



View of Odessa, 1850, modification: cut u. Druck bei Carl Hohnfelder in München.

Die russische See- und Handelsstadt Odessa.

Smart port city of Odessa: brilliant embodiment of Vitruvius' theories of beauty

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ABSTRACT

The condition of successive development, sustainability of the whole is a continuous relation between the present, the past and the future. An interdisciplinary approach aimed to create the holistic picture of the world helps to get an objective assessment of the logic of the environment changing process. The birth of a new Polis of the North Black Sea Region at the end of 18th c. led to the complex of geostrategic economic prerequisites for the development of the southern territories of the Russian Empire. The generation of the founders of the port city of Odessa (*J. de Ribas, F. de Volan etc.*) was formed in the era of European classicism the cultural context of which "was washed by the Gulf Stream of antiquity". Noospheric approach was manifested in the ability to create reality by means of techniques mentioned in Vitruvius' theories of beauty. The characteristic feature of the development of Odessa is creating the comfortable environment in harsh, aggressive conditions of the southern steppe zone - "deadly heat in the summer and terrible blizzards in the winter, sandy and alkaline soil, lack of freshwater springs". Taking into consideration astronomical, climatic and hydrogeological factors, they chose the harbour, the place to create the port city of Odessa, perfectly well. They provided optimal sun exposure and healthy living conditions. F. de Volan's city plan of Odessa is the master plan of the world's socio-natural development. The genetic code of the unique Polis culture was established in 1794, in accordance with the requirements of eurhythmy-harmony - "Strength, Utility and Beauty" by Vitruvius.

KEYWORDS

smart city, Odessa, genetic code, Vitruvius theory

TOPICALITY

Today, more than ever, it is necessary to be aware of the continuity of human experience. The principle of continuity is the basic principle of the universe. V. Vernadsky defined the process of continual expansion of the noosphere boundaries as "the pressure of life". The extensive influence of the technogenic civilization determines the search of intelligent socio-natural interaction and their optimization. The rate of changes increases, in this connection the depth of devaluation and transformation of the urban environment in physical, aesthetic, psychological terms increases dramatically. One of the reasons - semantic disaster - is caused by the creation of a fundamentally new architectural language that expresses only the material and technical content. Another reason is the opposition of new forms, as more sophisticated, and historical forms. Valuable forms and their expressivity can only appear as a result of successive evolution of gained experience.

The condition of successive development, the sustainability of the whole is a continuous communication between the present, past and future. The principle of continuity is the best tool to explore reality. It is sometimes necessary to understand and evaluate objectively the logic of changes of the living environment - that of cultural (partly mental) and physical, as well as valorization of "smart" material and spatial systems.

An interdisciplinary approach contributes to the objective assessment of the environment changes, as well as a holistic picture of the world. Therefore, this work deals with the complex scientific opinion of Odessa's researchers in archeology, urban construction and architecture.

1. PREREQUISITS

At the end of 18th c. the North Black Sea Region received favorable geopolitical opportunities - the Treaty of Peace with the Ottoman Porte, the annexation of the Crimean Peninsula, the reunification of the ethnically homogeneous Left-Bank and Right-Bank

Ukraine. Global changes in the international situation, the access to the Black Sea allowed us to integrate the southern regions of the Russian Empire into Europe. The North Black Sea Region started to play the role of an independent factor in the development of socio-economic and political processes of the continent. In 1802 Napoleon wrote to Alexander I:

«The State of Your Majesty and France would get a lot of benefits if we had direct trading routes between our ports of the Mediterranean and Russia across the Black Sea. We could ship directly from Marseille to the ports of the Black Sea the products of our colonies and manufactories, and in return we would receive bread, timber and other goods easily delivered by major rivers flowing into the Black Sea».

The birth of a new Polis named "Odessa" determined a number of objective (geo-strategic, economic, climatic) and subjective (complete professionalism, noospheric thinking of its founders) prerequisites. "The influx of immigrants provided the North Black Sea Region with people educated in a European manner whose knowledge, intelligence and talent was a guarantee for the future prosperity of the region. Artisans and farmers, teachers and doctors, botanists and bankers from France, the Netherlands, Italy, Germany and many other European countries engulfed in the flames of wars, gave that amazing mixture of Western Europeans with Slavic population, which seamlessly fit into the political system of the Novorossiysk territories" (Tret'yak, 2004).

2. "ANTIQUÉ" MENTALITY OF THE CITY'S FOUNDERS

All important human actions in the second half of 18th c. were dictated by genius and fashion for ancient style. Ancient mentality infected the whole European society. The origin of this process dealt with excavations in Herculaneum and Pompeii (1733-1766) which marked the meeting of Europeans with the world of antiquity. Those excavated ancient

masterpieces which caused a real "boom" of ancient culture in Europe. In fact, deep "antique" mentality of contemporary European culture, which was washed by the "ancient Gulf Stream" and arranged the whole structure of its life on ancient models, was obvious" (Knabe,1993). The motto in the period of classicism was coined by I. Vinkelmann: "The only way for us to be great, if any, inimitable, is to imitate ancient people". Even the wars against Turkey were perceived by European classicism as the struggle between Europe and Asia. The Ottoman Empire is barbarian Persia, the Achaemenid Empire. Byron did call Izmail Troy (Dobrolyubskii, 2012).

General mental-cultural atmosphere of classicism inevitably framed with "antique motivation" the actions of all the people of that time. The whole generation of the founders of Odessa (Jose de Ribas, Franz Devolant and others) was educated on ancient models, Iliade and Odissea. "Passionaries" souls sincerely felt themselves like ancient heroes, they were followed, they called themselves by ancient names.

In 1769 the young J. de Ribas left Naples, enrolled for military service in Russia and went to war against Turkey-Asia for "the freedom of Hellas". In the same way Odysseus left Ithaca against his will. This symbolic deed was the determinant fact to focus on the destiny of Odysseus who was a reluctant "wanderer", vagabond in exile, who wanted to return "home" (Dobrolyubskii, 2012).

Jose` (Joseph) de Ribas- Beyonce was born in Naples on June 6th 1749 to the family of an official of noble Catalan origin. The young J. de Ribas was brought up in "the epicenter" of the boom period of ancient culture at the court of the Kingdom of Naples.

« [...] The boy stood out with his vivid imagination, clear mind, passionate nature and impatient temper», - noted his tutors attributing these characteristics to his to his Spanish-Scottish temperament (Fedenev,

Figure 1.

Map of Odessa, 1809



1994). De Ribas' actions were determined by the type of his personality, his "ideal" - both as "a cultural hero of antiquity" and at the same time as "a hero of his epoch" (Knabe, 1993).

Joseph de Ribas, Franz de Volan and the military engineer Andrey Shostak personally explored the whole shoreline from Ochakov to the Dniester mouth measuring the depth of the harbours and bays and they came to the conclusion that the Bay of Khadzhibey met the requirements to build "[...] a military harbour together with a merchant wharf" - both in terms of hydrographic position and communication by land [...]. (Fig.1) (De Ribas, 1995)

The name "Khadzhibey" can be interpreted as "a companion of the Great Hadji", while "Odyssey" is "a companion of Zeus". It is appropriate to assume that J. de Ribas' knowledge of seven languages could provoke semantic confusion in his mind as to the names of Khadzhibey and Odyssey. The ancient Odyssey in honour of his victory over "the barbarian" Khadzhibey must immortalize this place and build here a city in his honour.

3. THE RITUAL AND FOUNDATION PLACE OF ODESSA

In 1995 the excavations at the corner of Langeron and Richelieu streets discovered not just the foundation place of the first house but that of a city (Gubar', 1996). They discovered some archaeological remains of the foundation ritual of Odessa- fragments of crystal glasses and a tray, some bottle shards with a stopper, a 1784 "five kopeck" coin with the monogram of Empress Catherine II along with a Russian double-headed eagle and a rust dagger. This type of ritual was widespread in the era of Classicism. This find as an archaeological "document" with the precise date - August 22nd, 1794- helped to find out the lost cultural meaning of an ancient ritual. (Dobrolyubskii, 2012)

Hermeneutics or the art of deciphering archaeological "texts" is based on the simple truth: any "archaeological" fact is properly explained only in a certain cultural context of its life time. The "aim" of culture is determined by a tradition which in turn

determines the meaning of culture and gives an appropriate name to it. The name is a "visible" aim for us. If we know this name we gain the cultural code to decipher cultural meanings established by a tradition (Tkachuk, 1996). It is obvious that the search for these meanings is only possible within an appropriate cultural tradition. In our case we know the name of "Odessa" and a cultural tradition in the bosom of which it arose is 18th century Classicism.

To possess new lands meant to subdue the substructure of their disordered nature, "Chaos". In ancient mythology there is a concept of allocation by gods a certain arranged space out of primordial chaos as the primary act of creation. The city was a model of the Cosmos as understood by people at the moment. Therefore, the city, as a whole, and every element of its structure must correspond to the "Big World" - the Universe and to the "small world" - a human. As early as the Early Roman Empire the founders of a future city stuck their spear to the ground and along the shadow line caused by the rising sun rays they performed "a furrow", the direction of the main street- "decumanus"; the perpendicular to it was respectively "cardin", and at their intersection rose the nucleus of the city. It was allegedly a spell of unordered primordial nature; the clear geometry of order and will appeared to be overlapped with its chaotic emptiness repeating the primary act of creation.

4. PROFESSIONAL APPROACH TO THE CHALLENGES OF A UNIQUE PLACE

The first plan of Khadzhibey-Odessa developed by Franz de Volan in 1794 testifies that the city was based on the principles of ancient urban planning which were dealt with in Vitruvius' work "Ten books on Architecture (Vitruvius, Franz (Pavlovich) de Volan, a native of Brabant, left his career prospects in the Netherlands for the Russian army position of a military engineer. Having natural talents and a penchant for sciences, F. de Volan possessed, according to Vitruvius, all the characteristics necessary for an architect:

«It appears, then, that one who professes himself an architect should be well versed in both directions. Neither natural ability without instruction nor instruction without natural ability can make the perfect artist. [...] and be acquainted with astronomy and the theory of the heavens» (Vitruvius, 1914).

Dozens of canals and watworks, fortresses and coastal fortifications in the north and in the south of Russia were built by his projects. Pioneers in construction "If I am to be reproached, it is only for my worship Russia" (De Volan, 2012).



Figure 2.
The first plan of Khadzhibey-
Odessa



Figure 3.
Map of Odessa, 1814

While choosing the place for comfortable harbours it is necessary to:

«Explain by what means ships are sheltered in them from storms» (Vitruvius, 1914).

Ice cannot block water current there. Shipping can occur all year round with all the winds. Therefore, it was Bay of Khadzhibey that remained as the best place for an innovative harbour which was unaffected by the above mentioned inconveniences and whose location corresponded to its destination (Tret'yak, 2004). Bay of Khadzhibey's protruding cape and its shape met the requirements to harbours "If their situation has natural advantages, with projecting capes or promontories which curve or return inwards by their natural conformation, such harbours are obviously of the greatest service" (Vitruvius, 1914). Hydraulic measurements in the bay permitted to calculate not only the maximum depth of water (no more than 42 feet - 12,8 m) but also safe entrance to the bay from the South-East.

In strict accordance with Vitruvius' recommendations on «The Plan of the city of Khadzhibey» the port faces the North-East «[...]the general rule for shipyards will be to build them facing the north» (Vitruvius, 1914).

« If the walled town is built among the marshes themselves, provided they are by the sea, with a northern or north-eastern exposure, and are above the level of the seashore, the site will be reasonable enough » (Vitruvius, 1914).

« First comes the choice of a very healthy site. Such a site will be high, neither misty nor frosty, and in a climate neither hot nor cold, but temperate; further, without marshes in the neighbourhood » (Vitruvius, 1914).

The southern part of Bay of Khadzhibey met these demands. F. de Volan took into consideration all the demands when he was making "the first plan of the city and the port". In fact, they managed to dispose Odessa and the port in the ideal place (Fig.3) Vitruvius not only listed eight principal winds:

« Some have held that there are only four winds: Solanus from due east; Auster from the south; Favonius from due west; Septentrio from the north. But more careful investigators tell us that there are eight » (Vitruvius, 1914),

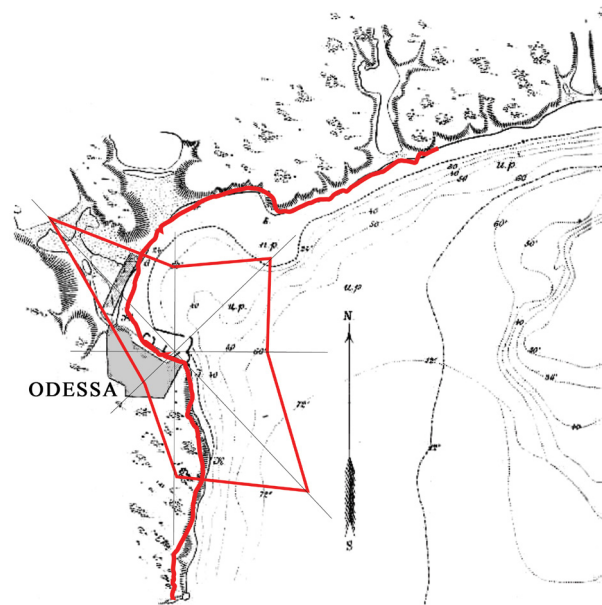


Figure 4

"Turbulence rose"

But he also explained in details the sequence of the wind rose development.

« From these two points describe with your compasses intersecting arcs, and through their intersection and the centre let a line be drawn to the circumference of the circle to give us the quarters of south and north. Then, using a sixteenth part of the entire circumference of the circle as a diameter, describe a circle with its centre on the line to the south, at the point where it crosses the circumference, and put points to the right and left on the circumference

on the south side, repeating the process on the north side. From the four points thus obtained draw lines intersecting the centre from one side of the circumference to the other. Thus we shall have an eighth part of the circumference set out for Auster and another for Septentrio. The rest of the entire circumference is then to be divided into three equal parts on each side, and thus we have designed a figure equally apportioned among the eight winds » (Vitruvius, 1914).

"They will be properly laid out if foresight is employed to exclude the winds from the alleys. Cold winds are disagreeable, hot winds enervating, moist winds unhealthy." F. de Volan did not make any mistake in this important aspect.

"The foundation plan of Odessa [...] was developed gradually, systematically, thoroughly" (De Ribas, 1995). With the aim to create a comfortable and healthy living "cold winds are disagreeable, hot winds enervating, moist winds unhealthy. We must, therefore, avoid mistakes in this matter[...]", F. de Volan collocated the Voennyi district at an angle with the prevailing South-East Eurus, and that of Grecheskii district - at an angle with North-West Caurus.

« Then let the directions of your streets and alleys be laid down on the lines of division between the quarters of two winds » (Vitruvius, 1914).

It permitted to eliminate not only the impact of hazardous winds, but also to "attract" to Odessa healthy winds.

The city itself on a high bluff protected the port from the most dangerous wind Caurus, while the port was completely vulnerable to "malicious" Eurus, so F. de Volan started to build the first and the most powerful malls by the dangerous South-East side (Fig.4). The longest Platonov (Karantinnyi) mall completely protected the port from the South-East, East and North-East. In the harbor "of course, colonnades or shipyards must be built" (Vitruvius, 1914).

A significant Admiralty quarter (16 ha) with an artillery fort and buildings for services and the army were allocated to protect the port and the city from attack

from the sea. In the chapter - Harbours, Breakwaters and Shipyards - Vitruvius suggested:

« walls which are to be under water should be constructed as follows. Take the powder which comes from the country extending from Cumae to the promontory of Minerva, and mix it in the mortar trough in the proportion of two to one » (Vitruvius, 1914).

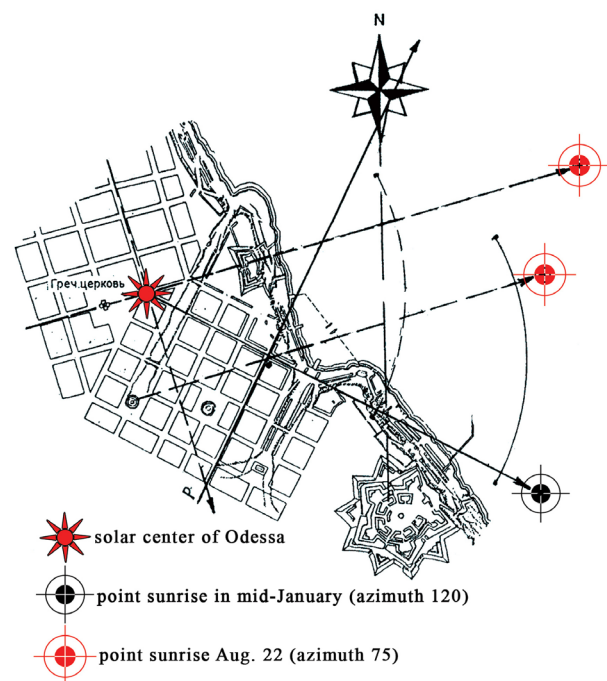


Figure 5.

Odessa - the Sun City

The original location, the strength of malls, breakwaters and other buildings of the harborprotecting it from dangerous winds, waves and currents, turned the port of Odessa in one of the most reliable in the world. It is a recognized masterpiece of hydraulic engineering construction:

« [...] On the same day (the day of Odessa's birth) there were laid the foundations of: the Major mall; the harbour for rowing vessels;

ellings and shipyards to repair ships; two piers for merchant ships; two churches in the name of St. Nicholas and St. Catherine, and they made the first furrow for the foundations of city buildings» (Skal'kovskii, 1889).

It confirms that the founders of the city strictly observed the ancient rituals.

Analysis of anthropometric characteristics - polar axis range, sunrise point changes - confirmed full compliance with the definition of the vector "Decumanus" of "city of Khadzhibey" based on the recommendations of Vitruvius.

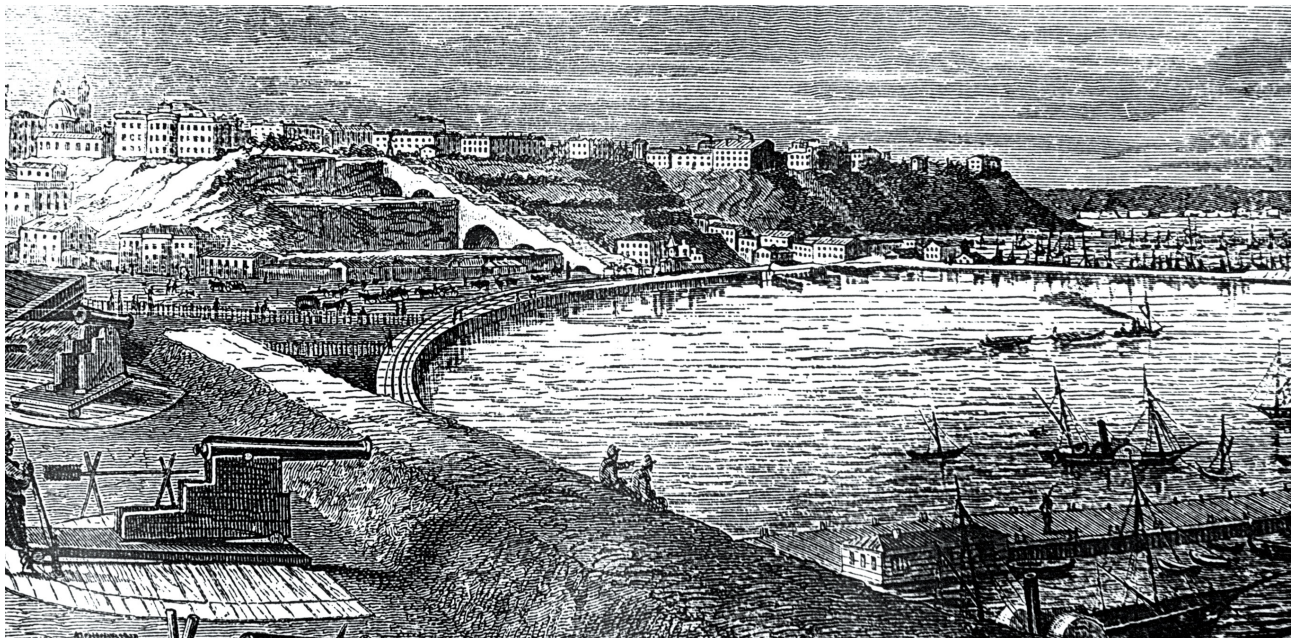
« The sun takes a fullmonth to move across the space of one sign, that is, one twelfth of the firmament. Consequently, in twelve months he traverses the spaces of the twelve signs, and, on returning to the sign from which he began, completes the period of a full year. Hence, the circuit made by the moon thirteen times in twelve months, is measured by the sun only once in the same number of months. But Mercury

and Venus, their paths wreathing around the sun's rays as their centre, retrograde and delay their movements, and so, from the nature of that circuit, sometimes wait at stopping-places within the spaces of the signs » (Vitruvius, 1914).

Perceiving the sky as a metaphor for the good and order, they built cities following the sky model - along the latitudinal "solar" axis. On the inaugural day of the foundation of Odessa the "Cardin" axis of the Grecheskii district became the solar axis of the whole city, its actual "heavenly pole". Since the Sun always rises over the sea, the range of variation of sunrise points over the city of Odessa is 70°. The solar center of Odessa turned out to be at the junction of the Voennyi and Grecheskii districts (Dobrolyubskii, 1998). (Fig. 5). Thus, the layout structure of the city of the Sun was developed in the most favorable way with due consideration for all specific conditions.

Figure 3.

City view from the sea



For that time Odessa was designed as a city of enormous size - more than 1000 hectares. The edge of the plateau was formed by the unique moving landslide slopes (Yeksareva, 2012). The groundwater devastating impact, the shock wave strength, frequent landslides on the slopes of the coast (about 200 km along the seashore) were the main causes of intensive erosion processes.

The complex work of huge amount - that of drainage (land terracing, drainage and irrigation network development) and that of construction (mounds, excavations, canals, dams) was the basis of the deliberately shaped landscape of Odessa's slopes.

Taking into consideration topographic characteristics of the area they made an expressive composition of the planning structure of the city. Odessa's "Cardin" and "Decumanus" street tracing was due to the direction of Karantinnyi, Voennyi Ravines and natural drains to the sea. The wide valley of Karantinnyi Ravine was used for storage; gullies - for communications to descend from the elevated part of the city to the port. On the high plateau there was a residential area, on the low-lying coastal strip - the port institutions. The original division into blocks and sections was based on ancient Roman norms of land distribution. The Voennyi district consisted of 52 blocks, divided into 560 sections; the Grecheskii district - of 65 blocks divided respectively into 720 sections. The blocks were marked with numbers. In 1794 159 open permits to own city plots were granted. The regular plan subdued chthonic Chaos, gave it cosmic features.

The centre of the future city was deliberately made at the intersection of "Decumanus" (Langeron street) and "cardin" (Richelieu street) following the specific recommendations of Vitruvius.

« If the city is on the sea, we should choose ground close to the harbour as the place where the forum is to be built; but if inland, in the middle of the town » (Vitruvius, 1914).

J. de Ribas and F. de Volan predetermined the first public and sacred centre of the city- the theatre, the exchange, aristocratic club, commercial casino, Reno hotel, Otton's restaurant, platz-parade - the analogue

of an ancient forum. More than 20.000 citizens lived in the city in 1812. The trade in wheat rapidly developed- in 1804 449 ships loaded with wheat sailed from Odessa, for comparison, in 1802 - a little more than 100 ships. The city grew and developed together with the port (Yeksareva, 2008).

Odessa was not only being built - it was improving, it was gradually assuming the image of a European city. Since the very foundation of Odessa its roads were paved with stone of volcanic Vesuvius ("Neapolitan") lava.

« There are also several quarries called Anician in the territory of Tarquinii, the stone being of the colour of peperino. This stone has innumerable good qualities. Neither the season of frost nor exposure to fire can harm it, but it remains solid and lasts to a great age, because there is only a little air and fire in its natural composition, a moderate amount of moisture, and a great deal of the earthy » (Vitruvius, 1914).

The lava stone was long believed to be brought to Odessa only as ballast for empty ships, and then forcedly used for paving roads. Now it is clear that F.de Volan following Vitruvius' advice specially recommended to take exactly this stone for ballast.

« Let the stone be taken from the quarry two years before building is to begin, and not in winter but in summer. Then let it lie exposed in an open place. Such stone as has been damaged by the two years of exposure should be used in the foundations. This precaution should be observed, not only with dimension stone, but also with the rubble which is to be used in walls » (Vitruvius, 1914).

Perhaps "Puteolian" sand itself "...with their varieties and points of excellence" (Vitruvius, 1914) was shipped together with stone to build the port. The fragments of lava pavements are still preserved intact in cozy Odessa patios.

The characteristic feature of the development of Odessa is creating a comfortable human environment

in harsh and aggressive conditions of the southern steppe zone - "*deadly heat in the summer and terrible blizzards in the winter, sandy and alkaline soil, lack of freshwater springs*" (De Ribas, 1995). Taking into account astronomical, climatic and hydrogeological factors they chose a perfect harbour, the construction place for the smart port city of Odessa, along with the optimal sun exposure and healthy living conditions.

CONCLUSIONS

Modern requirements to the environment arrangement, as well as its intellectual atmosphere are sustained by the developing universal space concept. Talented artists always knew how to work with time and not against it, in their works the past, present and future are united in a single indivisible whole.

The emergence of a new Polis of the North Black Sea Region in the late 18th century was due to a number of geo-strategic, economic prerequisites for the development of the southern territories of the Russian Empire.

Ancient mentality, noospheric approach of the founders of Odessa showed themselves in their perfect ability to create reality through technology mentioned in the treatise by Vitruvius. The characteristic feature of the development of Odessa is creating a comfortable human environment in harsh and aggressive conditions of the southern steppe zone. Taking into account astronomical, climatic and hydrogeological factors they chose a perfect harbour, the construction place for the smart port city of Odessa, along with the optimal sun exposure and healthy living conditions.

F. de Volan's city plan of Odessa is the master plan of the world's socio-natural development. The genetic code of the unique Polis culture was established in accordance with the requirements of eurythmy-harmony - "Strength, Utility and Beauty" by Vitruvius.

REFERENCES

- De Ribas A., Staraya Odessa, Moscow, 1995. (in Russian)
De Volan Frants Sent., Moya zhizn' v Rossii, Odessa, 2002. (in Russian)
- Dobrolyubskii A., Arkheologiya Odessy, Odessa, 2012. (in Russian)
- Dobrolyubskii A., Chelombit'ko A., Odessa - gorod Solntsa, ICOMOS.RUR-98.Odessa, 1998. - pp. 12-26. (in Russian)
- Fedenev R. De Ribas, Odessa, 1994. (in Russian)
- Gubar' O., Dobrolyubskii A., Ritual osnovaniya Odessy, Odessa, 1996. (in Russian)
- Knabe G., Ponyatie entelekhii i istoriya kul'tury, Voprosy filosofii, 1993, No. 5. (in Russian)
- Tkachuk M., Arkheologiya svobody, Kishinev, 1996. (in Russian)
http://www.archaeology.ru/Download/Tkachuk/Freedom_Arch.pdf
Tret'yak A., Severnoe Prichernomor'e XVIII v., Kishinev, 2004 (in Russian)
- Skal'kovskii A., Admiral De-Ribas, Odessa, 1889. (in Russian)
- Vinkel'man I., Istoriya iskusstva drevnosti, St.Petersburg, 2000. (in Russian) <http://www.twirpx.com/file/919984/>
- Vitruvius, (1914), The ten books on architecture, Cambridge Harvard University Press, London https://en.wikisource.org/wiki/Ten_Books_on_Architecture
- Yeksareva N., Yeksarev V., Evolution of the landscape, historical planning and elements of Odessa, Budownictwo i Architektura 3 (2008), Politechnika Lubelska, Poland, 2008, pp 119-130
http://wbia.pollub.pl/files/83/content/3_9.pdf
- Yeksareva N., Yeksarev V., The forming peculiarities of Odessa landscape slopes, Proceedings of the International Conference, Poppi, Italy, 2012 pp. 94-96