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DEVELOPMENT OF RECONSTRUCTION PROJECTS OF SCHOOLS IN A DENSE URBAN AREAS

Abstract. The paper presents several projects of schools in Ekaterinburg with description and analysis of emerging problems in dense urban areas. This topic was presented in the framework of the international forum "100+ Technobuild" in the section "Schools of modern cities". Presently, Russia is implementing a large-scale program for the construction of new schools and the reconstruction of existing ones. In recent years, not just school buildings have been built, but a rethinking of the educational space is taking place, which is flexible. Such trends lead to the fact that a school building should become capable of changes and transformations, comfortable and multifunctional.

Keywords: dense urban areas; urban development; school reconstruction projects

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РЕКОНСТРУКЦИЯ ШКОЛ В ПЛОТНОЙ ГОРОДСКОЙ ЗАСТРОЙКЕ

Аннотация. В данной статье представлены проекты школ Екатеринбурга с описанием и анализом возникающих проблем в плотной городской застройке. Доклад в рамках секции «Школы современных городов» был представлен на международном строительном форуме "100+ Technobuild". В настоящее время в России реализуется масштабная программа по строительству новых школ и реконструкции существующих. В последние годы строятся уже не просто школьные здания, а происходит переосмысление образовательного пространства, которое отличается гибкостью и индивидуальным подходом к каждому ученику. Подобные тенденции подводят к тому, что школьное здание должно стать способным к изменениям и трансформациям, комфортным и многофункциональным.

Ключевые слова: плотная городская застройка, градостроительство, проекты реконструкции школ

Introduction

At present, Russia is implementing a large-scale program for the construction of new schools and the reconstruction of existing ones. In recent years, not just school buildings have been built, but a rethinking of the educational space is taking place, which is flexible. This article describes extensive experience in the design and reconstruction of educational institutions in a dense urban development.

Description of projects

The first project that will be discussed is the reconstruction of the school №114 in Ekaterinburg. When designing a draft project for school №114 on the Polzunov st., in a densely built environment, the problem of natural illumination of the first floor was identified. The large area of glazing and the increased height

of the first floor, organized by the difference in the relief on the site, contributed to the solution of the problem of illumination of the building (Figures 1.1, 1.3).

Frequently, the size and shape of the land plot dictate the shape of the building “spot”. In this case, there were problems with insolation of classrooms. When designing the facility in 2017, the requirements for the insolation of classrooms were mandatory. To place the classrooms on the northeastern facade, it was decided to expand the classrooms strictly to the east. The turned planes of the facade form the "dynamics" of a flat facade, creating a play of light and shadow (Fig. 1.2). The high stained-glass windows of the first floor and the white color of the facade create the feeling of a “light” building, which is especially important in tight urban areas [1,2].



Figure 1.1. Main façade view with continuous glazing and the increased height of the first floor



Figure 1.2. “Turned planes” of façade (view to the classrooms)



Figure 1.3. Main façade view with continuous glazing and the increased height of the first floor



Figure 2.1. Main façade view



Figure 2.2. Recreation areas view



Figure 2.3. Main façade. Night view

When designing a school on Sheinkman St., the same problems of insulation and natural light arose. A similar principle was used to rotate the planes of the facade (Fig. 2.1, 2.3). The end of the corners of the facade is formed by the smooth lines of the parapets. The problem of a sufficiently large relief difference was solved by the construction of retaining walls, landscaping groups. The ground drops are also used for zoning recreation areas, games, sportgrounds (Figure 2.2).

On Figures 2.4-2.6 the interiors of the main premises of the school are shown.



Figure 2.4. Interior of communication zone



Figure 2.5. Interior of dining room

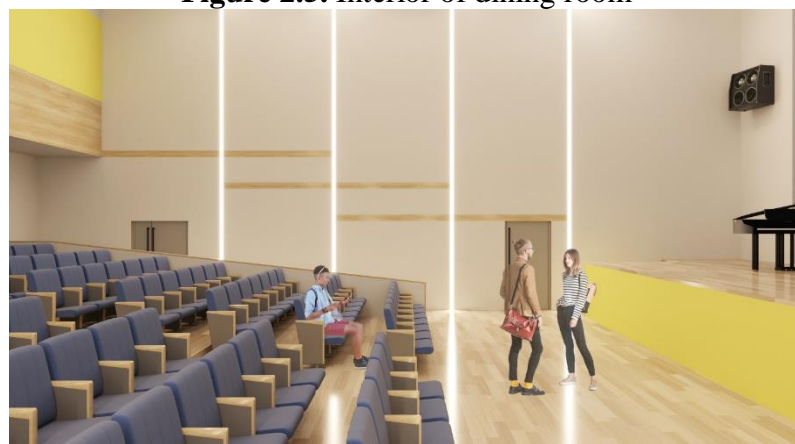


Figure 2.6. Interior of auditorium

When designing school №77, there was a problem of providing normalized natural light. The problem of illumination is solved by continuous tape stained-glass windows with decorative inserts with tree structure (Fig. 3.1-3.3). The problem with the lack of recreation and playgrounds is solved by using the neighboring recreational areas.



Figure 3.1. View from above



Figure 3.2. View to the classrooms



Figure 3.3. Main façade view

On the example of the developed draft design of the specialized educational and scientific center of the Federal State Autonomous Educational Institution of Higher Education "UrFU named after the first president B.N. Yeltsin", one can assess the advantages of building educational institutions in specially designated areas of the required area. The site for the projected educational building for 1000 students and a hostel for 525 people is located near the Technopark between Vysotsky St. and Sibirskiy tract (Fig.4.1.4.2).



Figure 4.1. View from above



Figure 4.2. View from above

Conclusion

The regulations applicable to the design and construction of new schools on the land plot of sufficient size may not always be applied to schools being under construction or renovation in a dense urban area. To our view, the preferable solution to this problem could be to develop supplements to existing rules for such cases.

References

1. ALEKHIN V.N., NOVOSELOVA N.E., PLETNEVA T.A, SHAROVAROVA E.P. Novye tehnologii v proektirovanii obrazovatelnykh uchrezhdeniy [*The new technologies in educational institutions design*]. Stroycomplex Srednego Urala. – 7-8(2018), pp.46-48.
2. ALEKHIN V.N., NOVOSELOVA N.E., PLETNEVA T.A, SHAROVAROVA E.P. Opyt razrabotki proektov rekonstruktsii shkol v usloviyakh plotnoy gorodskoi zastroyki [*The experience of school reconstruction design in urban areas*]. Stroycomplex Srednego Urala. – 10(2020), pp.15-16.