

GEOGRAPHY AND LOCAL HISTORY

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LINEAR ZONING IN THE STUDY OF FUNCTIONAL STREET'S POTENTIAL (THE CASE OF ACADEMICIAN VERNADSKY BOULEVARD, KYIV)

***Abstract:** The article considers the linear zoning on the example of one of the Kyiv boulevards on the basis of the new methodological approaches adapted to the capital of Ukraine. The research makes it possible to determine the functional content, development peculiarities and transport infrastructure of the street as an urban area. The article provides recommendations for improving the functional zone of the territory and its detailed planning.*

***Keywords:** linear zoning, function zoning, urban space, detailed planning.*

Introductions

Over the past decades, the development of Kyiv urban areas has not been systematic enough, without certain streets` deep analysis, which are the forming element of urban environment. As urban space has been chaotically filled with various functions, there is lack of clear hierarchy of social objects` concentration centers [2, 3]. There is a significant imbalance, i.e. in some areas the number of social objects significantly exceeds the population demand, and other areas face the deficit.

The study of urban environment heterogeneity both physically and geographically, considering the aspect of territory`s functional filling is highly

relevant among geourban planners [7]. The studies divide the city into separate functional, architectural, socio-economic and vernacular (mental) areas. The allocation of urban activity centers [1] or the areas` linear zoning are the most common scientific tasks performed by them. Various methods are used: polls, Google Maps analysis, social network analysis and field research [8]. The study of urban streets allows to reveal internal urban centers, and to specify the area boundaries [5]. This approach was called linear zoning. It is particularly useful for large cities`.

Objective is to identify the area boundaries with different functional content in Academician Vernadsky boulevard (Kyiv, Svyatoshinsky district).

Materials and methods. Linear zoning is a method of dividing areas into the homogeneous inside and different among themselves. Areas designation implies the most recognizable urban part - the street. It is the street that is the basis of intra-city identity. Urban streets are characterized by a large number of parameters: width, length and curvature, architectural style, infrastructure and functional content. The main street typically crosses the whole city. In this case, it serves as a great tool for studying the "Center - Periphery" gradient and the identification of the historical and economic center boundaries, as well as of semi-peripheral and peripheral city parts [4].

The field research method was used to study the territory (September 2021). Along two sides of the street we recorded: 1) service enterprises (total number and economic sector); 2) storeys of a building (both sides of a street); 3) greening and population density rate (scores from 0 to 10). Photographic evidence covered the main parts of a street. The area markers were revealed to indicate the basic territorial function. On the basis of The collected material was used to build a table of observation units (Table 1), a chart of storeys of a building (Fig. 1), and a map of functional area types (Fig. 2).

Object of study – Academician Vernadsky boulevard, Kyiv. Boulevard length – 2,1 km. Traffic, according to our estimates, is an average of 672 cars per hour.

Subject of study– territorial differences of a locality`s functional content.

Table of observation units

Parts of street	Storeys of building (maximum)	Number of service enterprises	Areas markers	Street greening rate	Street population density rate
1	9	3	the monument to V. Vernadsky	10	4
2	5	4	Supermarket «Fora», European university	10	3
3	17	14	Residential buildings «Academ-park», Children's Hospital, second-hand	10	3
4	14	2	Sports facility «Nauka»	10	6
5	16	8 - 20	G. V. Kurdyumov Institute for Metal Physics of the N.A.S. of Ukraine, market (Academician Vernadsky boulevard, 79), eastern entrance to the underground railway station «Akademmistechko»	10	8

Results and discussion

Academician Vernadsky boulevard was divided into eight functional types of territories and five street parts during the analysis (Fig. 2).

The first part from the Peremoha avenue to the intersection with the Deputatska street is a “calling card” of the Boulevard. There are a garden square, which has been recently modernized, and a typical Soviet-type building of the 1950s and 1970s. Bank branches "Sich" and Crédit Agricole, and grocery "Produkty" represent the objects of social infrastructure.

The second part of the Boulevard is distinguished by “Aviamistechko” two-storey buildings built during 1940s and single family homes. It is located between the intersections of the Deputatska street and M. Krasnov street. The area markers are the Supermarket "Fora" (Academician Vernadsky boulevard, 16) and the building of the private entity European University (Academician Vernadsky boulevard, 16-B).

The third part of the boulevard is located between the intersections of the M. Krasnov street and turning on the M. Zaliznyak street. Residential arrays, single

family homes, the hospital and industrial estate form the most functionally saturated segment of the boulevard. One could find the only new building (Academician Vernadsky boulevard, 24) here. It has a pharmacy, a mini market "Kolo", a beauty salon, furniture store, etc. on the ground floor. There is a territory of the children's hospital No. 5, which has recently been repaired, across from it.

The fourth part of the boulevard is located between the turning on the M. Zaliznyak street and the parking lot across from G. V. Kurdyumov Institute for Metal Physics and the turning on the Semashko street. We distinguished not only the residential arrays, but the territory of sports facility «Nauka», which is the property of the scientific research institutes of the National Academy of Sciences of Ukraine. Sports facility «Nauka» is the area marker, having a large territory with a covered pool and tennis courtyard, etc.

The fifth part of the boulevard lies from the turning on the Semashko street to the underground railway station «Akademmistechko». The functional content is represented by residential arrays, territories of scientific research institutes of the National Academy of Sciences of Ukraine, and the grocery market and supermarket "VK Express" next to Academician Vernadsky boulevard, 79.

The visual environment and storeys of the Boulevard buildings arise from its history: the first apartment buildings were built here in the 1940's in "Aviamistechko". The most part of the Boulevard was developed in the 1960-1970s, except residential buildings «Academ-park» (it is still under the construction) and some single family homes, which are the remains of the former village.

The chart of the storeys of a building demonstrates the differences in the boulevard buildings` storeys in five specified parts (Fig. 1).

Thus, there are 9, 5 and 3-storey buildings in **the first part** of the boulevard, which are typical for the Soviet period development. **In the second part** of the boulevard there are one-storey single family homes, two-storey apartment buildings of "Aviamistechko" and a typical Soviet five-story building. **The third part** of the boulevard is characterized both by 17-, 16- and 5-storey buildings, and one-storey single family homes, as well as by one- and two-storey buildings of industrial estate. **The fourth part** of the boulevard has typical 5- and 9-storey residential buildings

and 3 - storey buildings of scientific research institutes of the National Academy of Sciences. 9- and 16-storey residential buildings and 16-, 5- and 3-storey buildings of scientific research institutes of the National Academy of Sciences are located in the **fifth part**.

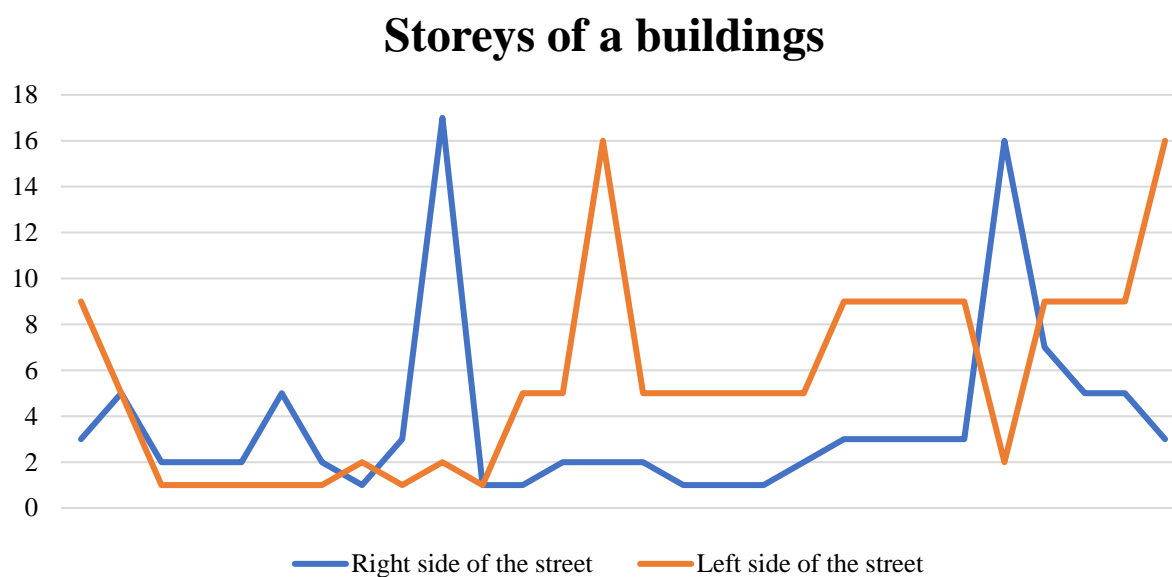


Fig. 1. **Chart of storeys of a building**

The heterogeneity of the number of boulevard buildings` storeys is explained by their different functionality and periods of development (from the 1940s in “Aviamistechko” to 2017 in Residential buildings «Academ-park»).

On weekends in the daytime, the number of people walking and enjoying themselves at the poplar alley is bigger than on weekdays. It should be admitted that the Boulevard is located on the periphery from the main traffic flows of Svyatoshynsky district.

Within this study, the method of linear zoning was tested. In general, eight functional area types which are not perpendicular but in parallel to the street were found out. The Boulevard partially divides the urban space to residential and / or industrial estate, the territory of research institutes, etc. This division is unique, because most of the streets in Kyiv which are longer than 1.5 km have perpendicular borders of functional areas relative to a street. In particular, this is the characteristic of large avenues passing through several administrative urban areas.

Borders between Academician Vernadsky boulevard`s areas are clear, i.e. certain areas or street sides meet functional types, even the hospital and the European Institute territories, being relatively small, are barriered and have specific boundaries.

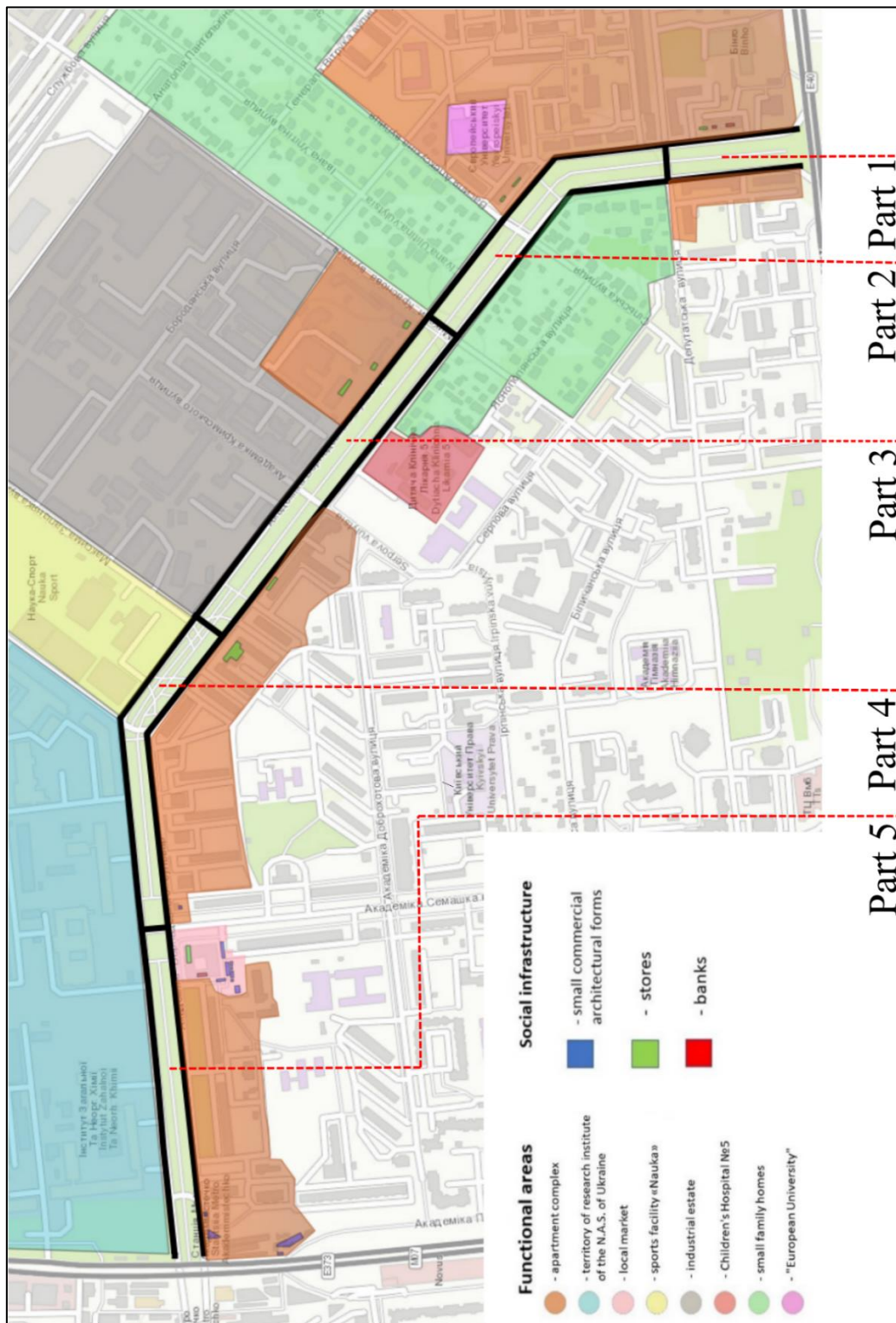


Fig. 2. Map of functional area types of Academician Vernadsky boulevard

Conclusions

The intersection of the Boulevard with Academician Palladin Avenue, which is part of a Large beltway, and the underground railway station «Akademmistechko» attracts residents to transport and malls on Academician Palladin Avenue and Academician Yephremov street.

There are no malls and entertainment centers and large supermarkets here. It is contrast with excessive trade infrastructure concentration near the underground railway stations «Akademmistechko», “Zhytomyrska” and “Svyatoshyn”, and forms functional imbalance. Nevertheless, the Boulevard has a high greening rate. It is one big public space, which lacks functionality of social infrastructure, in particular recreational segment.

Linear zoning allowed to identify the following characteristics of the Boulevard. First, it was built instead of partially harmonized development, mainly small family homes stock in the second half of the twentieth century. It has determined the functional features of the current development and functional structure of urban space, namely the location of residential and administrative buildings, objects of social infrastructure and junctions, etc. Secondly, a detailed street planning was made within the General Plan of Urban Development (worked out during 2000-2001). Thus, public space development should be more regulated and take into account the growing number of new homes residents. Thirdly, the development of transport infrastructure should provide a gradual increase in the automobile flow, the complication of crossroads (due to the new homes development), harmonization of urban transport. Now spontaneous parking in the driveway causes more complicated traffic and lower opportunities for maneuvers, which increases the amount of harmful emissions, worsens the residents` living conditions on lower floors and reduces recreational potential of the Boulevard`s middle "green" part.

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