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BIOSPHERE COMPATIBILITY: HUMAN, REGION, TECHNOLOGIES

The founders

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«Southwest State University»
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V.V. TSYGANKOV

RESEARCH OF LEVEL OF THE SOUND OF TRANSPORT STREAMS IN THE FIELD OF THE ACOUSTIC SHADOW OF INTRA DOMESTIC SPACES

When designing noise-protective landscaping in intraquarter spaces of the residential territory of large cities, a reliable and complete picture of the sound field in them, arising from traffic flows of adjacent highways, is needed. This characteristic can not be obtained without taking into account the diffraction of sound waves from the source, in the zone of its acoustic shadow. The article is based on the standard method, reflected in GOST 23337-2014 "Noise: Methods of measuring noise in a residential area ...". The measuring pad measured 18x18m, i.e. Contained 100 measuring points. Used in the course of research, the source of noise is shown in the article. As a measuring path, a two-level sound level meter 00025 of RET with a tert-octave filter unit 01018 with standard microphone MK102 was used. Before the measurements, the path was calibrated with a pistonphone 00003. Three measurements were taken at each point in each octave band. The results of the measurements at each point were averaged according to the standard formula. Based on the averaged results, the method of interpolation was used to build isophones on the measuring platform.

In the construction of the noise map of the city of Bryansk at the end of the 20th century, during an acoustic study of noise penetrating into the residential development, an effect was revealed that fell out of the general picture of the diffraction spread of transport noise. To study this phenomenon, a methodology for investigating the proposed in the article was developed. The object of research was the acoustic environment in the field of acoustic "shadow" at the time of the position of the noise source in the edge of the end wall. Studies were conducted in the new building of the Moscow microdistrict of Bryansk. The measurement time is summer.

In the course of the study, curves of equal sound pressure levels (isophones) are constructed. An analysis of the results shows that with this arrangement of the noise source relative to the edge of the screen house, the interference of waves with a lower frequency occurs more "actively" than high-frequency waves, which agrees with the wave theory. In our case, a picture identical to that of a linear cylindrical noise source located along the emission axis of a real source is observed. Moreover, the radiation level decreases as the distance is removed from the dependences close to the attenuation of sound in the free field.

Key words: noise, the method of calculation, noise protection, acoustic efficiency, domestic spaces, green spaces.

O.A. SOTNIKOVA, E.A.ZHIDKO

PROBLEMS OF WASTE DISPOSAL OF ENVIRONMENTALLY HAZARDOUS AND ECONOMICALLY IMPORTANT OBJECTS OF THE CENTRAL BLACK EARTH REGION AND THEIR SOLUTIONS

Every day more and more urgent problem of the international community is the increasing risk to life and health due to reducing the quality of the natural environment (OS), the constant threat of a major man-made disasters and degradation of natural ecosystems, excessive weight of waste production and consumption. Mankind and his activities over the last century has led to serious pollution of our planet a variety of waste products. Air, water and soil in areas of major industrial centers often contain substances which concentration exceeds maximum permissible norm. It is established that a serious problem translates to the task of disposing of the ash in the ash dumps of Russia is stored more than 85 million tons at the beginning of the twenty-first century.

Today it is possible to use many of the waste industry on the basis of which currently are made of different construction materials. The use of ash waste saves on the cost of basic expensive materials without compromising the quality of the product, simultaneously solving the disposal problem saleslady materials.

The results of the experiments using ash from thermal power station, offers practical recommendations on the application of the composition of the ash CHP for production of structural gazzoleen. To search for the composition of the used mathematical planning of the experiment phased search of the optimum.

The use of mathematical methods of gradual improvement.

Key words: emissions, environment , fuel and ash, waste, gazzoleen.

V. A. YEGORCHENKOV

LIGHTING OF HUMAN SPACES AND HEALTH THROUGH HIS BIORHYTHMS

Biorhythms are very important for ensuring human life and health. Light is the most powerful factor affecting the internal biological clock of a person. Currently, people spend more time in the premises. The aim of the article was to analyze how the illumination in a room varies with time and with different orientations. The existing natural light assessment system (KNI, cloudy sky) is not suitable for this purpose. Therefore, in this paper, as an evaluation criterion, absolute illumination is accepted in a semi-transparent sky. For the conditions of Kiev, with an average annual cloudiness, a horizontal illumination is calculated in the middle point of an office space with one window for different orientations. As a result, unfavorable orientations are defined in terms of mismatch of biorhythms - this is the eastern and south-eastern orientation with a shift in the peak of illumination two hours earlier, and the western and southwestern orientation with a shift in the peak of illumination two hours later. These studies are the first step in this direction. In the future, it is necessary to consider the change in illumination for different orientations from different systems of natural and combined lighting, and how does this affect the degree of mismatch with the rhythm of the change in natural illumination, and how will this affect the human biorhythms and health? This is especially important in the present conditions of compact construction. The given researches can be a basis at working out of the program of work of the combined and artificial illumination in which the artificial illumination during days should be variable.

Key words: light environment, lighting, human health, biorhythms, light climate, semi-transparent sky, room, orientation of windows.

P.L. KARASEV, E.P. PETRASH, D.B. FROG

THE MAIN TECHNICAL SOLUTIONS FOR CREATION OF TREATMENT FACILITIES USING NATURAL TECHNOLOGIES

The article discusses some of the technical, the creation of treatment facilities that combines engineering and biological treatment of the runoff.

Cleaning of rain and melt sewage from such areas as roads, industrial parks, large enterprises, etc., with an area of tens and hundreds of hectares of traditional methods requires a high cost. Treatment facilities for these purposes are made usually of reinforced concrete tank farm, buildings and facilities with pump stations, filters and other engineering equipment. At the same time for treatment of surface waters with natural methods with large areas used bio plateau, which occupy a considerable area, comparable in size with the catchment area. While there are problems of water purification in winter time. The authors conducted research and led engineering development to combine the advantages of these technologies. Was considered the experience of application for water purification of different types of aquatic vegetation. Using a combination of engineering and natural technologies can provide the required quality of wastewater treatment at costs that are lower by 3-4 times. At the same tank farm – capacity storage and bio prod – can be made in the architectural design, allowing you to give them a natural look. As engineering water purification equipment is located in underground compartments and under water, it does not affect the picture of the environment and safe for the environment. This allows you to extend the use of areas near sewage treatment plants.

Key words: sewage treatment, purification, runoff, bio plateau, aquatic plants.

S.G. SHEINA, A.A. FEDOROVSKAYA

COMFORTABLE LIFE ENVIRONMENT: ENVIRONMENTAL ASPECT OF SUSTAINABLE URBAN TERRITORY DEVELOPMENT

The main objective of the study considered in the article is to identify key aspects of sustainable development of urban areas, as well as factors that have a particular impact on the state of the environment. The model of biosphere compatibility, in this case, includes the technogenic component in the concept of sustainable development of the territory as an element of an integrated urban planning system. Town-planning aspects of the formation of the urban environment come to the forefront as a means of regulating not only socio-economic, but also environmental problems. The significance of acoustic pollution in the context of the quality of the urban environment and the stability of the territorial system as a whole is revealed. To create maps of acoustic pollution and assess its impact

on the comfort of the urban environment, the authors propose to use ArcGIS ESRI software, which in future will make an integrated assessment of the urban area for the rest of the indicators. The maps of: noise sources of the territory of Rostov-on-Don, noise measurement points, acoustic pollution and compared the results of investigation of noise pollution with an electronic map of the comfort of living. Also the study of acoustic pollution carried out by the authors made it possible to identify zones of noise discomfort and to select a number of measures to protect against noise, depending on the planning organization of the territory of the city of Rostov-on-Don. The main objective of sustainable design in urban planning is to create an environment for life, which is characterized by the adoption of modern rational, economical, technological and environmental solutions that take into account not only existing interests, but also ensuring the progressive development of the territories. The ecological aspect in the sustainable development of the territory is assigned one of the key roles, which indicates the relevance of the subject matter under consideration.

Key words: urban environment quality, acoustic pollution, urban environment, town planning, comfort criteria, urban environment assessment, noise.

A.I. IVANTSOV, V.N. KUPRIYANOV

TEMPERATURE MODE OF SURFACE OF ENCLOSING CONSTRUCTIONS IN THE CLIMATE CONDITIONS OF THE RUSSIAN FEDERATION

Durability and service life of polymeric heat-insulating materials in enclosing structures depends not so much on the processes of freezing and thawing as on the effect of high temperatures. The temperature regime of enclosing structures is determined by the temperature effect of the internal environment, which can be considered constant, and the changing effect of the external environment. The external temperature influence is determined by the total effect of the outside air temperature and the heat flux of solar radiation that comes to the outer surface of the enclosure, the so-called conventional temperature of solar irradiation.

The article deals with the dependence of the conditional temperature of solar irradiation of horizontal and vertical enclosing structures on the latitude of the terrain and the duration of sunshine for the climatic conditions of the Russian Federation. The analysis is carried out by determining the equivalent surface temperature of the model enclosing structure at an annual interval.

It is shown that for horizontal surfaces the coincidence of the intensity gradient of irradiation and the sunshine gradient from northern latitudes to south increases the difference in equivalent temperatures over the annual interval: in southern latitudes horizontal surfaces have a large surface temperature in comparison with northern latitudes.

For vertical surfaces, equivalent temperatures increase with increasing latitude of terrain, but due to the difference in the gradients of solar radiation and sunshine, the difference between equivalent temperatures for different latitudes at an annual interval is practically equalized

The thermal effect of solar radiation on the enclosing structures on a short-term interval depends on the latitude of the construction site, since it is generally determined only by intensity. On an annual interval, the effect of solar radiation on horizontal surfaces depends on the latitude of the terrain, on vertical surfaces of different orientations - almost constant for the entire territory of the Russian Federation. This trend can be used to simplify the method of calculating the equivalent operating temperature of enclosing structures.

Key words: enclosing structures, temperature, solar radiation, climate, duration of sunshine.

M.Y. KLIMENKO

PRACTICAL APPROBATION METHODOLOGY OF DECREASE OF ENVIRONMENTAL POLLUTION IN CAPITAL REPAIR (RECONSTRUCTION) OF URBAN DEVELOPMENT

The article presentation of the results testing techniques reducing environmental pollution in the system of recovery technical condition of building urban areas. Established methods of evidence-based on the basis of theoretical studies performed using the analytical generalization of scientific and practical results in the field of determining the level of environmental pollution during overhaul (reconstruction), the method of probability theory, system analysis and the theory of disperse systems. In implementing the reduction of construction, waste into the environment must perform on the stage of gathering information, to form a system with optimum performance, meeting the highest value of resource and energy efficiency for the given conditions of the object of urban development. The information base for the practical implementation of methods of field survey data served as the technical condition of urbanized areas in the city of Rostov-on-Don (Leninsky district) and Novocherkassk

(Pervomaisky district) of the Rostov region. As part of the research produced the following tasks are solved: the collection of baseline data; identification and comparison of technological combinations each functional stage of the system reduce the construction waste into the environment; calculated the evaluation criteria resource and energy efficiency; formed the optimum operating parameters for each stage of the system. Practical implementation of the methodology for the objects of urban development on the example of the city of Rostov-on-Don and Novocherkassk showed that the potential ecological and economic effect of 1 rub. 2 kop. and 1 rub. 11 kop. 1 kg construction waste respectively. Studies in the use of construction waste are fragmentary and require their actualization.

Key words: construction waste, environmental safety of construction projects, resource conservation, energy efficiency, repair, maintenance, reconstruction.

A.M. MAKAROV, I.V. MATVEEVA, E.O. SOLOMATIN

ECOLOGICAL ESTIMATION URBAN POWER FACILITIES UNDER NOISY ADJACENT TERRITORIES

Placed on the territory of urban buildings energy facilities (CHP, RTS, boiler houses, etc.) can create increased noise levels in the building. To assess the possibility of their placement in the building and determine the necessary sizes of sanitary protection zones, as well as to choose the construction and acoustic means of noise reduction on the way from the noise source to the building, it is necessary to solve three consecutive tasks related to the estimation of the noise regime inside buildings with noise sources, The definition of noise levels on the external surfaces of buildings, and noise evaluation in areas adjacent to noisy objects. This requires methods for calculating noise inside buildings, on the outer surfaces of their fences, as well as on the boundaries of the adjacent to the energy building sites. The methods should objectively take into account the formation of noise fields within the closed volumes of buildings and the propagation of sound energy in the open spaces adjacent to the buildings. The article provides information on methods developed by the authors for calculating direct and reflected sound in production buildings and in adjacent territories. In calculations using the proposed building methods, depending on the sound energy emitted from its surface, it is considered as a linear, flat or volumetric source. The proposed set of calculation methods makes it possible to determine the location of the position of energy objects in urban development and to evaluate their influence on the noise regime of the surrounding environmental objects. To implement the calculation methods, a computer program has been developed that makes it possible to perform a detailed analysis of the factors that affect the noise regime of the building and to make a choice of noise protection means. An example is given that illustrates the capabilities of the developed methods and the computer program that implements them.

Key words: city building, power facilities, the noise climate regime, the calculation of noise in buildings and areas.

E. L. BUDARIN

ARCHITECTURE, SPACE, ECOLOGY. ANALYSIS OF THE WORLD ECOLOGICAL SITUATION AND THE PROBLEM OF LOW ECOLOGICAL BUILDING DWELLINGS

The article subject is connected with carrying out in 2017 in the Russian Federation Year of ecology, the Decree of the President of the Russian Federation V. V. Putin No. 7 of January 5, 2016 is considered.

According to the UN, the construction branch considerably influences global emission of greenhouse gases (GHG) therefore and this direction demands big changes.

This important industry is connected with all economic complex and it is subject to transformation for introduction of "green construction".

That is why it is necessary to inform constantly and in due time experts of a construction complex on environmental problems, climate changes, achievements in the field of energy efficiency and energy saving. The scientific and technological revolution has led to an aggravation of an ecological situation on our planet and as a result growth of the population and an urbanization of the cities.

Ecologists of the whole world have for the first time begun to speak about future reality of an ecological Apocalypse and Armageddon.

Due to the intensive growth of the cities, technical and technological progress there was a number of environmental problems, the ecological architecture has gained development.

In connection with the intensive growth of cities, technical and technological progress has led to a number of environmental problems, environmental architecture has developed. "As the satisfaction of material demands arise higher - spiritual, which are the engine of human progress and development.

At present, humanity is in the fourth stage, designated by the Survival Strategy. The search for reasons for the deterioration of the ecological situation in the world led researchers to formulate the problem of human survival. The problem of survival has always been one of the main problems of mankind.

Industrial or scientific and technological revolution, they contributed to an increase in the rate of population growth on our planet. Over the past 150 years, the world's population has increased five-fold and totaled more than 6 billion people in 2000. Today the population of the Earth is 7.2 billion people. In Russia, the population now amounts to (together with the Crimea) 146, 1 million people. Currently in Russia, 74% of the urban population, and throughout the world on average - 50% of the population lives in cities.

Emerging megacities today led to a crisis of the ecosystem of our planet. Utopian theory of unlimited development of large cities turned out to be a myth in practice and this myth must be dispelled.

Key words: *low dwelling; energy efficiency and energy saving; linear metabolism; circular metabolism; environmental problems; sustainable development; global ecological crisis; total environmental disaster.*

V.A.SMIRNOV, P.A.PHILIPPOVA, I.E. TSUKERNIKOV

VIBRATION ANALYSIS IN RESIDENTIAL BUILDING, LOCATED IN THE TECHNICAL AREA OF THE METRO

At train service on lines of the subway of small laying vibration influence which can negatively influence on a condition of buildings, communications, and also people is created. In the paper the analysis of levels of vibration in rooms of the building located in a technical zone of the subway is made. It was measurements of parameters of vibration of overlappings of the second and fifth floors taken. Registered values of vibration accelerations, with their subsequent recalculation in vibrospeed and comparison with standard values according to the technique presented in the set of National Standard SP 23-105-2004 "Assessment of vibration in the design, construction and operation of metro facilities". Time of measurements was chosen from a condition of continuous registration by not less than 10 events of passing of trains of the subway. Also in paper was executed comparison of a difference of the maximum levels of the vibration registered in measurement points on floors of the building to theoretical decrease in the maximum level of wave front increase in distance from a tunnel. The calculated values are significantly higher experimentally received that is connected with interaction of a construction and the wave front of fluctuations from a tunnel, existence of resonant fluctuations not only in vertical, but also in the horizontal directions. The made analysis of results of the measurements executed on various floors of the building during various removal from a tunnel axis has allowed to estimate influence of the constructive scheme of the building and to give an assessment of compliance to requirements of standard levels of vibrations

Key words: *vibration, vibration estimation, metro, measurements, resonance, theoretical reduction of vibration level.*

A.E. SHASHURIN, K.V. BUZHINSKIY, I.S. BOIKO

NOISE BARRIERS DESIGN AND CONSTRUCTION: COMMON ERRORS EXCEPTION, COMMONALITY AND CONSTRUCTION COST REDUCTION

Article describes problems, which are result of the absence in the Russian Federation of the Noise Law, which would regulate the mutual relations of the parties concerned, the conduct of noise protection measures, the definition of the zone of responsibility, the appropriate penalties and other. The article identifies and shows the main errors in noise barriers design and construction (which are the most often-practiced type of noise protection measures), including errors directly developers of design and working documentation, errors in mounting and poor quality panels (structural defects). The result of the described errors is the acoustic fragility of the noise barriers, when the barrier materials cease to be operable and require regular maintenance. Russian normative and technical documentation different levels (state standards, standards of organizations, methodological recommendations, departmental building codes) has been analyzed, main shortcomings have been identified, and directions requiring corrections have been described. Article shows illustrations of the installed noise barriers at the operating facilities in the Russian Federation, which have lost their functional purpose due to errors in the design, construction and fabrication of structures. Comparison of domestic and foreign experience in the design of soundproof structures has been performed, and ways of solving the indicated problems have been proposed. The authors put forward the idea

of forming two main groups of noise barriers: unified and individual. The unified structures of noise barriers at the introduction and testing stage are proposed to be given the status of "recommended", and, subsequently, with their successful application and implementation, including in the task of reducing the cost and timing of the construction of barriers, in the category of "mandatory".

Key words: *noise barrier, designing, construction, mistakes, normative and technical documentation.*

A.I. ANTONOV, I.L. SHUBIN, T.S. YAROVAYA

CALCULATION OF THE PROPAGATION OF DIRECT SOUND IN THE URBAN ENVIRONMENT FROM OBJECTS WITH MASS STAY OF PEOPLE

In modern urban development there is a large number of objects with a massive stay of people clamoring the adjacent territory. To assess the noise regime in such areas and develop noise protection measures, methods are needed to calculate the propagation of sound energy from noisy objects, taking into account the specific features of radiation of sound energy by such objects.

The main feature is the random nature of the position and direction of noise emission by event visitors. The article contains expressions for calculating the averaged directivity factor and the acoustic power of speech. Calculation of direct sound in the urban area can be performed by mathematical modeling, taking into account the probability of random position, orientation and duration of speech of noise sources. Mathematical modeling of random processes is laborious enough, therefore it is used to solve practical noise control problems, but it can be successfully used as a reference method for evaluating the applicability of other simplified calculation methods. For practical use, the article proposes a calculation method that realizes the principle of averaging the parameters of discrete point sources of noise due to their replacement by a continuous radiating surface. The acoustic parameters of the noise source, such as the distributed acoustic power and the directivity of the radiation from each point of the surface, are calculated on the basis of the random nature of the noise emission by visitors to mass events. The resulting sound pressure levels at the calculated points are determined on the basis of an analytical or numerical calculation of the surface integral from the elementary radiators to which the noise emitting surface is divided. To implement the methods of calculating direct sound, a computer program is developed and an example of its practical use is given. Comparison of the sound pressure levels calculated by different methods and measured values showed good agreement of the results and the possibility of using the developed techniques and computer program for solving noise reduction problems in urban areas from objects with mass stay of people.

Key words: *urban development, objects with mass stay of people, calculation of direct sound, noise regime.*

