

The Impact of Architectural and Space-Planning Design of Student Accommodation (Dormitories, Campuses) on the Time Budget of The Student Youth

Aleksey Vladimirovich Popov

Abstract: *This study is aimed at determining the time budget of the student youth in the Russian Federation living in dormitories in conjunction with the architectural and space-planning design of these buildings. This study is important to optimize the architectural design of buildings and residential complexes for student accommodation. The research object includes buildings and their complexes for the accommodation of university students. The research subject is the determination of the time budget of the student youth in the system of studies, campus life and rest. The research purpose is to determine the directions of optimization of the architectural design of student accommodation, based on the optimization of the layout of locations of the implementation of functional needs of students living in dormitories and campuses. Research objectives are as follows: determination of the system of functional needs of residents of a student dormitory; determination of time expenditure on movements directly related to the performance of separate functional processes; calculation of the student's time budget based on the calculated time expenditure; determination of the influence of the space-planning structure of student accommodation on the time budget of the student youth and the directions of improvement of such structure.*

Index Terms: *campus, student accommodation, dormitory, student quarter, higher educational institution, temporary accommodation, university, academy, institute, higher education.*

I. INTRODUCTION

This work has been performed in continuation of the study described in the article "Experimental calculation of the time young university students spend on functional processes related to studies, campus life and recreation on the example of dormitories of the student quarter (campus) of the Moscow State University of Civil Engineering" [1] and on the basis of the data obtained in it. The work is based on the works of scientists who dealt with general issues of the time budget of a modern person, as well as the time spent on various physiological, household and labor processes, among which are as follows: Lobanov [2], Bychin and Malinin [3], Karakhanova and Bolshakova [4-5], Shangaeva [6], Chepelik [7]. The works of the following authors are dedicated to a narrower issue – a student's time budget: Zheltikov [8], Kondratieva and Prokopenko [9], Nebesnaya and Gridina

[10]. The clarification of characteristics of functional processes in student accommodation will make it possible to further formulate an approach to the organization of the architectural environment, determine the composition of premises and their main parameters. In the light of the research conducted within the framework of improving the architecture of temporary accommodation for students and related areas [1, 11-19], it seems relevant to calculate the time spent by modern students on functional processes related to the educational process, campus life and recreation for the further search for directions of optimization of the schemes of functional zoning of student accommodation [20]. For the functional organization of residential complexes and buildings of student accommodation, it is rational to use the following system of functional needs of residents, in which they are structured according to the frequency and periodicity of the necessary fulfillment, thus they can be classified into:

- needs requiring daily fulfillment,
- needs requiring periodic fulfillment,
- needs requiring occasional fulfillment,
- other needs not requiring direct fulfillment and formed indirectly by residents (functional needs of the entire residential complex/building of student accommodation).

Based on the system of needs of residents, a functional model has been developed for the formation of the space-planning structure of student accommodation.

Residents' functional needs requiring daily fulfillment are the most important group of residents' needs that all students need to fulfill on average once a day or more often. The group of daily needs includes sleep, passive rest, cooking, meals, toilet purposes (meeting a person's natural needs), face hygiene (washing a face), body hygiene (shower/bath), a change of clothes and personal care. This group of needs is the most important and often in demand; respectively, zones to meet these needs should be located in a room or as close as possible – in a lodging unit. Residents' functional needs requiring periodic fulfillment compose the next group of needs that is formed by all residents periodically – from several times a week to several times a month: washing personal clothes, drying and ironing personal clothes, body care and hairdressing (hairdresser, beauty salon), the supply of food products, the supply of household goods, cleaning of residential premises, home educational processes, internal communication. Places of implementation of the functions of this group due to the high frequency of visits may be located in a campus, dormitory building, in a living room or in a lodging unit, depending on the type of need.

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* Correspondence Author (s)

Aleksey Vladimirovich Popov, National Research Moscow State University of Civil Engineering, Yaroslavskoye Shosse 26, Moscow, 129337, Russian Federation

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Residents' functional needs requiring episodic fulfillment – the needs of a separate part of the residents' contingent, or the needs formed by various individuals without a clear periodicity: outdoor activities, sports, various gatherings, entertainment, communication-based leisure, storage of personal belongings, medical care, provision of medicines, reception services, ecological recreation, parking of vehicles.

Functional needs of the entire residential complex (building) of student accommodation – the needs formed not by individual residents, but by the whole group of residents of a building/residential complex designed for student accommodation, are separated into a special category: building (student quarter) management, cleaning and maintenance, law enforcement and security arrangements in a building (a student quarter). It is necessary to take into account all the functional needs of the youth for the comprehensive organization of campus life, educational-scientific process and leisure activities of residents and, ultimately, for the formation of a qualified specialist and a contributing member of society.

II. EXPERIMENTAL CALCULATION OF THE TIME REQUIRED FOR THE FULFILLMENT OF FUNCTIONAL NEEDS OF RESIDENTS

In the case of different ways of spending time on the fulfillment of a need by young men and women, within the framework of the study, an arithmetic mean value was conditionally taken for further calculations under the conditional assumption of an equal ratio (1:1) of residents by gender. Quantitative indicators for calculating the time spent on movements were taken on the basis of empirical observations and calculations conducted in the student quarter of Moscow State University of Civil Engineering (MSUCE) [1], in the following buildings: OS-1 (26 Yaroslavl Highway, bld. 12, Moscow) – a project without the integration of accommodation units into lodging units, located in the student quarter of the MSUCE;

- OS-3 (26 Yaroslavl Highway, bld. 15, Moscow) – a project with the integration of accommodation units into lodging units, also located in the student quarter;
- B-1 (19 Borisov Passage, Moscow) – a project with the integration of accommodation units into lodging units, located outside the student quarter – in an apartment block.

Based on the study of the national experience of organizing the student accommodation, it can be argued that space-planning and town-planning parameters of the buildings selected for the study are characteristic of the Russian Federation [20-24]. The following model of time expenditure calculation was chosen for determining time expenditure – the time spent on the fulfillment of a resident's need is the total time spent on the process related to the fulfillment of a need and the time spent on movements related to the fulfillment of a need (to the place of process completion and back).

$$T_{total\ n} = T_n + t_n; \text{ where} \quad (1)$$

$T_{total\ n}$ is the total time that resident spends on the fulfillment of a need n ,

T_n is the time required directly to complete the process n ,

t_n is the time required for movements related to the completion of the process n .

A summary of the works of the above-mentioned authors and in-situ measurements performed are given in Table 1 that illustrates the time spent on the fulfillment of various needs of residents.

These time-consuming indicators calculated empirically on typical Russian examples enable the assessment of the impact of the space-planning organization of student accommodation on the distribution of the time budget of a modern university student.

Thus, it can be concluded that the rational space-planning organization of student accommodation associated with equipping living rooms and lodging units with necessary amenities, in addition to increasing comfort, also entails significant time savings. The determination of such rational space-planning organization of student accommodation seems to be a promising direction for further research.

Table I. Time spent on the fulfillment of the needs of residents

Functional need	Time spent directly on the functional process on average (min/week)	The average estimated time spent on moving to the place of fulfillment of a need, if it is located respectively (min/week)				
		In the lodging unit	On the residential floor	On the service floor	In the complex of buildings	Outside the complex
Sleep	3,360	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled
Cooking	420	21	105	Not fulfilled	Not fulfilled	Not fulfilled
Meals	287	14	91	Not fulfilled	Not fulfilled	Not fulfilled
Toilet purposes	84	42	126	Not fulfilled	Not fulfilled	Not fulfilled
Face hygiene	56	21	105	Not fulfilled	Not fulfilled	Not fulfilled
Body hygiene	126	7	56	70	Not fulfilled	Not fulfilled
Change of clothes and personal care	245	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled
Passive rest	individually	No data	No data	No data	No data	No data
Home study processes	1,950	7	56	70	Not fulfilled	Not fulfilled
Washing personal clothes	41	2	8	12	Not fulfilled	Not fulfilled
Drying and ironing personal clothing	20	2	8	12	Not fulfilled	Not fulfilled
Body care and hairdressing	Differently, on average 0.4 visits a week	Not fulfilled	Not fulfilled	3	7	18
Supply of food products	40	Not fulfilled	Not fulfilled	6	15	39
Supply of household goods	14	Not fulfilled	Not fulfilled	2	5	14
Housekeeping	72	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled	Not fulfilled
Internal communication	individually	No data	No data	No data	No data	No data

III. DETERMINATION OF THE POTENTIAL OPTIMIZATION OF THE STUDENT'S TIME BUDGET THROUGH THE FORMATION OF COMFORTABLE SPACE-PLANNING DESIGN

In this section, an impact of the space-planning design of the student accommodation building on the time budget of a resident student has been considered and potential reserves for its optimization by architectural means have been identified.

To determine promising functional space-planning solutions of student accommodation, we will make their assessment from the standpoint of the optimal organization of the student's time budget.

Since the space-planning and functional solutions of the structure of buildings are different and often unique, several conditional options can be taken to illustrate the differences in the formation of the time budget of a student who lives in a dormitory.

Option 1 illustrates a lobby dormitory, which is the most common in national practice: a toilet, washbasin, kitchen and lounge room are located on the residential floor; a shower, study room, laundry and drying room are on the service floor (often on the ground floor). A food and household store, a hairdresser and other service enterprises are located outside the complex – in the urban space of surrounding buildings.

Option 2 illustrates the type that is less common in national

practice with the arrangement of part of services in a lodging unit: a toilet, wash basin, shower – in a lodging unit; a kitchen and lounge room – on the residential floor; a study room, laundry and drying room – on the service floor (often on the ground floor). A food and household store, a hairdresser and other service enterprises are located outside the complex – in the urban space of surrounding buildings.

Option 3 illustrates a promising type of student accommodation with the organization of maximum servicing in a lodging unit and in a complex of buildings – a student quarter (campus). There is a studying place in each living room. A toilet, washbasin, shower, washing machine, kitchen, and lounge room are in a lodging unit. A food and household store, a hairdresser and other service enterprises are located in the student accommodation complex.

Option 4 illustrates a promising type of student accommodation with the arrangement of a full-fledged and self-sufficient individual living space – an individual living cell that includes: a studying place, toilet, washbasin, shower, washing machine, open kitchen. Recreation and leisure rooms are on the residential floor; a food and household store, a hairdresser and other service enterprises are located in the

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student accommodation complex.

Based on the previous calculations of the time spent on meeting the needs of residents, one can calculate the time budget for each option, determine the difference and, based on its amount, draw conclusions about the prospects of a particular functional organization model.

A student's weekly time budget is the main estimate indicator, it consists of study time and extracurricular time. In turn, based on the studies of scientists- teachers Nebesnaya and Gridina [10] that study time is the period spent on studying directly in an educational institution (academic building), including breaks and other related time expenditures, one can take an average of 440 min/day (2,200 min/week in case of a five-day study week).

According to the results of the sociological survey conducted by the author, the average time spent by a student residing in a dormitory on the way to the university will be 82 minutes (41 minutes one way), which is 410 min/week in case of a five-day working week.

For the convenience of further calculations as part of the study, let us introduce the necessary conditional category "conditionally free time" and define it as the time that includes all the time of a student, less the time spent on the main educational process, the way to the university and sleep (Figure 1). The above indicators allow calculating the average value of the "conditionally free time"; it amounts to 4,110 min/week.

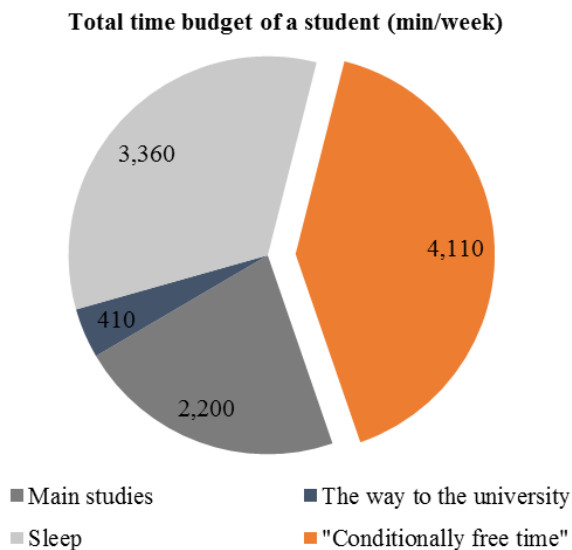


Figure 1: Total weekly time budget of a student

Let us take a closer look at the "conditionally free time" of a student. In turn, it consists of: time spent on homework/self-study; time for performing the necessary household processes; time for necessary movements in the building related to household processes; time for necessary movements within the complex (student quarter) and outside its territory, related to household processes, and free time

IV. CONCLUSION

Thus, it can be concluded that the rational space-planning organization of student accommodation related to equipping living rooms and lodging units with necessary amenities, in

itself.

According to the data given earlier, the amount of time required to perform the necessary household processes is 1,405 min/week and the total time required for homework/self-study is 1,950 min/week. The time required for movements in the building, as well as for movements within the complex, is calculated according to the data in the previous section, as well as in agreement with the above-mentioned existing and promising options of the space-planning design of complexes, buildings and premises of student accommodation. A diagram illustrating the amount of free time in the "conditionally free time", depending on the functional and space-planning design of student accommodation, is shown in Figure 2.

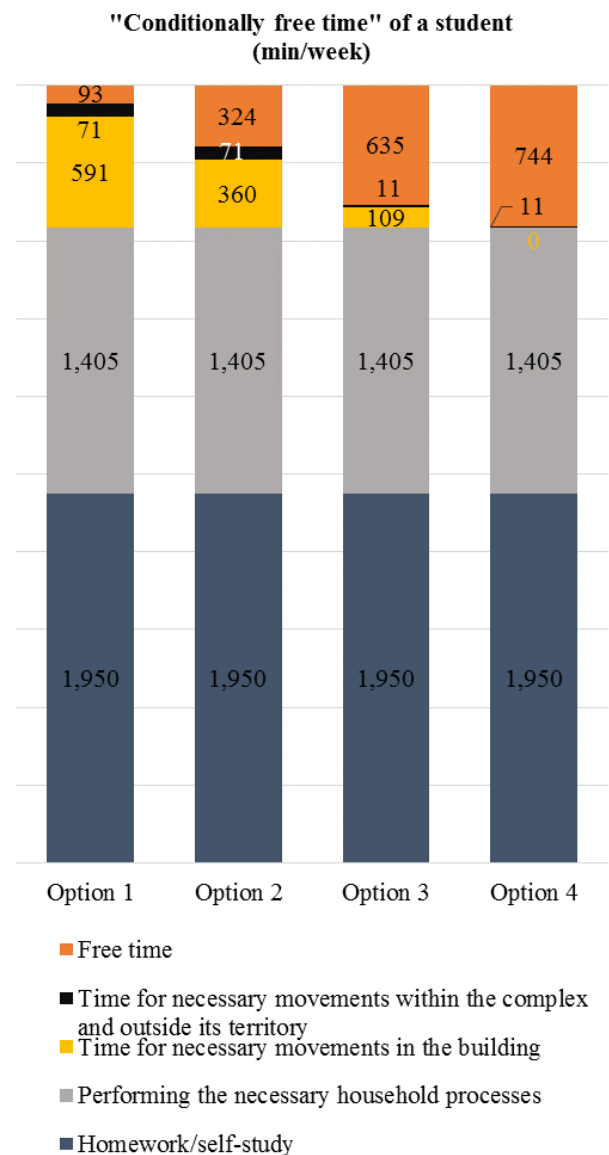


Figure 2: A diagram illustrating the amount of free time in the "conditionally free time", depending on the space-planning design of complexes, buildings and premises of student accommodation

addition to increasing comfort, also entails significant time savings.



Thus, a promising option of student accommodation, in which all comforts are transferred to a living room and enterprises supplying goods and services – to a student quarter, will save a student more than 10 hours (651 minutes) per week, compared to lobby dormitories that are currently popular in Russia, and a promising option, in which amenities are transferred to a lodging unit, will save a student a little more than 9 hours (542 minutes) per week.

REFERENCES

1. A. V. Popov, T. V. Sorokoumova, Eksperimentalnyi raschet zatrat vremeni studencheskoi molodezhi na funktsionalnye protsessy, svyazannye s ucheboi, bytom i otdykhom na primere obshchezhitii studencheskogo gorodka (kampus) NIU MGSU [Experimental Calculation of the Time Young University Students Spend on Functional Processes related to Studies, Campus Life and Recreation on the Example of Dormitories of the Student Quarter (Campus) of the Moscow State University of Civil Engineering]. *Nauka i biznes: puti razvitiya*, 10(88), 2018, pp. 65–71.
2. Yu. N. Lobanov, *Otdykh i arkhitektura: Budushchee i nastoyashchee* [Recreation and Architecture: Future and Present]. Leningrad: Stroyizdat, 1982.
3. V. B. Bychin, S. V. Malinin, *Normirovanie truda: Uchebnik* [Labor Rationing: Textbook]. Moscow: Ekzamen, 2002.
4. T. M. Karakhanova, O. A. Bolshakova, Ispolzovanie vremeni gorozhanami: sotsialno-ekonomicheskie i demograficheskie faktory [Time Use by Citizens: Socio-Economic and Demographic Factors]. In *Rossiia reformiruyushchayasya: Ezhegodnik* [Reforming Russia: Yearbook], Issue 10, M. K. Gorshkov, Ed. Moscow: Institute of Sociology of the Russian Academy of Sciences, 2011, pp. 332-349.
5. T. M. Karakhanova, Povsednevnyaya deyatelnost gorozhan v pokazatelyakh byudzheta vremeni (1965-2004 gg.) [Daily Activities of Citizens in Indicators of the Time Budget (1965-2004)]. *Sotsiologicheskie issledovaniya*, 9, 2006, pp. 41–43.
6. N. K. Shangaeva, Kharakteristika struktury byta sovremennogo gorodskogo naseleniya [Characterization of the Structure of Mode of Life of Contemporary Urban Population]. *Vestnik Buryatskogo gosudarstvennogo universiteta*, 6, 2010, pp. 184–188.
7. V. V. Chepelik, *Arkhitekturno-planirovochnye resheniya domov dlya odinochek: dis. ... kand. arkh.* [Architectural and Space-Planning Design of Houses for Singles (Ph.D. Thesis). Kiev, 1964.
8. A. I. Zheltikov, Sravnitelnyi analiz byudzheta vremeni studentov 1 i 6 kursa [Comparative Analysis of the Time Budget of students of the 1st and 6th Years of Study]. *Vyatskii meditsinskii vestnik*, 1, 2009, pp. 85–86.
9. N. S. Kondratieva, L. A. Prokopenko, Struktura byudzheta vremeni i formy dosuga studentov spetsialnosti "PGS" TI (f) SVFU [Structure of the Time Budget and Leisure Forms of Students Majoring in "PGS" TI (f) SVFU]. In *Materialy raionnoi nauchnoi konferentsii shkolnikov i studentov "Obrazovanie. Dukhovnost. Zdorove detei i molodezhi"* [Proceedings of the District Scientific Conference for Pupils and Students "Education. Spirituality. Health of Children and Youth]. Neryungri: TI (f) SVFU, 2011, pp. 54–59.
10. V. V. Nebesnaya, N. A. Gridina, Issledovanie byudzheta rabocheho vremeni studentov vysshikh uchebnykh zavedenii [Research of the Budget of Working Time of Students of Higher Educational Institutions]. *Pedagogika, psikhologiya i mediko-biologicheskie problemy fizicheskogo vospitaniya i sporta*, 6, 2008, pp. 57–59.
11. I. L. Pershina, Tendentsii formirovaniya investitsii v studencheskie obshchezhitiiya kak v vid dokhodnogo zhilya [Trends in the Formation of Investments in Student Dormitories as a Type of Profitable Accommodation]. In *Naukoemkie tekhnologii i innovatsii Yubileynaya Mezhdunarodnaya nauchno-prakticheskaya konferentsiya, posvyashchennaya 60-letiyu BGTU im. V.G. Shukhova, XXI nauchnye chteniya* [High Technologies and Innovations. Jubilee International Scientific and Practical Conference dedicated to the 60th anniversary of BSTU named after V.G. Shukhov, XXI Scientific Readings]. Belgorod: Belgorod State Technological University named after V.G. Shukhov, 2014, pp. 92-96.
12. A. V. Popov, R. A. Kazaryan, Sotsiologicheskie aspekty arkhitekturnogo formirovaniya zhilishcha studencheskoi molodezhi, sotsializatsiya lichnosti [Sociological Aspects of the Architectural Formation of the Student Youth Accommodation, Individual Socialization]. *Perspektivy nauki*, 4(103), 2018, pp. 46–52.
13. A. V. Popov, R. A. Kazaryan, Ekonomicheskie aspekty arkhitekturnogo formirovaniya zhilishcha studencheskoi molodezhi [Economic Aspects of the Architectural Formation of the Student Youth Accommodation]. *Nauka i biznes: puti razvitiya*, 5(83), 2018, pp. 53–56.
14. I. S. Rodionovskaya, Innovatsionnye napravleniya razvitiya sistemy arkhitekturno-stroitel'nogo obrazovaniya na sovremennom etape [Innovative Directions of Architectural and Engineering System Development at the Present Stage]. *Ekologiya urbanizirovannykh territorii*, 3, 2009, pp. 102–104.
15. V. V. Romanchikov, A. V. Kalugina, I. A. Puchkin, D. A. Panfilov, Sozdanie komfortnoi sredy i uslovii, stimuliruyushchikh razvitie nauchno-tekhnicheskogo potentsiala samarskogo regiona, i perspektivy sozdaniya kampusov [Creating Comfortable Environment and Conditions Stimulating the Development of the Scientific-Technical Potential of the Samara Region and Prospects for the Creation of Campuses]. *Nauchnoe obozrenie*, 17, 2016, pp. 81–89.
16. T. V. Sorokoumova, A. N. Akimova, Vliyanie urbosredy na obshchee sostoyanie zdorovya cheloveka [The Impact of Urban Environment on the General State of Health of a Person]. In *Stroitel'stvo – formirovanie sredy zhiznedeyatel'nosti* [Construction – Formation of the Living Environment]. Moscow State University of Civil Engineering, 2016, pp. 178–190.
17. T. P. Tolpinskaya, I. O. Zavgorodnyaya, Organizatsiya i razvitie rekreatsionnogo prostranstva studencheskikh kompleksov kak odnogo iz napravlenii renovatsionnogo protsesssa [Organization and Development of the Recreational Space of Student Complexes as One of the Areas of the Renovation Process]. In D.P. Anufriev (Ed.), *Potentsial intellektualno odarennoi molodezhi – razvitiyu nauki i obrazovaniya: Materialy VII Mezhdunarodnogo nauchnogo foruma molodykh uchenykh, innovatorov, studentov i shkolnikov* [The Potential of Intellectually Gifted Youth – for the Development of Science and Education. Proceedings of the 7th International Scientific Forum of Young Scientists, Innovators, Students and Pupils]. Astrakhan, 2018, pp. 207–217.
18. A. V. Popov, Historical Development Stages of the Student Youth Accommodation Architecture from Dormitories Prototypes to Post-industrial University Campuses. *International Journal of Civil Engineering and Technology (IJCIET)*, 9(11), 2018, pp. 2526-2536.
19. A. V. Popov, Ecological Optimization of the Architectural Environment of Higher Education Institutions in Moscow – The Use of Phyto-Metal Structures. *Advanced Materials Research*, 869-870, 2014, pp. 162–166.
20. A. V. Popov, *Printsipy formirovaniya arkhitektury studencheskogo zhilishcha vysshikh uchebnykh zavedenii: dis. ... kand. arkh.* [Principles of the Formation of Architecture of Student Accommodation of Higher Educational Institutions (Ph.D. Thesis)]. Moscow, 2014.
21. A. V. Popov, Osobennosti arkhitekturnoi organizatsii i kharakternye parametry zdaniy obshchezhitii i domov studenta po rezultatam arkhitekturnogo obsledovaniya 297 obektov v Rossii i SNG (obshchezhitii, studencheskikh gorodkov, kampusov vuzov) [Features of the Architectural Organization and Characteristic Parameters of Dormitory Buildings and Student Houses as a Result of the Architectural Survey of 297 Student Accommodation Facilities in Russia and the CIS (dormitories, Student Quarters, University Campuses)]. *Perspektivy nauki*, 8(107), 2018, pp. 39–45.
22. A. V. Popov, Osobennosti arkhitekturnoi organizatsii kompleksov studencheskogo zhilishcha – studencheskikh gorodkov po rezultatam arkhitekturnogo obsledovaniya 297 obektov studencheskogo zhilishcha v Rossii i SNG (obshchezhitii, studencheskikh gorodkov, kampusov vuzov). Chast 4 [Features of the Architectural Organization of Complexes of Student Accommodation – Student Quarters According to the Results of the Architectural Survey of 297 Student Accommodation Facilities in Russia and the CIS (Dormitories, Student Quarters, University Campuses). Part 4]. *Perspektivy nauki*, 12(111), 2018.
23. A. V. Popov, Primery naibolee kharakternykh proektnykh reshenii zdaniy studencheskogo zhilishcha po rezultatam arkhitekturnogo obsledovaniya 297 obektov studencheskogo zhilishcha v Rossii i SNG (obshchezhitii, studencheskikh gorodkov, kampusov vuzov). Chast 2 [Examples of the Most Characteristic Design Options of Buildings of Student Accommodation based on the Results of the Architectural Survey of 297 Student Accommodation Facilities in Russia and the CIS (Dormitories, Student Quarters, University Campuses). Part 2]. *Perspektivy nauki*, 10(109), 2018, pp. 37–43.

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24. A. V. Popov, Unikalnye i eksperimentalnye proekty zdaniy i kompleksov studencheskogo zhilishcha po rezul'tatam arkhitekturnogo obsledovaniya 297 obektov studencheskogo zhilishcha v Rossii i SNG (obshchezhitii, studencheskikh gorodkov, kampusov vuzov). Chast 3 [Unique and Experimental Projects of Buildings and Complexes of Student Accommodation According to the Results of the Architectural Survey of 297 Student Accommodation Facilities in Russia and the CIS (Dormitories, Student Quarters, University Campuses). Part 3]. *Perspektivy nauki*, 11(110), 2018, pp. 34–40.

AUTHORS PROFILE



Aleksey Vladimirovich Popov – Candidate of Architecture. He has been working as an associate professor at the Department of Architecture at the National Research Moscow State University of Construction since 2017. From 2011 to 2017 headed the scientific laboratory "Urban Planning and Assessment of the Quality of Living Environment in the Settlements" at the same university. Until 2011 he worked in design organizations. Author of more than 20 scientific and educational works. One of the authors of the joint venture 379.1325800.2018 dormitories and hostels. Design rules (REDD OF RULES).

He has higher education in the specialty "Building Design" qualification "Engineer-Architect" obtained in the Moscow State University of Civil Engineering (honors degree).

His research interests include the architecture of residential, public and industrial buildings, urban planning and regulatory issues. He was most closely involved in the architectural formation of a student dormitory. In 2014 he defended his thesis on the topic "Principles of the architecture of a student dwelling of higher educational institutions".