. Sorokin, V.V. Pankin (engineer).

Photo: S. A. Gilev

A few extraordinary types of block sections of complex configuration are employed in the project "Town of Voronezh" of one of the districts of the city's North. The construction of residential buildings was performed in monolithic structures with a single step of transverse load-bearing walls (3.6 m). Exterior walls were largely made of three-layer reinforced concrete panels with quality finishes. T-shaped sections of different storeys and orientations in combination with ordinary block sections allowed one to design cozy, human-sized residential neighborhoods forming the entrance to the city from Moscow. As the number of apartments was clearly defined in the task and the building density was not supposed to be increased, T-shaped five-storey sections were planned with three apartments on a typical floor, which allowed for a building with houses of different orientations. Stepped block sections on the 8th

and 15th floors have a larger number of apartments on each floor since the steps are formed by part of the sections located meridionally. Three groups of residential buildings, consisting of five-, eight- and fifteen-storey block sections, make for a rhythmic row along Moscow Avenue, echoing the scale of the city's central quarters. Turning the avenue, one sees the building from afar, at the entrance to Voronezh from the north. Pitched roofs, a number of architectural details, a bright color scheme lend the building a unique, memorable image, which has become familiar to the locals and visitors alike (Fig. 3, Fig. 4).

Fig. 3. Voronezh City development project in the North. Authors of the project: S. A. Gilev, S. M. Sorokin, A. K. Zabnin, P. V. Mikhin (engineer) in collaboration with the company "Khopro" ("Berlin").
The color solution is presented by LLC PTM № 3 SA

Fig. 4. Development of the "City of Voronezh" in the North. Authors of the project: S. A. Gilev, S. M. Sorokin, A. K. Zabnin, P. V. Mikhin (engineer) in collaboration with the company "Khopro" ("Berlin").
Photo: A. K. Zabnin

The construction of the Morskaya residential complex on the embankment of the water reservoir, which was designed to mark the 300th anniversary of the Russian Navy, is associated with three sailing ships, as if sailing into the open sea. The composition of each "ship" is formed by four block sections of different storeys. The major role in the complex structural organization of the building is played by the shamrock section where three ordinary sections are blocked. The five-storey block section with a sharp end ends depicts the bow of the ship, the branch of the shamrock and the ordinary section with ledges from 5 to 17 floors form a "sail" with a slope of almost 60°, another ordinary block section develops the depth of the site. The complex is distinct from the remote corners of the reservoir, the promenade and the curb of the right bank. Not all design plans were implemented, the finishing materials laid down by the project were not used in the built complex, and many other things never got to see the light of the day (Fig. 5).

Fig. 5. Construction project of the Morskaya residential complex in Voronezh. Author of the project: S. A. Gilev. Co-author: A. K. Zabnin. The project was developed by PTM № 3 SA LLC

Similar shamrock sections and two types of T-shaped block sections are employed in a residential complex on the corner of Shishkova and Begovaya streets. Ordinary block sections of the "sector" type also look quite extraordinary. All the blocks of the complex have different storeys (from 5 to 17 floors) and layout techniques. But due to a low quality of construction, a large number of different types of sections and locking techniques developed and applied in the complex did not impact the entire aesthetic appearance of the complex [16] (Fig. 6, Fig. 7).

Fig. 6. The scheme of the general plan of the residential complex located at the intersection of Shishkov streets and Begovaya in Voronezh. Author: S. A. Gilev. The project was developed by PTM № 3 SA LLC

Fig. 7. Plan of 2-5 floors of a residential complex located at the intersection of Shishkova and Begovaya streets in Voronezh. Author: S. A. Gilev. The project was developed by PTM № 3 SA LLC

A fascinating example of the layout of "point" volumes of residential buildings is located on Friedrich Engels Street in Voronezh. Five blocks of different heights form a complex symmetrical composition enhancing this part of the street. This object is designed in monolithic structures (frameless frame with a wide pitch of columns and stiffening cores in each block). The modern constructive scheme of the complex allowed two underground floors of car parking to be constructed, and in the first and partially second floors there were rooms of cultural and daily function. The external architectural and artistic appearance of the residential complex, which completes the formation of the historic quarter, looks extraordinary. The symmetrical compositional solution of the complex complements the historic buildings, without interfering with the scale of Revolution Avenue (Bolshaya Dvoryanskaya), the city's main street (Fig. 8).

A similar constructive scheme of the residential complex "Park Gorky" is implemented on the site of the right bank near the North Bridge of Voronezh. In each of the four blocks of the complex on standard floors there are eight apartments, which are provided with regulatory insulation due to the use of the original locking element in the connection of individual buildings. At the competition "Construction Olympus 2019" held in Voronezh, this object was recognized as the best implemented housing project. However, the buildings of the complex in the

implemented version differ from the original project: the number of storeys of the blocks was considerably increased, architectural details were eliminated, and the color scheme changed. That impacted the architectural and artistic appearance of the residential complex (Fig. 9).

Fig. 8. Residential complex on Friedrich Engels Street, Voronezh.
Authors of the project: S. A. Gilev, A. V. Bozhko. Photo: L. N. Gileva

Fig. 9. Gorky Park residential complex project. Authors: S. A. Gilev, A. V. Bozhko. Photo: S. A. Gilev

Following a considerable relaxing of regulatory requirements for insulation of apartments, it became possible in Voronezh for the first time to apply a block section of a complex cruciform configuration. The monolithic residential house, consisting of cruciform block sections, is located at the bend of the branched structure of the streets which is typical of the preclassical layout of the right-bank slopes of Voronezh, and forms the bridgehead area of the Chernavsky bridge. The building consists of four block sections crashing into the foot of the slope. In the first, second and partially third floors there are rooms for cultural and daily functions, in the basement there is a car parking. However, other public premises on the slope side are also located underground since the building lies on a significant difference in relief. The extraordinary, dismembered shape of the building, the ledges, the pitched roof and the presence of architectural details enabled it to fit into the picturesque right-bank slopes in agreement with the small-scale surrounding buildings. Note that the common use of cruciform block sections is capable of enhancing the modern residential development and vacate some yard space since the "running density" of cruciform sections is a lot higher than that of regular ordinary block sections (Fig. 10).

Fig. 10. Project of a residential complex with built-in non-residential premises and underground parking in Korolev Street (Petrovskaya Embankment) and Detskiy Lane in Voronezh.

Authors: S. A. Gilev, A. S. Gilev, V. V. Kislyansky. The project was developed by PTM № 3 SA LLC

Conclusions. The examples of construction of a few residential complexes presented in the article are indicative of the significance of using block sections of complex configuration in the formation of a kind of architectural image of mass construction. A thorough analysis of the techniques of layout of residential buildings, differing in shape, configuration and number of storeys of the block section would diversify the development of the city as well as reveal the great potential of the design method set forth by the authors. Despite the limited funding possibilities of mass construction, the designers of residential complexes have been able to achieve architectural originality thereby enhancing the development of Voronezh. Thus, the design technique based on the use of block sections of complex configuration would help urban planners to implement complex challenges facing the urban reconstruction.

The currently coordinated new master plan of Voronezh, which was prepared by Moscow city planners envisages active construction in the city's centre. I.e., mass construction is going to have a considerable impact on the city's entire figurative characteristics. Voronezh residents are fond of the historic center, its classical ensembles, cozy streets, the houses rich in architectural details, the scale of construction. Under the circumstance doing no damage to the architectural environment of the city is the major challenge facing designers and builders. It is the use of block sections of complex configuration and reduction of the average number of storeys compared to the number of storeys used in modern construction of new areas that would help designers to avoid making serious urban planning mistakes in the construction of residential complexes in the vicinity to the city center and to make the new building original and not inferior in its architectural quality to the historic quarters.

References

1. Barkhin M. G., Ikonnikov A. V., Mats I. L., Orlov G. M., Stupin V. I., Yaralov Yu. S. *Mastera sovetskoi arkhitektury ob arkhitekture: v 2 t.* [Masters of Soviet architecture about architecture]. Moscow, Iskusstvo Publ., 1975 – vol. 1-2.
2. Barkhin M. G. *Arkhitectura i chelovek. Problemy gradostroitel'stva budushchego* [Architecture and man. Problems of urban planning of the future]. Moscow, Nauka Publ., 1979. 234 p.
3. Vil'ner M. Ya. Ob innovatsionnoi sostavlyayushchei gradostroitel'stva [About the innovative component of urban planning]. *Gradostroitel'stvo*, 2012, no. 2 (18), pp. 24—27.
4. Glazychev V. L., Egorov M. M., Il'ina T. V. *Gorodskaya sreda. Tekhnologiya razvitiya: Nastol'naya kniga* [Urban environment. Development technology: Desktop book]. Available at: [http://www. Glazychev.ru/books/gorodskaya_sreda/gorodskaya_sreda.htm](http://www.Glazychev.ru/books/gorodskaya_sreda/gorodskaya_sreda.htm).
5. Glazychev V. L. *Urbanistika* [Urban Studies]. Moscow, Evropa Publ., 2008. 220 p.
6. Gutnov A. E., Baburov A. V., Lezhava I. G. *Novyi element rasseleniya: na puti k novomu gorodu* [A new element of settlement: on the way to a new city]. Moscow, Stroiizdat Publ., 1966. 127 p.

7. Gutnov A. E., Glazychev V. L. *Mir arkhitektury: Litso goroda* [The world of architecture: The Face of the City]. Moscow, Molodaya gvardiya Publ., 1990. 358 p.
8. Gutnov A. E. *Evolutsiya gradostroitel'stva* [The evolution of urban planning]. Moscow, Stroiizdat Publ., 1984. 256 p.
9. Enin, A. E., Chesnokov G. A., Sergeev I. M. *Istoriko-kul'turnyi potentsial TsChER i problemy ego sokhraneniya* [Historical and cultural potential of the CHR and problems of its preservation]. Voronezh, FGBOU VO «Voronezhskii gosudarstvennyi tekhnicheskii universitet», 1991.
10. Esaulov G. V. Epokhi v zerkale arkhitektury. K stoletiyu A. G. Rochegova [Epochs in the mirror of architecture. To the centenary of A. G. Roch'egov]. *Arkhitectura i stroitel'stvo*, 2017, no. 1. 160 p.
11. Esaulov G. V. Gradostroitel'naya doktrina Rossiiskoi Federatsii: v poiskakh osnovanii [Urban Planning Doctrine of the Russian Federation: in Search of Grounds]. *Gradostroitel'stvo*, 2012, no. 2 (18), pp. 8—13.
12. Ikonnikov A. V. *Arkhitectura goroda. Esteticheskie problemy kompozitsii* [Architecture of the city. Aesthetic problems of composition]. Moscow, Stroiizdat Publ., 1972. 220 p.
13. Ikonnikov A. V. *Funktsiya, forma, obraz v arkhitekture* [Function, form, image in architecture]. Moscow, Stroiizdat Publ., 1986. 288 p.
14. Karmazin Yu. I. *Tvorcheskii metod arkhitekтора* [The creative method of the architect]. Voronezh, Izd-vo VGU, 2005. 496 p.
15. Korbyuz'e L. A. *Arkhitectura XX veka: perevod V. N. Zaitseva* [Architecture of the XX century]. Moscow, Progress Publ., 1977. 291 p.
16. Kuz'min A. V. Arkhitectura, gradostroitel'stvo, stroitel'stvo — vyzovy sovremennosti [Architecture, urban planning, construction-challenges of our time], 2018. Available at: <https://ardexpert.ru/article/12699>.
17. Lazareva I. V. *Formirovanie nauchnogo napravleniya «Territorial'nye osnovy gradostroitel'stva»* [Formation of the scientific direction "Territorial foundations of urban planning"]. *Gradostroitel'stvo*, 2012, no. 2 (18), pp. 28—32.
18. Posokhin M. V. *Gorod dlya cheloveka* [City for a person]. Moscow, Progress Publ., 1980. 219 p.
19. Sdobnov Yu. A., Lyubovnyi V. Ya. *Goroda Rossii: tendentsii, problemy. Vozmozhnye puti razvitiya i sovershenstvovaniya upravleniya* [Russian cities: trends, problems. Possible ways to develop and improve management]. *Gradostroitel'stvo*, 2012, pp. 14—16.
20. Finogenov A. V. *Kak reshit' klyuchevye problemy gradostroitel'stva?* [How to solve the key problems of urban planning?]. *Zvezda*. Available at: <https://zvzda.ru/columns/3f88388b65a2>
21. Vason E. N. *Design of cities*. New York, MIT Press, 1968.
22. Corbusier L. A. *New spirit in architecture*. New York, Whitney Library of Design, 1975.
23. Francis D. K., Jarzombek M. M., Vikramaditya Prakash. *A Global History of Architecture*. Hoboken, N.J., John Wiley & Sons, 2007. 816 p.
24. Holl S., Pallasmaa J., Perez-Gomez A. *Questions of Perception: Phenomenology of Architecture*. San Francisco, 2006. 155 p.
25. Perez-Gomez A. *Architecture and the Crisis of Modern Science*. Cambridge, Mass.: MIT Press, 2016. 400 p.
26. Perez-Gomez A. *The Space of Architecture: Meaning as Presence and Representation. Questions of Perception*. Phenomenology of Architecture. San Francisco, William Stout Publishers, 2006, pp. 7—26.
27. Venturi R., Scott-Brown D., Isemour S. *Learning from Las-Vegas*. Cambridge, Mass., MIT Press, 2018.