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Chub A. N.
Kharkov National University of Civil Engineering and Architecture
(Sumskaya str., 40, Kharkov, 61002, Ukraine; e-mail: Alexchub.22@gmail.com)

FIRST FACTORS AFFECTING A COMPLEX RECONSTRUCTION OF THE STADION

The experience of preparing stadiums for holding international competitions in modernizing existing Ukrainian stadiums for EURO 2012 is of interest for further reconstruction of sports facilities. A review of specialized sources and the study of European guidelines revealed the main factors that must be taken into account in the work on the modernization of stadiums. Work on the reconstruction of the stadium "Metalist" in the city of Kharkov is considered as an example of the influence of factors on the complex modernization of the stadium.
Keywords: stadium, reconstruction, modernization, sports facilities.

The relevance of this study. In the mainstream of the world trends in the development of sports and physical culture in Ukraine, the process of forming new sports and fitness centers and modernization of existing sports facilities is going on rather intensively. In addition to meeting the needs for sports and physical culture facilities of residential communities, Ukraine's participation in major international sporting events is a powerful incentive for the development of sports infrastructure. An example of this was the holding of the games of the football European championship of Euro-2012 on the territory of Ukraine and Poland. To this event, 8 stadiums (4 in each country) were prepared in both countries as base facilities with all necessary infrastructure consisting of an additional subsystem (sports base, hotel, airport, etc., transport facilities, including roads and parking, medical Service, office facilities, media centers, energy facilities, mobile communication systems sites) and the serving subsystem (trade, service and financial institutions). To the auxiliary subsystem can be attributed sports villages for accommodation to accommodate participating teams, temporary hospitality towns, city fanzones.

Requirements for football stadiums have changed significantly over the past decade. Convenience and safety for spectators, new technologies and effective commercial exploitation became the main guide to the formation of new requirements for sports complexes. The increasing complexity of the planning structure of the sports stadium is increasingly affecting the function and operation of the stadium. Norms and safety directives often have a decisive influence on the geometry of the stands and the structure of the accommodation of fans. Therefore, in the work on each stadium, as a rule, individual solutions are applied, which is especially important. In addition, the modern sports stadium should have reserves for accommodation and adaptation of additional equipment for large-scale events.

Problematization. This article focuses on the development and improvement of modern requirements for the design of new and modernization of existing stadiums. It is necessary to identify the primary factors that must be taken into account when designing new and comprehensive modernization of existing stadiums that have preserved the structure of sports facilities of the Soviet period.

A review of literary sources. In recent years, a sufficient number of publications have been devoted to the design and construction of stadiums. The issues of systematization of existing materials on the study of this type of public facilities remain relevant, as the need for sports and sports facilities is continuously growing. It should be noted that the construction of sports facilities is devoted to a layer of various books, articles, recommendations of the Soviet period [1-4]. To date, this material has not lost its value, but modern publications and developments on the theme of the development of sports facilities have significantly expanded this subject. Publi-

cations devoted to sports facilities can be conditionally divided into groups that consider this type of structures from different positions. Most of the sources are of a scientific, analytical and scientific-practical nature:

- analysis of the relationship between the network of sports facilities and the planning structure of urban development [5];

- methods for designing and calculating stadium stadium structures, conducting experimental aerodynamic studies, and analyzing aerodynamic loads for stadium coverings [6];

- methodology for calculating the evaluation of successful evacuation from stadiums [7];

- analysis of risks of fires in stadiums for EURO 2012 [8].

A number of publications are devoted to the experience of reconstructing existing stadiums and building new ones in Ukraine, for example:

- description of spatial structures of the covering of the stadiums "Meteor" in the city of Dnipropetrovsk and "Donbass-Arena" in the city of Donetsk [6, 9];

- the history of the emergence and construction of the NSC Olimpiyskiy in the city of Kiev is described, and also the architectural solution of the complex and its main constructions are described [10];

- Arena-Lviv Stadium in Lviv was taken as a basis for analyzing the streams of spectators at the stadium (emotional and psychological state, the composition of people, the characteristics of the movement); A methodology for calculating success, evacuation, describing disconnection forecasts and combining human flows during evacuation, establishing the total evacuation time of people in the most loaded sector of the upper tier, and the total time of evacuation of people from the heaviest sector of the lower tier [7].

A number of publications analyze the stadiums that have gained worldwide fame. The sports facilities built for the competitions of the European and world level are of interest:

- in 2008, Stefan Nixdorf, a specialist in the field of stadium preparation for world-class football games, prepared a book that compiled material on all stadiums in Germany that hosted the 2006 FIFA World Cup. The main guidance for the formation of new requirements for the design of new sports complexes was the convenience and safety for spectators and effective commercial exploitation [11];

- article-report on the design and construction of four stadiums - Maracano in Rio de Janeiro (Maracana-Stadium), Mineira (Stadium Mineira), Mannus (Stadium Manaus) and Stadium of Garrincha (Stadium Mane Garrincha) for the 2014 FIFA World Cup in Brazil. The main attention is paid to innovations in the field of constructive and technological solutions of roofs of stadiums. The presented stadiums are not all newly designed. There are stadiums that have their own history and were built at the beginning of the 20th century. It describes how carefully and exactly the process of reconstruction of existing and well-organized process of new construction of stadiums [12];

- described the Water Sports Center in London for the 2012 Olympics. A system of temporary elements has been applied, which will be dismantled after the games are played. In the design of this structure, the principle of transformation was applied as the principle of the existence of an object in the future. [13];

- describes the construction of the roof and grandstands of the new Grand Stad Stadium in Le Havre in France for the city program "The Axis of Rouen-Havre", also describes the first applied technology of coloring granules coating material - extrusion of granules to achieve homogeneity of the film [14], etc.

European researchers are studying problems in the design and construction of sports facilities, predict the direction of development of these structures in the future:

- leading design firms in the field of design and construction of sports facilities are exploring the problem of economically inefficient and unprofitable construction projects and offer basic principles for planning a future sports facility: 1. Forecast in the long-term use of the facility. 2. If the object is in demand in the future, make it capable of transformation. 3. If there is no prospect

for long-term use, then strictly save up to temporary buildings [15];

- European experts in the field of stadium design and construction are considering the interdisciplinary principle of designing stadiums, where the work of architects and engineers is interrelated. The goal of the interdisciplinary approach is the use of progress in the design of stadiums [16];

- experience of interdisciplinary work on the expansion of modern approaches in the design of football stadiums; Search for new formats of architectural solutions, theatrical architecture, extraordinary tribune solutions, the specificity of their geometry in order to bring the viewer closer to the field in order to improve visibility [17].

By the time the preparation of the stadiums in Ukraine and Poland began for the EURO-2012 games, there was the 4th, and then the 5th edition of the Guide to Safety at Sports Grounds, also known as the Green Book (Green Guide) [18].

The status of the collection is advisory and is intended for use by competent persons. However, since its requirements are mandatory when the stadium receives a certificate for holding international competitions by experts from UEFA and FIFA, its provisions become mandatory in these cases.

Simultaneously with the new construction, the old stadiums are systematically reconstructed in accordance with modern technical and technological requirements.

The book of Ukrainian authors who took part in the reconstruction of Metalist Stadium in Kharkov during preparation for EURO 2012 is devoted to the question of expediency and the possibility of reconstructing existing stadiums. In the study of constructive solutions, the accent is placed on the arrangement of coatings over the stands of the stadium [19].

Main content. It seems important to clarify in this article terms - reconstruction and modernization, used in architecture in connection with their regionally different interpretation. In the post-Soviet space, the notion of reconstruction as a process of changing obsolete objects was fixed, with the aim of imparting new properties in the future [20]. In Ukraine, the term reconstruction – это rebuilding of an object of construction put into operation in the established order, which entails a change in its geometric dimensions and / or functional purpose, as a result of which there is a change in the main technical and economic indicators (quantity of production, capacity, etc.), improvement of production, improvement of its techno -economic level and quality of manufactured products, improvement of operating conditions and quality of services. The reconstruction envisages full or partial preservation of the elements of bearing and enclosure structures and the suspension of the operation time of the object as a whole or its parts (provided that they are autonomous) [21]. Whereas in the European Community, the term reconstruction is understood in the context of restoring lost structures through new construction with the reproduction of the exact forms and details of all or part of existing or disappeared structures [22]. The closest and most suitable term in the sense of this article is modernization, meaning in architecture the giving of an existing object the signs of modernity, renewal [20].

The active phase of stadium development begins in the second half of the XIX century in the industrial regions of England and the European continent. The typology of sports facilities was developing chronologically. The first generation of stadiums focused on placing a large number of spectators with minimal comfort and quality of service for these viewers. After the Second World War, many stadiums were reconstructed or rebuilt. Their constructive decisions were based on stadiums located on the slopes or on artificial earthen ramparts, where the lower rows were installed directly on the slopes of the embankment [11].

For these stadiums was characterized by an equal ratio of athletics and football as factors that determined the structure of the stadium and created space for all sports disciplines. These

stadiums were the second generation, significantly redesigned and supplemented with respect to the first.

In the early 1990s there were stadiums of the third generation, where sport became the center of family leisure. The main idea was the additional trade (serving spectators), television and advertising, which brought substantial revenues to sports clubs. To improve the comfort of spectators, stadium equipment has also begun to improve. New quality standards were created for bars, shops, food outlets for spectators on the territory of sports facilities. The ratio between the number of male and female viewers has changed, and this has affected the number of sanitary devices in the toilets of stadiums that occupy a large volume of podtribunnogo space. Next came the stadiums of the fourth and fifth generations, which became symbols of European and world cultures [11].

Stadium "Metalist" in the city of Kharkiv at the time of preparation for EURO 2012 was a representative of stadiums of the third generation, one of the oldest stadiums in Ukraine. Metalist Stadium, which arose in 1925, was built and developed evolutionarily, underwent several reconstructions aimed at increasing the number of seats and improving the comfort of spectators. Each reconstruction of the stadium increased its level in accordance with the requirements for conducting international competitions.

Modernization of stadiums is common practice in the world. The decision on a new stadium construction or modernization of the old one is taken in accordance with the need for renewal. The depth of modernization and the choice of methods of working with the object depends on a number of factors, among which one of the most important is the determination of the parameters of the future object that must be achieved and the capabilities of the existing structure. In the case of stadium upgrades, as a rule, its parameters are set based on the level of competition for which the object is being reconstructed. The capacity of the stands, the technical parameters of the football field, the requirements for the media complex, the level of comfort of both the competitors and spectators, the current level of safety, the technical condition of the structures and engineering systems are specified.

After determining the capabilities of the existing structure of the stadium, with regard to the necessary upgrade, a decision should be made on the methods of design work.

The most common methods are reconstruction, renovation, modernization [20-22]. Methods of work on objects that are monuments of cultural significance are determined by a preliminary survey of the monument and its condition.

The design of new stadiums and the reconstruction (modernization) of existing ones should be carried out taking into account the system of factors determining the planning structure of the sports complex, the choice of the design scheme and materials and, ultimately, forming the architectural and imaginative solution of the stadium. Regarding the modernization, and, especially if the decision is made to preserve the historical heritage of the complex - research research is needed, which in turn will reveal the factors that affect the design process. In the case of modernization, it is important to solve a possible volume of changes that make it possible to obtain the object with the best possible characteristics taking into account the planned preservation of architectural and constructive decisions of previous years.

A set of factors that must be taken into account and included in the implementation of the project solution is the system that forms the project, or rather the task for the project. In fact, the number of factors can be much greater depending on the goal and the specific features of the particular object. A certain number of factors allows us to describe a system with certain relationships within it.

In the case of a decision on the reconstruction (modernization) of the stadium in the subsequent design and construction, a number of design factors must be taken into account. To do this, it is necessary to take into account the requirements of UEFA / FIFA - a handbook that contains the security requirements developed in detail, the conditions for the viewer's visibility, the position of the cameras, etc. This guide is

recommended for the design of each stadium and formulates all levels of design to details [18].

According to Guide to Safety at Sports Grounds, the decisive factors in designing a sports complex are:

- accessibility to the stadium, segregation of the categories of spectators and participants of the event, free entry into its place and distribution of spectators' flows;
- safe evacuation (including emergency) of spectators;
- taking into account changes in the demographics of the audience;
- changes in the attractiveness of sports and unsportsmanlike events occurring at the stadium;
- changing the requirements for the comfort of the viewer and the types of services;
- reduction of public financing and increase in the share of commercial independence in providing stadiums;
- accounting business planning of the complex and marketing strategy;
- planning and technical solutions related to the growing influence of the media due to their commercial opportunities through global means of telecommunications [18].

As for the experience in the preparation of the Metalist stadium in Kharkiv for EURO 2012, the option of upgrading the existing stadium was chosen according to the following parameters:

- a successful town-planning situation in the center of the developing region (within the polycentric structure of the city's development), which, along with other proposed facilities and proximity to the city center, convenient transport communications could become a prerequisite for the development of the district;
- the modernization of the existing stadium was to bring tangible savings, both budgetary funds and general investor funds compared to the construction of a new stadium. Comparison of the results of the implementation of construction projects for all host stadiums in the EURO 2012 confirmed preliminary calculations. Comparison of the cost of building a new stadium in Lviv of the same capacity with the reconstruction of the stadium in Kharkov was in favor of the latter even without taking into account the engineering infrastructure (the cost of a completely new engineering infrastructure in Lviv further increases this gap);
- the successful location of the existing stadium at the intersection of both land and underground (underground) transport highways;
- the use of the brand of the existing stadium "Metallist" enjoyed great popularity, both in the city, and in Ukraine and abroad.

The concept of modernization (reconstruction) of the sports complex "Metalist" was based on the following principles:

- designing a multifunctional sports complex on the stadium's territory, which includes the stadium itself for holding football games with the preservation of the track and field complex, a set of training football fields with an artificial surface, a children's and youth academy;
- placement of media center on specially designated adjacent areas, mobile TV stations, vast hospitality zones (temporary awning facilities), parking lots complex, necessary engineering facilities;
- the creation of a step-by-step system of security zones with the necessary fences, checkpoints and other facilities.

The principle by which this list of design factors was chosen is the goal of creating an object with the greatest possible safety and comfort for spectators, economically sound, having parameters of a third-generation sports complex with respect to engineering support, communicative-effective.

Conclusions. Thus, the driving factors for the process of continuous improvement of the stadiums are big sporting events - the Olympic Games, World Championships in Athletics Championships, World Cups and European Championships. The importance of such an event is great for the country, which is the hostess of the event, in turn, the role and prestige of this country is increasing. Global television and radio coverage of such a sporting event contributes to the formation of a positive image of the

country. Economists of this period predict an increase in international contacts, as well as an improvement in the economy.

When determining host cities for international competitions, one of the decisive factors in making a decision is the availability, type and condition of the stadium, the number of seats for different groups of viewers, the infrastructure or economic opportunities for creating new stadiums and other factors. The economic component is determined to enable the host city to host the event at the international level as soon as possible.

Proceeding from the set goals, a certain number of factors are identified, the aggregate of which, it seems to us, allows us to obtain an object with characteristics that are optimal with respect to the stated objectives. In each specific case, the appearance of other factors important for this particular object is possible. But the factors described above are the most common and compulsory.

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Чуб О. М. Першочергові фактори, що впливають на комплексну реконструкцію стадіону. Досвід підготовки стадіонів до проведення спортивних змагань міжнародного рівня в модернізації українських стадіонів становить інтерес для подальших реконструкцій спортивних споруд. Огляд спеціалізованих джерел і вивчення європейських настанов виявив основні чинники, які необхідно враховувати в роботі над модернізацією стадіонів. Робота над реконструкцією стадіону «Металіст» в місті Харкові до ЄВРО 2012 розглядається як приклад впливу факторів на комплексну модернізацію стадіону.
Ключові слова: стадіон, реконструкція, модернізація, спортивні споруди.

Чуб А. Н. Первоочередные факторы, влияющие на комплексную реконструкцию стадиона. Опыт подготовки стадионов к проведению спортивных состязаний международного уровня в модернизации существующих украинских стадионов к ЕВРО 2012 представляет интерес для проведения дальнейших реконструкций спортивных сооружений. Обзор специализированных источников и изучение европейских наставлений выявил основные факторы, которые необходимо учитывать в работе над модернизацией стадионов. Работа над реконструкцией стадиона «Металлист» в городе Харькове рассматривается как пример влияния факторов на комплексную модернизацию стадиона.
Ключевые слова: стадион, реконструкция, модернизация, спортивные сооружения.

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Zabelin S.
CE «Kharkovvodokanal»
(Shevchenko str., 2, Kharkov, 61013, Ukraine)
Aleinikova A., Grinchuk O., Gamzatova C.
Kharkov National University of Civil Engineering and Architecture
(Sumskaya str., 40, Kharkov, 61002, Ukraine; e-mail: gabriel222@rambler.ru)

THE MAIN FACTORS THAT INFLUENCE ON THE OPERATIONAL DURABILITY OF SEWAGE NETWORKS

The article is devoted to the study of the main factors affecting the operational durability of sewage collectors. It is established that the main reasons for the exit from the working condition of pipelines are the presence of corrosion processes; non-compliance of pipeline materials with the design operating conditions; violation of the technology of production of construction works, etc.
Key words: corrosion, sewage collector, wear, operational durability.

Introduction. The sewage system of any settlement is one of the most expensive and most vulnerable parts of underground engineering infrastructure. The state of the environment, the comfort of living the population, the efficiency of the city's enterprises depends on its reliable and uninterrupted operation. A significant part of the sewer collectors of the cities of Ukraine, built in the last century in the period of intensive construction, has now completely exhausted its depreciation resource. As of 2015, the length of sewerage networks in Ukraine was 37,404 thousand km, of which emergency - 12,749 thousand km or 34%.

Construction of a sewerage network in Kharkov began in 1913, about 20-30% of the length of the network was built up to 1960, and about 60% - in the 1960-1980's. The number of drainage networks in Kharkov, which are in emergency condition today, is about 40%. Their construction was often carried out from reinforced concrete, steel and cast iron, which are prone to destruction as a result of the influence of many factors and, first of all, corrosion.