

Methodology project dimensions of courtyard areas and the principles of comfortable environment of the INRTU campus

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Abstract. The results of project-based learning under the theme “Comfortable yard” for the development of the campus of the INRTU. At the stage of field researches identified the main problems and conceptual solutions to transform the courtyards of the dormitories of the campus, analyzed the criteria of superior courts on various project proposals and the methodology project dimensions of yard space.

The courtyard of the University campus is a space for everyday recreation and communication of students and teachers, at least 25% of the open area. In the modern era of technology, there is a rapid development, communication and exchange of professional experience in various fields of activity, where it is worth noting the trend towards the transformation and reconstruction of outdated architecture of public spaces. Traditionally, universities are geographically formed in large cities or local centers that have the appropriate scientific and educational personnel, and developed infrastructure [1]. Therefore, higher education institutions that focus the high intellectual potential of society are powerful “centers of attraction”, where a certain population is sent to get higher education, improve it or develop it scientifically [2].

The yard area is the smallest contour of the zone where a person crosses the line of privacy. However, speaking of the social nature of the yard, it should also not exclude safe, comfortable and private recreation areas for communication and communication of people, promotes their unification, as well as has a convenient infrastructure and landscaping, while satisfying the aesthetic component. The formation of the territory structure at universities is regulated by certain factors, such as the features of the landscape system, ecology, accessibility, insolation, and the functional significance of adjacent buildings and neighboring territories.

A courtyard is a space where a local community is formed [6]. The criteria of comfort are regulated on the following items: 1 - Marked borders of the territory that form the “cell”, which is quite isolated, but connected with the surrounding space., 2 - The yard without cars and parking on its territory., 3 - The presence of greenery., 4 - The presence of the lawn on which people can spend time, relax., 5 - Lighting., 6 - The presence of private areas., 7 - Conditions for use of the yard in different seasons and under different weather conditions.

One of the projects considered is the territory of the Russian Academy of National Economy and Public Administration. When developing the project for the reconstruction of the territory of the RANE and PA, the designers were assigned the following tasks and goals.



Creating a comfortable and modern environment on the territory of the academy based on the economic, engineering, transport, environmental and social needs of the academy, i.e. reconstruction of the territory to adapt to modern conditions and requirements. The project should develop a convenient system of functional zoning of the territory, which includes the development, organization of a central public space for mass events, with the arrangement of the territory, reconstruction and expansion of an open sports complex on the territory of an existing sports ground, and development of a sufficient number of recreational areas [3] (picture 1). The main idea of the project was to unite the territories of two higher education institutions that were previously independently separated from each other. When designing, special attention is paid to existing tree and shrub plants. These plants form the expressiveness of the site. The territory is also divided into several zones: park, transit, economic, sports, public and parade.

In the modern world, where the campus is essentially a city within a city, it is necessary to have the right, and, importantly, individual approach to working with the structure and planning solution of each territory. Based on this work, it can be argued that it is necessary to carefully approach every aspect of the organization and modernization of campus territories [3].



Figure 1. Planning solution for the reconstruction of the territory of RANE and PA”. Materials taken from the developments of the Institute of SUE MRDI Mosproekt-4 [3].

Additionally, for a conceptual solution of comfortable physical stay in the yard, we considered university campuses that meet the challenges of wind loads and create a kind of cascade for shelter. These include the University of Toronto Scarborough and Novosibirsk State University. In the first case, we observe the continuity of the main building, which wraps around the forest and creates the same barrier against the wind. Considering the building of the NSU, it is impossible not to note the isolation of the main building, where again the fact of wind protection of the internal space can be traced. Thus, we can say that this type of location of the main building can create comfortable conditions for staying both inside, due to the length or closed system, and outside, because even in winter, the recreational space remains protected from the wind [5].

Participants in project-based learning “Comfortable yard” conducted a study of the courtyard of the dormitories of the campus, the INRTU. The analytical part of the design begins with determining the location of the study area relative to the city and the main campus of the University (picture 2).

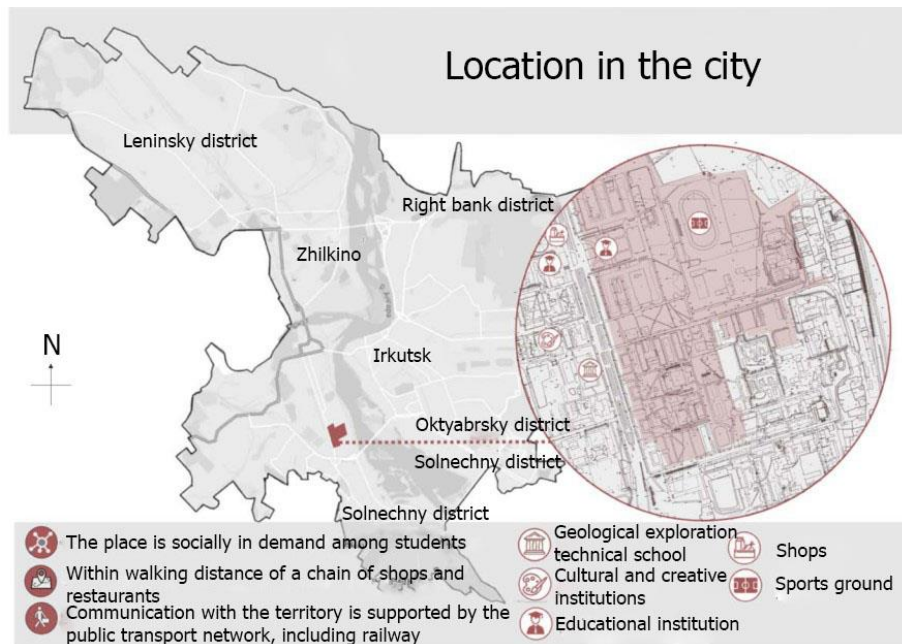


Figure 2. Location the campus of the INRTU regarding the city”. The author of the scheme a student of the INRTU, group ARB-18-2 Krivchikov N.E. 2020.



Figure 3. Map of existing terrain”. The author of the scheme a student of the INRTU, group ARB-18-2 Krivchikov N.E. 2020.

Further consideration of the topography of the campus and the project area under study in particular (picture 3), there is a characteristic decrease in the topography to the northeast, but on the territory where the site is located at dormitories № 5 and № 6, a relatively flat ground surface prevails.

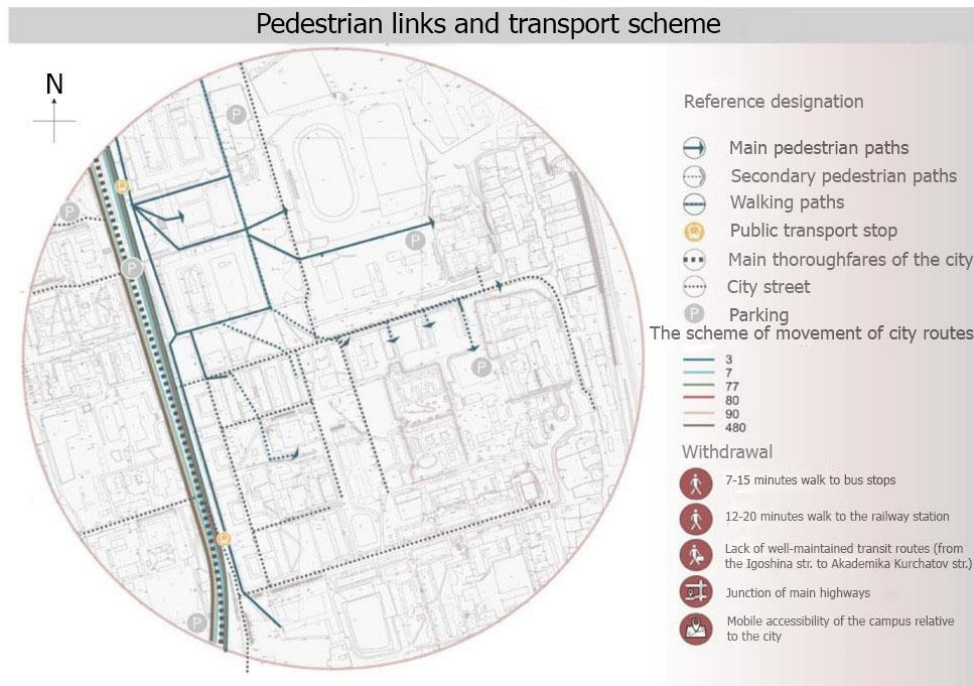


Figure 4. Existing ways in the territory of the INRTU”. The author of the scheme a student of the INRTU, group ARB-18-2 Krivchikov N.E. 2020.

The main task was to perform analytical work, in particular the space between dormitories № 5 (2 Igoshina str.) and № 6 (4 Igoshina str.), to identify the main problems and determine the most favorable pedestrian directions. Based on the location of dormitories with adjacent territories and the main functional significance of nearby objects and sites in the structure of the city, it depends on the further determination of the reference point according to the design principles and the creation of proposals for optimizing the courtyard space. Then, drawing conclusions about existing pedestrian and transport links, determining the main roadway and courtyard roads, the next step is to determine the main active paths on the common territory of dormitories № 5 and № 6 (picture 4,5).

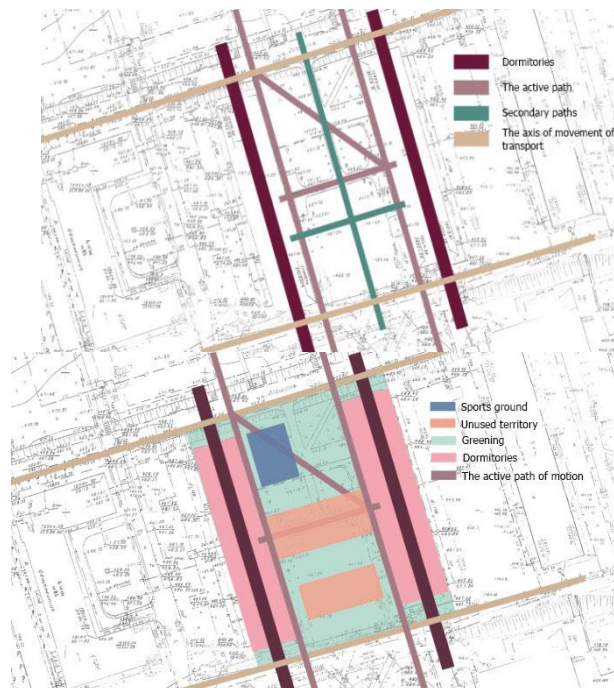


Figure 5. Scheme of existing paths and zoning of the territory on the territory of dormitories № 5 and № 6”. The authors of the schemes are students of IRNTU, groups ARB-17-2 Kutsar N.G. and ARB-18-2 Tykheeva A.Zh., 2020.

Then we made an exit to the studied territory and determined the existing zoning of the site. It turned out that there are several sites along the perimeter of the territory under consideration: with an extensive green area, sports grounds and reserve space (picture 5). We can note that one of the active traffic routes is located directly on the diagonal of the entire sports zone, and the territory of the sports destination itself is not used or little used.

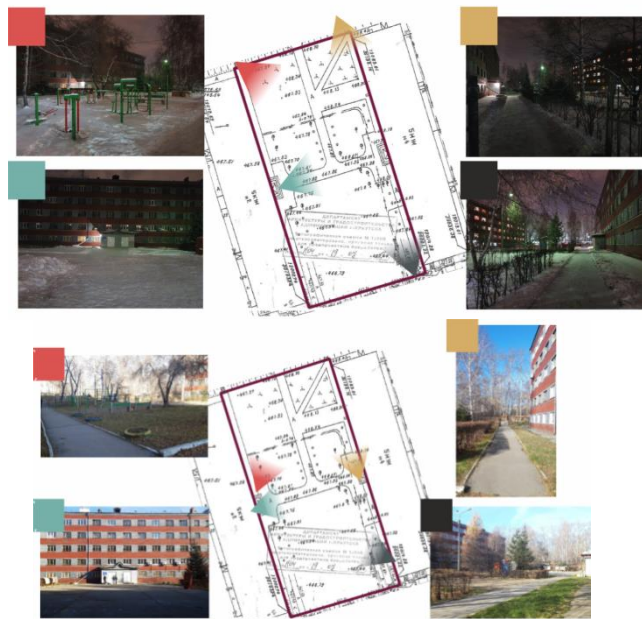


Figure 6. Scheme of photo fixation of the territory between dormitories № 5 and № 6 at night and during the day”. The author of the scheme a student of the INRTU, group ARB-18-2 Tykheeva A.Zh., 2020.

Also on the studied site, photo-fixing was carried out from several main viewpoints at night and during the day (picture 6), problems were found: after dark, there is no necessary lighting for movement and location, and in the daytime, you can note the depressing state of the courtyard and the complete lack of architectural and visual solutions. Below is a diagram of the existing reference plan, which shows the existing communications on the territory. For further work, it is necessary to take into account the presence of existing engineering networks, such as: power supply, water supply and sewerage systems (picture 7).

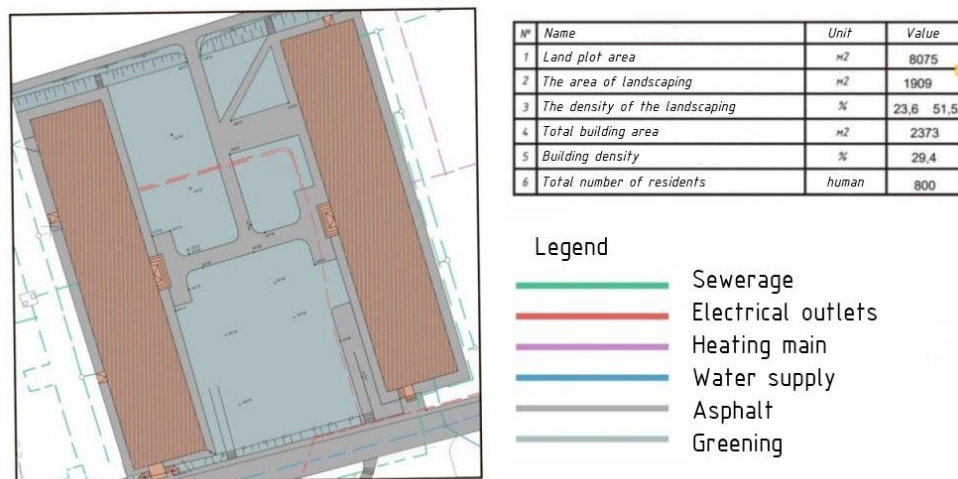


Figure 7. Existing reference”. The author of the schemes are students of IRNTU, groups ARB-17-2 Kutsar N.G. 2020.

The next task was to review the study area relative to the rest of the campus dormitories studied by other participants of the project training “Comfortable yard”. The sites under consideration are adjacent and may well have a common structure, which is supposed to be determined by the principle of local consideration of each analyzed zone, identifying internal features - the relationship with the environment and the general ones. The IRNTU has highly developed internal organization of the yards and streets (picture 8). The central square of the University and the main roads located between the University and dormitories are the most dominant and actively used relative to other streets (picture 9).



Figure 8. Layout of the territories under study, based on the 2GIS map” [4]. The author of the scheme a student of the INRTU, group ARB-18-2 Tykheeva A.Zh., 2020.

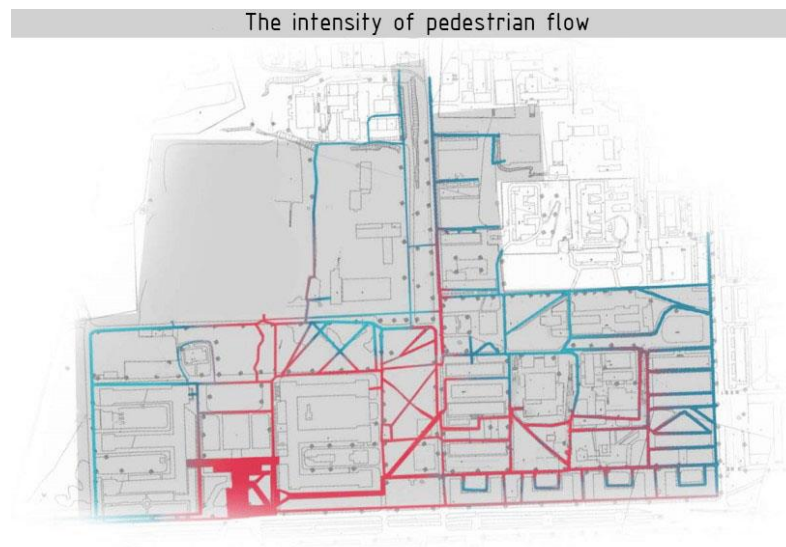


Figure 9. Existing paths of the area on the territory of the INRTU”. The author of the scheme a student of the INRTU, group ARB-18-2 Krivchikov N.E. 2020.

The results of the conducted analytical research work were the design of the reconstruction of every house dormitories INRTU. Participants in the project training identified the most favorable and appropriate structure of courtyard connections, while optimizing the space as much as possible, including socially significant areas - amphitheatres and open recreational areas, and the most private - closed spaces designed for individual pastime. The design took into account the inviolability of existing locations of local green spaces and the placement of additional vegetation in order to make the yard more isolated from the roadway (picture 10). The calculation of changes in the dynamics of the expected indicators of a comfortable yard was made: landscaping, the percentage of recreational area to development, lighting, and the amount of paving (picture 11). In addition, a common yard network was created, which was developed by identifying the main spatial guides of each territory under consideration, and their relationship with the surrounding areas. This grid connects all developed courtyards and unites a network of paths into a complete complex, while not depriving them of their individuality and isolation (picture 12).

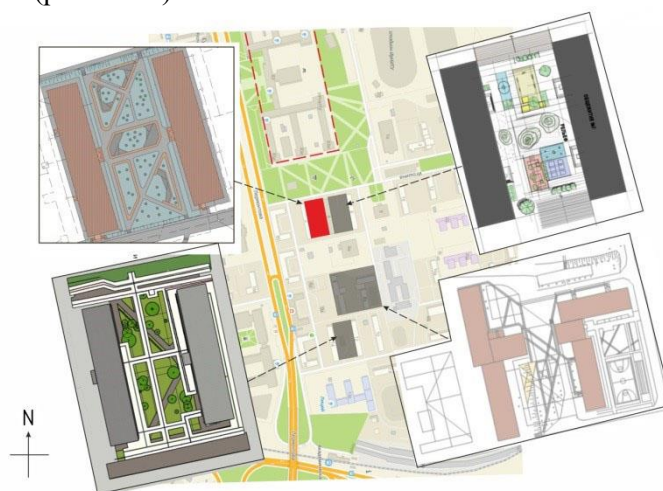


Figure 10. The design solution for the courtyard spaces of the INRTU campus is based on the 2GIS map” [4]. The author of the scheme a student of the INRTU, group ARB-18-2 Tykheeva A.Zh., 2020.

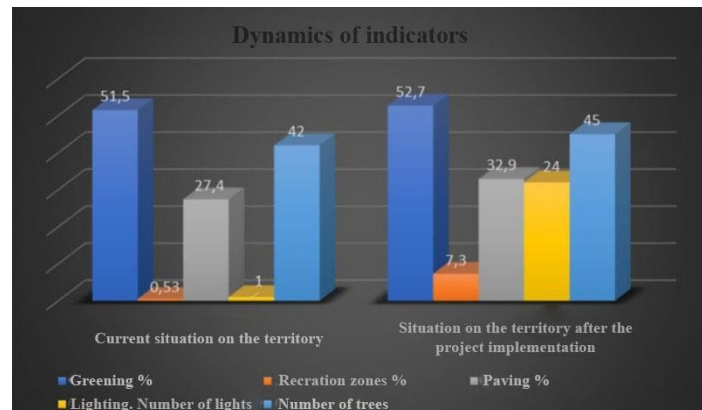


Figure 11. Dynamics of indicators of comfort of the courtyard before and after renovation the campus of the IRNTU”. The author of the schemes are students of IRNTU, groups ARB-17-2 Kutsar N.G. 2020.

The conclusion of this work is that the architecture of the courtyard space is a concept that is constantly changing and requires special attention, because it is an important social component that contributes to a favorable atmosphere of learning, leisure and active association of people. Analytics areas includes several stages: 1 - definition of the project boundary of the study area, 2 - the location of major facilities, 3 - analysis of existing transportation and pedestrian networks, 4 - consideration of each functional area within the courtyard, 5 - accounting utilities, 6 - consideration of existing landscape, 7 - dimension illumination along the perimeter of the territories at different times of day, 8 - the study of the nature of the relief, 9 - the search for the relationship of each yard. Advanced universities are interested in developing their territories and developing the most favorable and modern landscaping solutions. Comfortable improvement of the University campus should include a well-thought-out and appropriate zoning, an optimally designed structure of paths, emphasizing their easy accessibility, and an organized continuous green frame, preserving existing green spaces, adding them as needed.

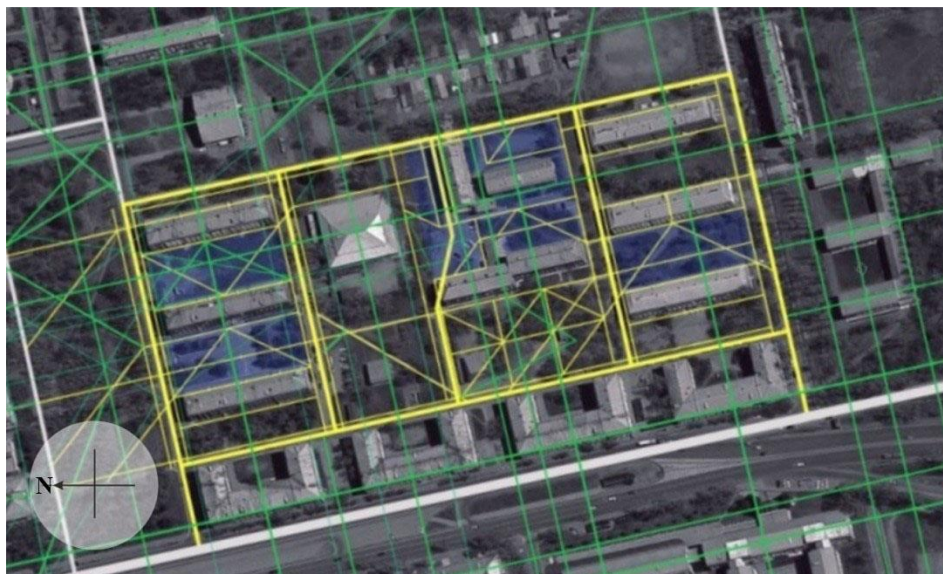


Figure 12. Project proposal for interconnection of courtyards of campus dormitories”. The author of the scheme a student of the INRTU, group ARB-18-2 Tykheeva A.Zh., 2020.

INRTU campus courtyards lack greenery, color, and space for students and teachers. Further development is the introduction of modular outdoor furniture (mobile tables and transformer seats), installation of screens with projectors, and the transfer of classes, workshops, and meetings from classrooms to the open space of courtyards in the warm season. Many universities around the world have long created all the conditions for students to be as comfortable as possible there. We do not have such a trend yet, but the experience of many Russian universities shows that the management is trying to develop in this direction, and this is the first step towards something more.

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