Key words: New Jewish cemetery, change of boundaries, GIS, archival aerial images, archival map.

Formulation of the problem
The new Jewish cemetery was opened on August 24, 1855, 2 days after the closure of the old one. It is located on Pilikhov hills near Kortumovaya Hill near the street. Yanivska (present Shevchenko's street).

In 1856, at the expense of the Jewish merchant Ephraim Wicksell (Wiksel), the New Sanctuary Synagogue was erected on the cemetery. Subsequently, in 1875, the Jewish community dictated the Pilichowska Street (V. V. Eroshenko St.), which led to the cemetery from the street. Yanovskaya [1].

On November 25, 1890, the Jewish community bought the ground for the expansion of the cemetery in Count Stanislav Skarbek (Skarbek). That same year, arch. Alfred Kamenobrodsky (Kamenobrodski) completed the project of a fence in the neo-roman style, which was supposed to surround the cemetery from the street. Eroshenko

Subsequently, this fence was built, to this day its fragment has been preserved. An architectural building was also built on the left of the main entrance to the cemetery. Solomon Krokh (Kroch).

In 1912, under the project architect. Roman Felinski and Jerzy Grodinski (Grodynski) the construction of the Beth Tahara chapel in the modernist style was started. Construction works were supervised by the famous architect. Michal Ulyam (Ulam) [2].

On May 4, 1930, the Jewish community again expanded its cemetery, new fields were solemnly consecrated by a rabbi. In the middle was a main alley, both of which were placed graves in dense rows. August 9, 1934 Arch. Norbert Glauststein (Glatstein) completed the project of fencing this cemetery.

During the German occupation, all buildings and graves at the cemetery were destroyed, in particular, in the spring of 1943, the Nazis landed in the house of the pre-burial chapel Bet Tahara.

In the Soviet period, the Lviv Jewish community was cared for by a cemetery on the Pilyakhiv hills. In the first postwar years, at its expense, along with the entrance from the present street. Eroshenko on a fraternal grave, in which the remains of the executed Jews in the years 1942-1943 were reburied, and from the destroyed ancient graves, an obelisk was established.

In 1962, in connection with the dissolution of the Lviv Jewish community, the cemetery was attached to Janovsky, but it retains its own numbering of fields.

At the time of the new Jewish cemetery many prominent figures of the Jewish community were buried. Among them are Dr. Emanuel Blumenfeld, Dr. Emil Byk, Rabbi Dr. Schwabacher, Nathan Loewenstein, Ezekiel Karo, Olesky Rebbe, prof. Lviv Polytechnic Berkman, Dr. Khim. Mr. Prof. Jon Greeneberg (Grinberg) and others.

However, the destruction of the cemetery was also carried out in the newest Soviet period. In particular, this is said about the varbage transfer of the boundary of the cemetery on the part of the street Eroshenko, which was subsequently asphalted and created part of the proizzuga. For the sake of historical justice, and paying tribute to the people who were buried in the area of the cemetery, it is necessary to determine the true boundaries of the necropolis in order to prevent its further development.

Analysis of recent research and publications
A lot of attention from the side of local historians and cultural scientists is paid to the study of the history of the New Jewish Cemetery in Lviv.

So, in the work of Boyko H. S. The problems of historical burials - ancient Jewish cemeteries, in particular Lviv [3], are explored. The necropolis is considered from the point of view of cultural heritage. Ivanov S.O. and Krivoruchuk Yu.I. in their work as well as interfere with the historical and cultural components of the existence of this necropolis [4]. There were other publications of this orientation [5]. But so far, nobody has considered changing the boundaries of this object of research with the help of modern GIS technologies, to display them within the limits of modern city-building.

Setting objectives
The purpose of the study is to analyze archival Polish cartographic materials and the interpretation of the archival German aerospace image to determine the boundaries of the New Jewish Cemetery in Lviv, such as they were before the changes.
Presentation of the main research material
The territory of the cemetery is limited by the part (155 meters) of the Eroshenko street from Shevchenko Street and 195 meters by the territory of PJSC "Lvivgaz" from the east, the slope and the garage cooperative from the north, the quarter of industrial buildings PE "Sign of quality" 150 meters from Eroshenko St. and 95 more meters from Azov-Galicia industrial buildings from the south and a Christian cemetery from the west (Fig. 1).

Inputs for research served:
• a fragment of the archival Polish map of Lviv, created in 1938 (Fig. 2) [6];

Fig.1 Scheme of location of the New Jewish cemetery in Lviv

Fig.2 A fragment of the Polish map of Lviv in 1938

• Polish archival plan for the territory of the cemetery in 1936 (Fig. 3);

Fig. 3 Polish plan of the cemetery territory 1936

• a fragment of the archival German aerospace as of 1944 (Fig. 4) [7];

Fig. 4 German archival image of 1944

• a fragment of the modern topographical plan of the territory of the cemetery (Fig. 5).

Fig. 5 Modern topographical plan of the territory of Yaniv cemetery in Lviv

Before conducting research, it is necessary to make a geometric correction of input materials and to tie them to a single coordinate system. The correction was carried out at the reference points whose coordinates were obtained using GNSS-removal.
Since the Polish map of 1938 was used for the general visual representation of the location and boundaries of the necropolis, it did not take geometrical correction and further work.

The archival Polish plan for the territory of the cemetery in 1936 was transformed into nine reference points, found on archival and modern material with an average of up to 2 pixels, which is a valid value, since the preliminary calculation of accuracy was up to 3 pixels.

The German German Aerospace archive, as of 1944 [7], was transformed with the help of ErdasImagine [8,9,10]. The binding was performed on 11 reference points with an accuracy of up to 4 pixels, which is within the permissible value, since the preliminary calculation of accuracy was up to 7 pixels.

The current topographical plan was tied to 7 reference points, with an accuracy of up to 1 pixel, which is within the permissible value, since the preliminary calculation of accuracy was up to 2 pixels.

Also, the archive archive of 1934 was analyzed, with the purpose of determining the burial places of the Jewish warriors of the First World War. These studies are carried out in order to understand later whether this place has fallen into a part of changing the boundaries of the cemetery (Fig. 6).

An analysis of the Polish archival plan was carried out and interpretations of the boundaries of the Jewish cemetery from the German air portrayal of 1944.

In order to create resultant cartographic materials, synthesis of graphic materials is made alternately. The modern topographic plan of the Janovský cemetery in Lviv with a fragment of the archival German aerospace was synthesized in 1944, from which the deciphered borders of the necropolis were transferred. Also, the archival Polish plan of the 1936 cemetery was synthesized and a modern topographical plan. With the help of the latest synthesis, the borders of the cemetery were specified and finally determined by what they were before the Second World War and before their change.

According to the received data, two graphic documents of scale 1: 1000 in the format A2 have been created. They recreated the original boundary of the cemetery within the framework of the modern urban development situation and all the changes that took place with it over time (Fig. 7, 8).

---

**Fig. 6. Archaeological aerospace writer of 1934, which lists the burial places of Jewish soldiers who died in 1914-1918, which consisted of 15 rows of graves, each of which had at least 23 burials.**

**Fig. 7. Photoplan the territory of the Jewish cemetery as of 1944 with the deciphered borders of the cemetery**

**Fig. 8. Plan of the territory of the Jewish cemetery as of 2013 with the borders of the cemetery as of 1944**
Conclusions
In this paper archival and modern cartographic materials and remote sensing data have been processed. With the help of geoinformation technologies, it was determined that the boundaries of the New Jewish Cemetery in Lviv suffered devastating changes. The boundary of the cemetery on the street Erosheka was moved by 70%, in the territory of the cemetery the streets and other buildings were built.

No changes are reflected in the two research results plans.

References
2. J. Schall. Historia Zydów Polsce, na Litwies i Rusi / Lwów. - 1935
6. Central State Historical Archive in Lviv (CDIAL).
7. National Archives and Records Administration, USA / Lvow (National Archives of the United States, section "Lviv"). German Aerospace Museum in Lviv, 1944

Geoinformational determination of the change boundaries of "New Jewish Cemetery" in Lviv

Chetverikov B.

In the article present the method of geoinformational determining the changing boundaries of the New Jewish cemetery in Lviv.

It was determined that part of the cemetery has undergone the devastating changes. It was laid the street and part was built up.