

FEATURES OF DESIGNING UNDERGROUND PARKINGS IN THE HISTORICAL ZONES OF THE BIGGEST CITIES OF UKRAINE

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Abstract. The article is devoted to the ecological and economic aspects of the construction and design of underground parkings. The normative base is considered, theoretical researches are analyzed and tendencies in the urban development of the largest domestic and foreign cities are studied. On the basis of historical research an algorithm for the development of construction and design of underground parking for the territory of Ukraine is formed. As an example of an automated underground parking project which was created by the author of the article the main ecological and economic aspects of the construction of underground parking lots are indicated. The article outlines the main requirements, constraints, principles of energy saving and economic feasibility for the design of underground parkings.

Keywords: underground parking, ecology, economy, design, construction.

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Introduction

The question of resolving the transport problem is acute in the modern world and especially in the largest cities of Ukraine. Measures aimed at improving the situation associated with the movement of vehicles have already been implemented (expansion of the street and road system, increasing the speed of movement). The acute problem is the question of placing vehicles. Solving the problem of improving the comfort of living in large cities is the use of underground space as a backup. This problem is being paid attention at international symposiums and conferences (South Korea, Seoul "8th International Symposium 2014"; Belarus, Minsk "12th international scientific and technical conference, 2014") and in state documents including the Law of Ukraine "On Regulation of Urban Development" dated February 17, 2011 No. 3038-VI, Law of Ukraine "On planning and development of territories" dated April 20, 2000 No. 1699-III, Law of Ukraine "On the General Scheme of Planning of the Territory of Ukraine" dated February 7, 2002 No. 3059-III.

The number of registered cars in all regions of Ukraine according to the information and analytical group AUTO-Consulting is 187 cars per 1000 inhabitants. As for the large cities the indicators are significantly different. For example the city of Kyiv has such indicators: 343 cars per 1000 inhabitants. According to the normative documents places in underground parking are calculated in accordance: not less than 25 cars per 1000 inhabitants. Now this indicator does not cover the need for places to store personal vehicles. The current practice of designing parking lots does not meet the new requirements.

Environmental and economic aspects of design and building of underground parkings in Ukraine

Trends are detected in the use of underground space for the placement of transport facilities leaving pedestrians the level of land analyzing international research and practical achievements. The current experience of major cities of Ukraine indicates to the development of construction of underground parking in the historic areas but the recommendations for the architectural planning and functional organization of the internal space are not well-founded and need further study. The main task is the creation of artificial climate like as ecological comfort in the underground space which will provide favorable conditions for people to stay. This achievement made possible the wide development of the construction of underground parking lots as their construction is a necessary measure in the historical areas of the largest cities in Ukraine. Underground parking lots are the most relevant and promising direction of such development as it provides the solution of many social and economic issues in the field of urban development.

Trends in urban planning particularly in design of underground parking are expressed in the formation of promising laws, norms and rules for improving the culture of the population and reducing the inappropriate waste of free time. Nowadays the territorial task of large cities has become the economical use of the territory. It was manifested in urban planning in more intensive use of the territory with the combination on one site of buildings of different purposes and with using the underground space as a reserve for increasing the construction area.

The base of placement and architectural and artistic solutions of structures in the underground space is the research of such scientists: G.E. Golubev, V.S. Yegerev, V.A. Ilyichev, Y.V. Mikhailova, T.I. Sadovska, O.S. Semenova and others.

The issue of a volumetric-planning and engineering organization of parking is considered in scientific works by V. P. Adamovichus, G. E. Golubeva, O. I. Yezhova, G.D. Kaganovych, A. A. Lisogorskyi, B. F. Serebrova, V. P. Chirkova, V. V. Seshtokas, P. V. Yushkavichius and others.

The normative base on the design and construction of underground parking is divided into parts of the issue namely scientific studies and publications reflecting the following issues: the humanization of the architectural environment of parking in the city structure (*Golubeva, 2007*), ecological and economic assessment of the use of underground space (*Zaitsev, 2008; Polikarpova, 2010*), systematization and substantiation of the technologies of the construction of urban underground structures (*Lerner, 2000*), study of the economic efficiency of the use of underground space (*Shutov, 2000*), technological principles of the construction of garage complexes (*Davydiuk, 2004; Naumov, 2102*), influence of vehicle parking on the capacity of the street-road network (*Zagorui, 2007; Lobashov, 2010*), town-planning principles and methods of forming a parking system (*Stelmakh, 2002*), formation of a strategy for increasing the effectiveness of the organizationthe construction of parking complexes (*Tulieva, 2009*).

Analysis of theoretical works revealed a lack of a clear approach to the problems of organization of underground construction on the modern territory of the largest cities of Ukraine, issues of formation, ecological, economic and consumer safety.

On the basis of analysis of the existing normative and reference base of parking design it is discovered that at this stage of development of the level of motorization its position does not correspond to the needs of the inhabitants of the largest cities of Ukraine. The street-road

network in historical areas is not intended for growth and development of motor vehicles. So the question arises as for the modification and additions to the existing normative documents concerning the regulation of the process of storage cars in the historic areas of the largest cities of Ukraine. Creation of a system of facilities for permanent and temporary storage of passenger cars will lead to a decrease social, transport and environmental tensions of the city. Town-planning aspects are not taken into account in the analyzed normative documents namely the basic norms and rules as for designing and building and economic and environmental aspects of construction in territories with a large number of cultural heritage sites are not formed.

The urgency of the construction of underground parking for the largest cities of Ukraine can be explored on the example of the historical development of the design and construction of underground parking lots in world practice. As of January 1, 2017 the largest cities of Ukraine are Kiev (population 2868702), Kharkiv (population 1451132), Odesa (population 1017022).

For large cities the problem of vehicles storage has been solved for more than a decade and there is a great world experience of a positive solution this problem convenient for motorists and pedestrians and at the same time commercially successful. But despite of considerable world experience, building technologies and tested automated systems design and construction of underground structures on the territory of Ukraine is extremely slow and faces a multitude of objective factors that hinder the implementation of humanistic ideas of freeing streets from excessive transport. This is largely due with ways to solve problems of creating underground parking as separate objects. Especially sharply this situation is reflected on the example of the historical districts of the largest cities of Ukraine where the issue of designing and building underground parking is extremely important. For the creation of any underground multi-tier structure it's necessary to transfer engineering networks, closing of street traffic and strengthening of surrounding building. Temporary storage of vehicles in the territory not related to the carriageway will be solved in this case. But along with this underground space in the largest cities is also relevant for resolution of many other transport tasks the priority of which is undeniable.

Therefore it is necessary to consider this issue in the structure of world architecture namely to determine the main periods of development of the construction and design of underground parking in the world architecture (Fig. 1). Thus the algorithm will be formed for the territory of Ukraine namely for the historic zones of the largest cities.

The purpose of the article is to determine the principles of energy conservation through the construction of underground parking lots and techniques for the organization of the internal environment. To achieve this goal the following tasks are addressing:

- to study and systematize the analysis of recent research and publications on the construction of underground parking lots in historic zones of cities with a population of more than 1 million people;
- to determine the conditions of use and factors of the formation of underground parking;
- to develop a classification of underground parking lots for economic, ecological, technical, architectural and construction characteristics;
- to define the architectural and planning principles of underground parking.

The possibilities of using a car largely depend not only on its maintenance but also from storage conditions. The cost and energy efficiency of these objects depends to a great extent on the characteristics of the parking and its capacity.

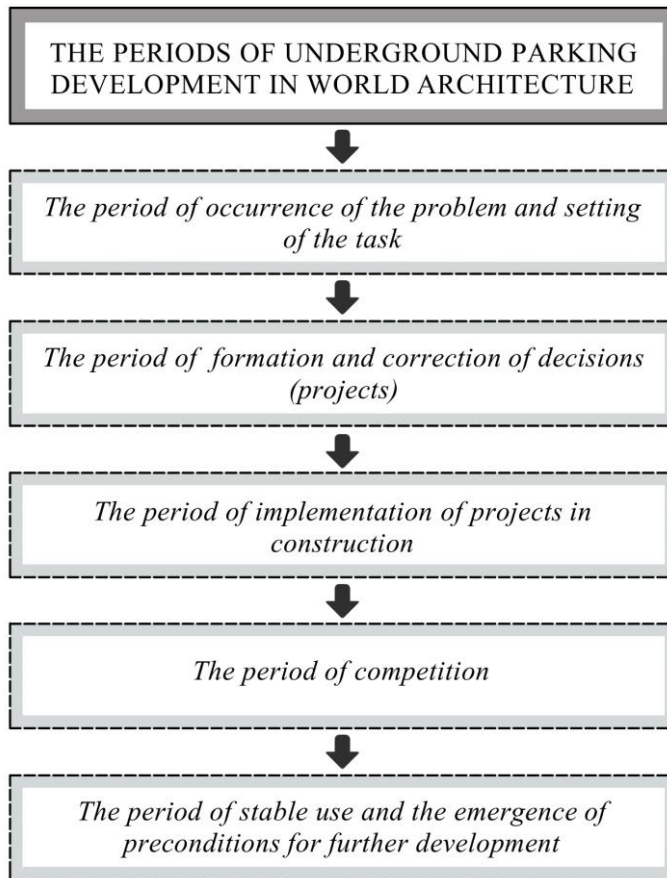


Fig.1. Periods of underground parking development in world architecture

The four main economic factors determining which parking will be (above ground or underground, one-level or multi-level):

- the cost of creating parking;
- the cost of land;
- city-planning restrictions;
- technical limitations.

The advantages of underground garages and parking are obvious. First of all underground parking garages save territory as they can be located under existing buildings, roads and landscaping.

In an environmental sense underground parking also has advantages over land: emissions of exhaust gases of cars are carried out only through ventilation and in the surface layer their concentration is lowered. That's why sanitary and hygienic requirements for the placement of underground parking lots are much softer. The energy aspect is especially important: the fact is that the air temperature underground all year round remains constant and can be 8-13 ° C (depending on the breed) which allows reducing significantly energy consumption. Therefore appropriate thermal insulation of the building is required for the realization of this advantage.

An important role is played by factors that determine the very possibility of creating underground parking. On the one hand underground parking is sometimes the only possible construction options surrounded by historical buildings.

Difficulties of underground construction:

- availability of underground communications;
- complex hydro-geological situation in urban development;
- the need to strengthen the foundations of the nearest houses;
- high cost of construction costs comparing with ground parking.

When designing underground parking lots it is necessary to ensure fulfillment of a number of general requirements:

- security;
- technological capacity;
- convenience of entry and exit (they are located separately);
- good waterproofing;
- availability of necessary engineering systems providing microclimate (ventilation and control of gas pollution, heating);
- fire extinguishing and smoke removal;
- communication;
- lighting;
- the height of the ceilings and the width of the entrances-departures and parking places is sufficient for all types of cars.

Recently in the large and the largest cities underground urbanization is becoming more widespread. From the point of view of the architectural ecology this is due to that underground structures are more protected from the influence of many harmful factors which act on a person in ordinary buildings: noise, air pollution, etc (*Tulieva, 2009*).

Nowadays there are more than 100 types of underground structures that are located at different depths: from 4 to 4,000 m, preferably 4-20 m. Compared to ground-based underground structures have the following environmental benefits: can be located almost throughout the city due to minimal impact on the landscape and the environment; do not violate the existing structure of urban development; save energy in the process of their exploitation; characterized by increased vibration resistance and acoustic insulation (*Peredelsky, Pryhodchenko, 2003*).

Technically the easiest underground construction is in cities with advanced metro-construction where the availability of such organizations allows them to use their methods and capacities for the development of underground space. The main types of construction of underground structures are open pits (the main drawback is to require large areas and therefore almost unacceptable for urban development), fertilization (the disadvantage is limited by the types of soils), "the wall in the ground" and the round shape structure. The latter method is optimal for the construction of underground garages because it does not require the participation of special construction organizations and allows erecting an underground structure in close proximity to existing buildings (*Tulieva, 2009*).

But with the development of underground space in urban areas there is a series of complex engineering problems: necessity of arrangement of complex systems of ventilation, waterproofing, lighting, sewerage, special alarm; application of complex equipment; ensuring the safety of underground work; utilization of soils.

Apart from these purely technological problems do not forget also that the construction of underground structures is possible only in areas that are not prone to flooding: even if the

underground structure will be well insulated and itself will not suffer from flooding it can substantially change the hydro geological regime of the surrounding areas and to provoke flooding of existing surrounding buildings.

Energy conservation in the architectural and construction industry can be achieved through the construction of dug buildings which are called energy-saving. In this case the principle of energy conservation is simple: the earth protects the building from wind, cold, etc. (Tulieva, 2009). The energy-saving effect of deep underground parking is determined by the protective layer of soil. In summer deep buildings practically do not require air cooling in the premises because it is cooled due to the return of heat through the construction (floor, wall, cover) soil scum. Special cooling measures may be required only during extremely hot periods. In the winter time soil bulking significantly reduces the heat loss of the building due to the creation of additional thermal resistance, the practical exclusion of uncontrolled infiltration of cold air due to the lack of constructions as well as a significant change in the amplitude of daily and seasonal temperature fluctuations. As a result in-depth structures operate as a rule under conditions of favorable thermal regime which contributes to their preservation.

From an economic point of view deepened buildings are also interesting with possibilities of use for building territories unsuitable for the location of terrestrial buildings – with large slopes or located along the transport highways and near aerodromes. The main requirements for the site are: the presence of dry not prone to erosion preferably sandy soils; low groundwater level; the presence of relief; small relative humidity (Tulieva, 2009).

Hydro geological conditions are one of the most important characteristics of the site chosen for the construction of underground parking. Groundwater and soil composition can limit the depth of laying and complicate the construction process. In addition any major construction is particularly affecting the underground watercourse and we have to take into account the influence of the created parking on the foundations of the surrounding buildings.

Urban planning constraints are taken into account when designing in particular the protection zones of architectural monuments and various communications. At the same time it is necessary to meet the requirement to provide 10-minute pedestrian accessibility for car owners if it's about parking that is designed to permanently store cars.

The most difficult task in terms of the economy is the installation of underground parking lots under the roads. Underground car park organized directly under the carriageway is convenient; however it requires a lot of expenses for strengthening of supporting structures and covering. These costs will be justified in the presence of several underground tiers. On the other hand the costs associated with the terms of performance are sharply increasing with an increase the number of underground tiers.

Construction of parking in Europe dates back to the sixties. Among the underground parking lots of the middle of the last century are quite difficult technically structures which today are of interest to architects. So an underground garage was built in Geneva built by the round shape structure. This well with an external diameter of 57 m under its own mass and special knives is lowered by 28 m below the ground level. A guide line is installed on the inside of the reinforced concrete wall width 21.5 m which gives the rigidity of the wall of the well. This guideline in eight turns reaches a length of about 1000 m and two of its 9.5-meter wide strips allow the simultaneous movement of cars in both directions. The parking places are located on two sides of the lane perpendicular to it and divided into 500 boxes (Godard, 2004; Admiraal, 2015).

Conclusions and suggestions

Thus the issue of ecological and economic aspects in the design and construction of underground parking lots is presented by such features in terms of ecology as: lower concentration of exhaust gases in the surface layer, energy conservation during operation, absence of noise and vibration contamination of the territory. As for the economic aspects of this issue they include such features as: savings in construction materials compared to land construction, energy saving (no need for heating), justified economic costs of building materials in the presence of several tiers, space saving due to the round shape structure during the construction of an automated underground parking and savings of urban areas. These aspects of construction are presented in Fig. 2.

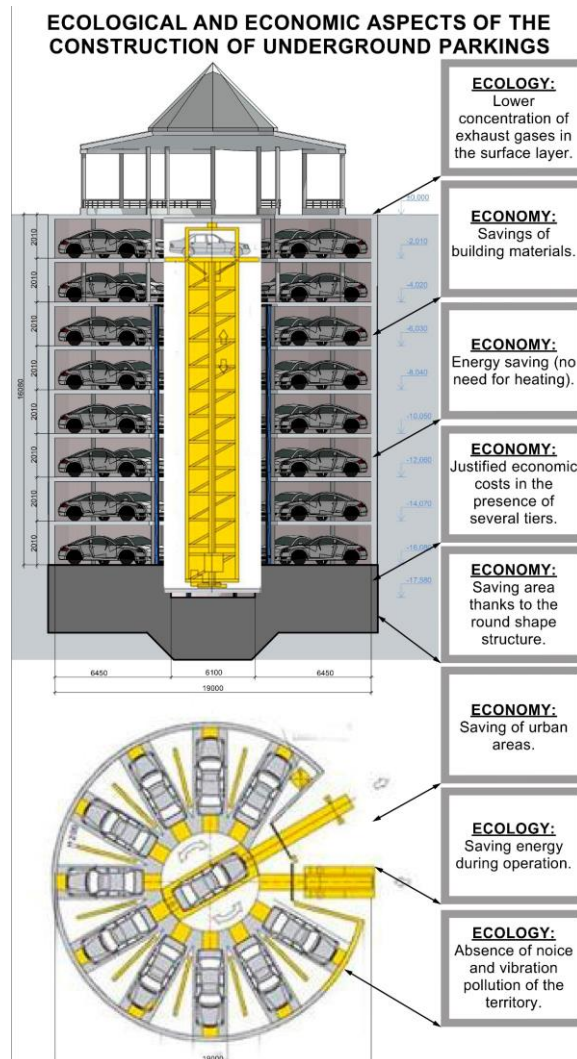


Fig. 2. Ecological and economic aspects of the construction of underground parking

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HUMANITIES

THE LONG PATH OF ISLAM TO "THE BLACK COUNTRIES"

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Abstract. Islam as a mode of belief of the Arab peoples existed for several centuries in its original reign of the Near East. But as soon as it had a vigorous expansion, it turned to the "black countries" on the paths of Africa, first North, then South. In its desire to extend to the whole Africa, the conquering march of Islam was not smooth, it experienced many obstacles and wars. The islamization of the world took place because of many wars, but those wars did not always end with the victory of the Muslims, they sometimes led to the decline of the project of Islamization of the whole world.

Keywords: Islam, Muslim, black countries, Christian, expansion, war, conquest, islamization.

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Introduction

Faire un article sur « LA LONGUE MARCHE DE L'ISLAM VERS LE « PAYS DES NOIRS » » revient à s'étendre sur l'origine de l'Islam, son fondateur, ses jeux et enjeux, ses objectifs et le long processus qui a conduit à son introduction dans plusieurs régions du monde, au-delà de son lieu de création. Dans cet article il est question du processus d'islamisation du monde en passant par le continent africain plus précisément. Il est aussi question des jeux et enjeux des guerres qui ont permis d'introduire l'islam dans plusieurs pays africains, et les obstacles qui ont jonchés le chemin de cette islamisation.

1.0 L'islam sur le chemin de la conquête

L'islam est né dans l'ouest de l'Arabie centrale au début du VII^e siècle. À peine dix ans après la mort du fondateur (en 632), les Arabes musulmans ont déjà conquis les cités les plus prestigieuses du Proche-Orient: Damas (en 636), Jérusalem (en 638), Alexandrie (en 642); et le mouvement foudroyant d'expansion n'était qu'à ses débuts.

Dès ses origines, l'islam se présenta ainsi comme la religion du succès, de la victoire par les armes. Cette étiquette lui est restée attachée à travers les siècles; une étiquette dont il faut vérifier le bien-fondé des composantes en ce qui concerne la