

Analysis of Archival Cartographic Materials for the Modeling of Digital Terrain Model of the Lviv City Landfill during 1988-2008

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Abstract – Made selection archival cartographic materials for further modeling of the digital terrain model of Lviv city landfill.

Keywords – Lviv city landfill, Archival topographic maps and plans, aerial photography materials, digital terrain model.

I. Introduction

Maps that depict terrain with horizontals allow you to carry out all, without exception, measurements and calculations. With maps you can define different types of characteristics: geographic and rectangular coordinates, squares, volumes, lengths of lines, vertical and horizontal angles [1].

II. Analysis of archival cartographic materials on the territory of the Lviv city landfill from 1950 to 1990.

Significant changes in the area after the World War II led to the need to update topographic maps, but also on decades of new topographical surveys. According to the decision of the Council of Ministers of the USSR No. 760 of April 7, 1946, a single system of geodetic coordinates and heights was introduced on the territory of the USSR, which was named "System of coordinates of 1942". The altitude of the Baltic Sea was taken for counting altitudes. A significant development since the mid-1950s was acquired by topographical maps at a scale of 1: 100 000 and 1:25 000. The representative of this period is a topographic map (Fig. 1), the state of the area in 1957 was made at a scale of 1:25 000 with a section of relief of 5 m. In particular, a fragment of this topographic map was used as the initial surface to determine the volume of the municipal solid waste landfill in Lviv [2].



Fig. 1. A fragment of a topographic map of scale 1: 25000 with contour lines of 5 m (1957).

In 1972 a topographic map was issued on a scale of 1:25 000 with a section of the contour lines through the 5 meters coordinate system of 1942, the system of heights of the Baltic Sea (Fig. 2).

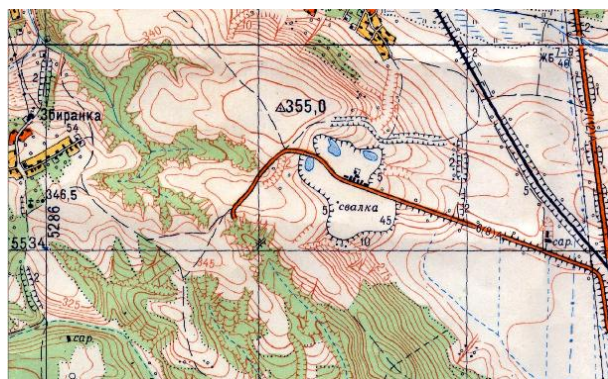


Fig. 2. Fragment of a topographic map of scale 1: 25000 with contour lines of 5 m (1972).

In 1985, a topographic map with a scale of 1:10 000 with a contour lines of 2 m of the nomenclature M-35-73-A-1-I (Fig. 3) is published.

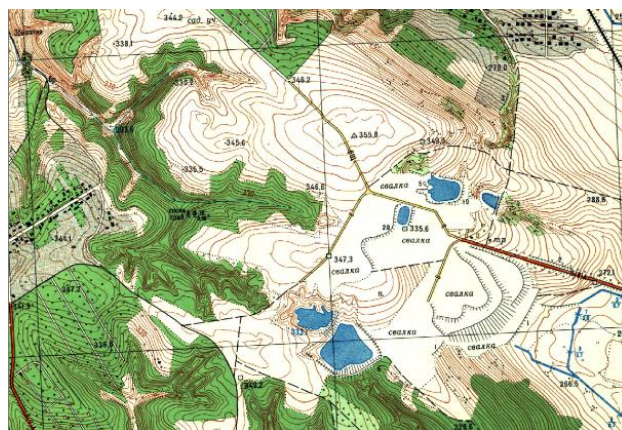


Fig. 3. Fragment of a topographic map of scale 1: 10000 with a contour lines of 2 m (1985).

On the basis of taking off of 1985 from a map of scale 1: 10000 in 1991, a topographic map of 1: 25000 with a 5-meter- contour lines was issued.

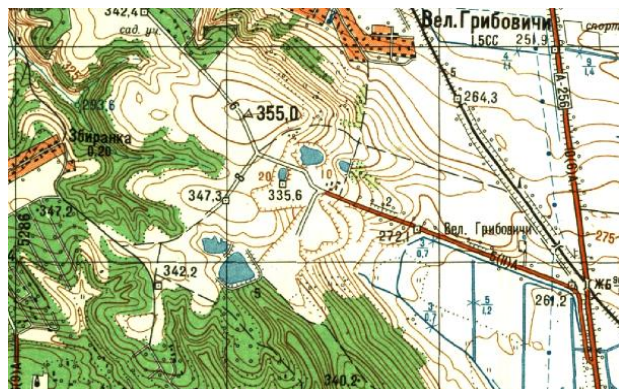


Fig. 4. Fragment of a topographic map of scale 1: 25000 with a section of relief of 5 m (1991).

As a result of the study, a collection was made and a retrospective geographic analysis of cartographic works on the territory of the Lviv city landfill from 1950 to 1990 (4) was presented..

In particular, mapping one-dimensional maps pertaining to different periods is one of the most important ways of studying the dynamics of landfill [3], which in combination with the use of geographic information systems (GIS) will better understand the specifics and stages of the functioning of the Lviv landfill, which in further and is planned to be implemented.

III. Analysis of archival materials for modeling digital terrain models from 1988-2008

As a result of aerosizing on October 5, 1988, the researchers obtained photos that can be used to simulate the digital terrain models using the photogrammetric equipment of the digital stereophotogrammetric station "Delta".

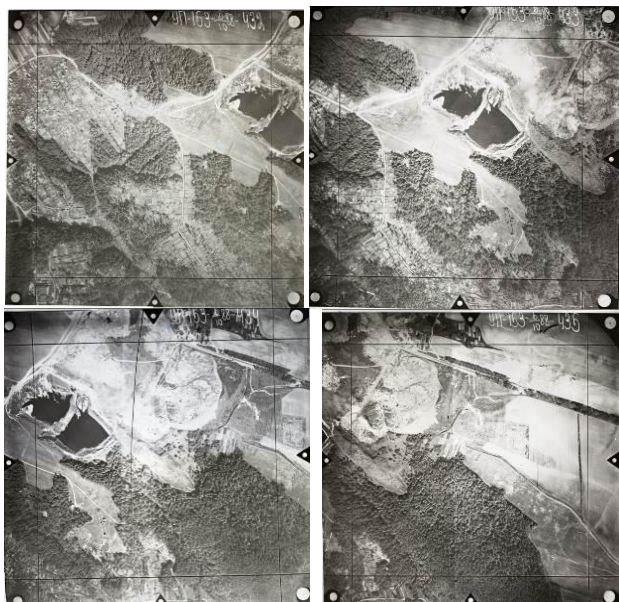


Fig. 5. Aerial photos of the state of the Lviv city landfill in 1988.

At the request of the Lviv City Council in 2006 LvivDiproCommunBud created a topographical map of the Lviv city landfill of solid waste, shown in Figure 6.

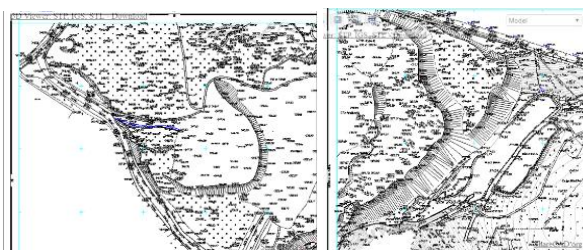


Fig. 6. Fragment of a topographic plan at a scale of 1: 1 000 with a contour lines 5 m creating as 2006.

In 2008 SE "Zahidheodezkartohrafiya" created topographical plan of the village Hrybovytshi in a scale of 1: 5000 showing the digital terrain models on Lviv city landfill.

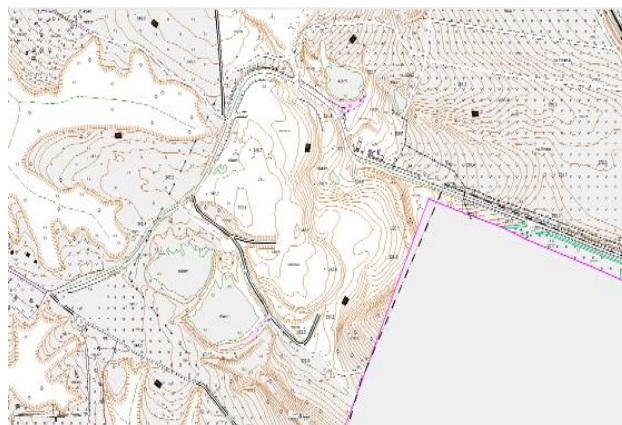


Fig. 6. Fragment of a topographic plan at a scale of 1: 5 000 with a contour lines of 1 m. creating as 2008.

Conclusion

As a result of this research, the collection of four topographic maps, aerial photographs as of 1988 and two topographical plans for 2006 and 2008 of Lviv city landfill. The further processing of these materials in specialized GIS will enable the construction of digital terrain models from 1988 to 2008 and will be useful for studying the stages of functioning of the Lviv municipal solid waste landfill.

References

- [1] A.M. Berliant Cartographic method of investigation. Monograph – 2nd edition .- Moscow: Izd-vo MGU, 1988.- P. 252 2.
- [2] V. A. Lozynskyi, V. I. Nikulishyn, K.R. Tretyak, E.O. Shylo Methodology for determining the volume of the Lviv Polygon landfill using archival cartographic materials and UAV TRIMBLE UX-5 Geodesy, cartography and aerial photography. – Lviv, 2016. – № 82 (1). – pp.61-82.
- [3] K.A. Salishchev Cartography / K.A. Salishchev. – Moscow: Izd-vo MGU, 1982. – 408 p.
- [4] V. A. Lozynskyi, Analysis of archival cartographic materials on the territory of the Lviv municipal solid waste landfill from 1950 to 1990. Collection of works of the materials of the eighth All-Ukrainian scientific and technical conference of students, postgraduates and young scientists "Scientific Spring 2017" in the Dnipro, April 26-27, 2017, pp. 27-28.