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Memories of Recent Past. Objectives and Results of Non-invasive Archaeological Research Project at KL Plaszow Memorial Site

ABSTRACT

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Debate about the possibilities of using interdisciplinary methods in investigations of labor and concentration camps of world war two is well embedded. In this cases, the archaeology is a mixture of sub-disciplines like Combat Archaeology, War Archaeology and Interment Archaeology as well as a Public Archaeology. Field researches, especially non-invasives ones are common practices. In recent years numerous archeological research project has taken place. Some of them were prepared for the investment activities and design of memorials and new museums. The main purpose of documentation, surveys, and excavation of this kind of sites is a preservation of architectural relicts and landscape, but also a supplementing the historical knowledge by authentic archaeological sources. In this paper, authors decided to present the results of archaeological research project prepared in 2016 by The Historical Museum of the City of Kraków (MHK) and the investigations of Rabbinical Commission for Jewish Cemeteries in the area of labor and concentration camp Plaszow. The archeological documentation and investigations were combined with extensive research and study of memorial sites in Poland and Europe, which served as the basis for the scenario of the exhibition and commemoration of KL Plaszow as a future memorial site's institution.

Key words: non-invasive investigation, Holocaust archaeology, memorial site, museum, KL Plaszow, Plaszow camp

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Introduction

The specialized branch of archaeology exploring the relics of the 20th century, including the archaeology of the Holocaust, is now one of the leading problems of the so-called “archaeology of recent past” (González-Ruibal 2014). It involves the use of methods and theories

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of archaeological research in the context of relics of recent past. When exploring recent history, field studies (surveying, prospecting, excavations) obviously represent the final stage of a long analysis of sources, which are not available for archaeological research in prehistory or historical examinations. Besides numerous photographs, maps or drawings, our archives contain witnesses' accounts and memories, permeating the land with human history and endowing it with an extremely important social context. The areas of former camps mostly of the world war two, have undergone extensive transformations, which to a smaller or larger extent distort our current perception of them. They become a specific kind of sites are also attractive for other scientists. As Marek E. Jasiński underline, after Alfredo González-Ruibal, „the boundaries between the archaeology of the contemporary past and those of anthropology, sociology, contemporary history, art. History, history of architecture, material-culture studies and technology studies increasingly overlap, representing the emergence of interdisciplinary cooperation, that will shed a new light on the events of recent history” (Jasiński 2017, 3). Jasiński also suggested, in a similar way as Isaac Gilead *et al.* (2009) did, that the role of archeology is the context of Holocaust studies similar to the process of memorialization, providing the knowledge about the authentic artifacts and physical remains into the public debate. The aim of this paper is to outline the results of non-invasive research into the area of Nazi German Labour and Concentration Camp Plaszow in Kraków.

History of Plaszow camp

The German Nazi forced labor camp was created in autumn of 1942. According to the SS- und Polizeiführer Julian Scherner's directives the official name of camp in German was Zwangsarbeitslager Plaszow des SS- und Polizeiführers im Distrikt Krakau (ZAL Plaszow) (*cf.* Kunicka-Wyrzykowska 1982). In January 1944 the camp was transformed into concentration one and since that date, it was functioning as Konzentrationslager Plaszow bei Krakau or simply KL Plaszow (Kotarba 2009, 24–25; 2017, 68).

There were three main stages of KL Plaszow's aerial evolution (Kotarba 2017, 68). The first one was since the fall and winter od 1942 and the official creation of the camp in 1943. Until the summer of 1943, this stage was marked by inconsistent development. During all that

time, the workers were forced to demolishing and devastation of Jewish cemeteries, that becomes the part of camp. The basic works at camp's infrastructure were completed, some facilities were adapted for camp purposes like the funeral parlor (a pre-funeral hall) of the new cemetery of the Kraków Commune (cf. Gawron 2012, 396–397). Others were built or designed, eg. the Kommandantur (SS Headquarters), monumental brick walled garrison barracks, a large area of workshops, as well as residential barracks for prisoners and *Appellplatz*. In the beginning, the estimated number of prisons was between 4 and 5 thousand of people.

After the liquidation of Kraków ghetto in March 1943 part of the Jews were transported to Plaszow camp. The bodies of about 2,000 people, whose were killed during that days were buried next to the northern border of Jewish Cemetery of Podgórze Commune (so-called “old cemetery”; Kotarba 2009, 31, 166; cf. Biberstein 1985, 108). That place also become a localization of execution.

The second stage started in summer of 1943. The former administrative and residential building (also known as the *Grey House*) of Jewish Cemetery of Kraków Commune (so called “new cemetery”) was changed into the SS administration offices. At the same time, the special area of the camp was organized as a “labor re-education camp” (*Arbeitserziehungslager – AEL*) for Poles. Between the new *Appellplatz*, the *Grey House* and funeral parol, the range of barracks was specially dedicated for prisons whose had committed administrative crimes, common crimes or took part in the resistance movement.

In 1943–1944, the Jews who survived the liquidation of the ghettos in Bochnia, Tarnów, Wieliczka, Rzeszów, Przemyśl and the Szebnia labor camp where deported to KL Plaszow. Other inmates were residents of Kraków and its vicinity. Some of them were directed to labor camps at the arms factories in the Radom district (Awtuszevska-Ettrich 2008, 276–280). In the winter of 1943, the former execution site was changed to the former Austrian sconce FS-21 *Wola Duchacka*, which was called „Hujowa Górka”.

The construction and building works were intensified at the turn of the summer and autumn of 1943. Eventually, after the renaming to the concentration camp, it expanded to an area of about 80 hectares and reached its maximum area. As Ryszard Kotarba wrote (2009, 40–41):

[...] in the first half of 1944, the expansion of KL Plaszow continued and some investments were very serious, but as it turned out to be late.

At a time when the camp reached its peak, it was also the moment of decision to liquidate it. The preserved plans of the camp represent the next stages of camp's expansion. The first one from July of 1943 shows that the camp was still quite chaotic, with an *Appellplatz* next the first mass graves of the Jewish people. The area near Wielicka street and industrial quarter were only partially filled with barracks. In the second plan dating back to March of 1944, buildings near Wielicka street were marked, but without railways. New industrial areas (*Neue Gelände – KK*) and an *Appellplatz* were built. Third plan – undated, from the summer of 1944 shows full development, railway line and incorporated residential area along Pańska Street (*Herrenstraße – KK*) with buildings, as well as planned objects”.

When plans are compared, it is evident that the consistent expansion was aimed at creating a concentration camp with all the facilities necessary for its normal functioning, while also exterminating the immediate prisoners and destroying them by work over human abilities.

The main parts of the camp were set up in 1944. The German area was located in the eastern part, with headquarters and barracks. There was also the SS and the SS barracks. The pre-war houses were an adapter for the officers and commandant of the camp, Amon Göth. Also, buildings erected in the 20s and 30s along Jerozolimska Street were used as a telephone exchange. The core area of the camp with the division for men's and women's residential barracks was stretching into the West and reached Swoszowicka Street. It was accompanied by other buildings in other parts of the camp like (laundry, kitchens, bakery, ice houses and hospital sector). The south part of the area, between Jerozolimska and Pańska streets, was devoted to workshops. Each part was separated by internal fences and gates. During the second stage of camp's functioning, in the territory of Jewish Cemetery of Podgórze Commune new bathhouse, and quarantine barracks were erected. Also, the new assembly square was built. Old places of mass executions in the were changed and partially developed for the construction of new buildings. The place of execution has been moved to the other fortification, the sconce FS-22, called by prisons „Cipowy Dołek”. The expansion plans also included the development of infrastructure, eg. construction of railway station next *Grey House*. For this purpose the building of the funerary parol was almost completely destroyed on July 10, 1944 (Zbroja 2013, 38–39).

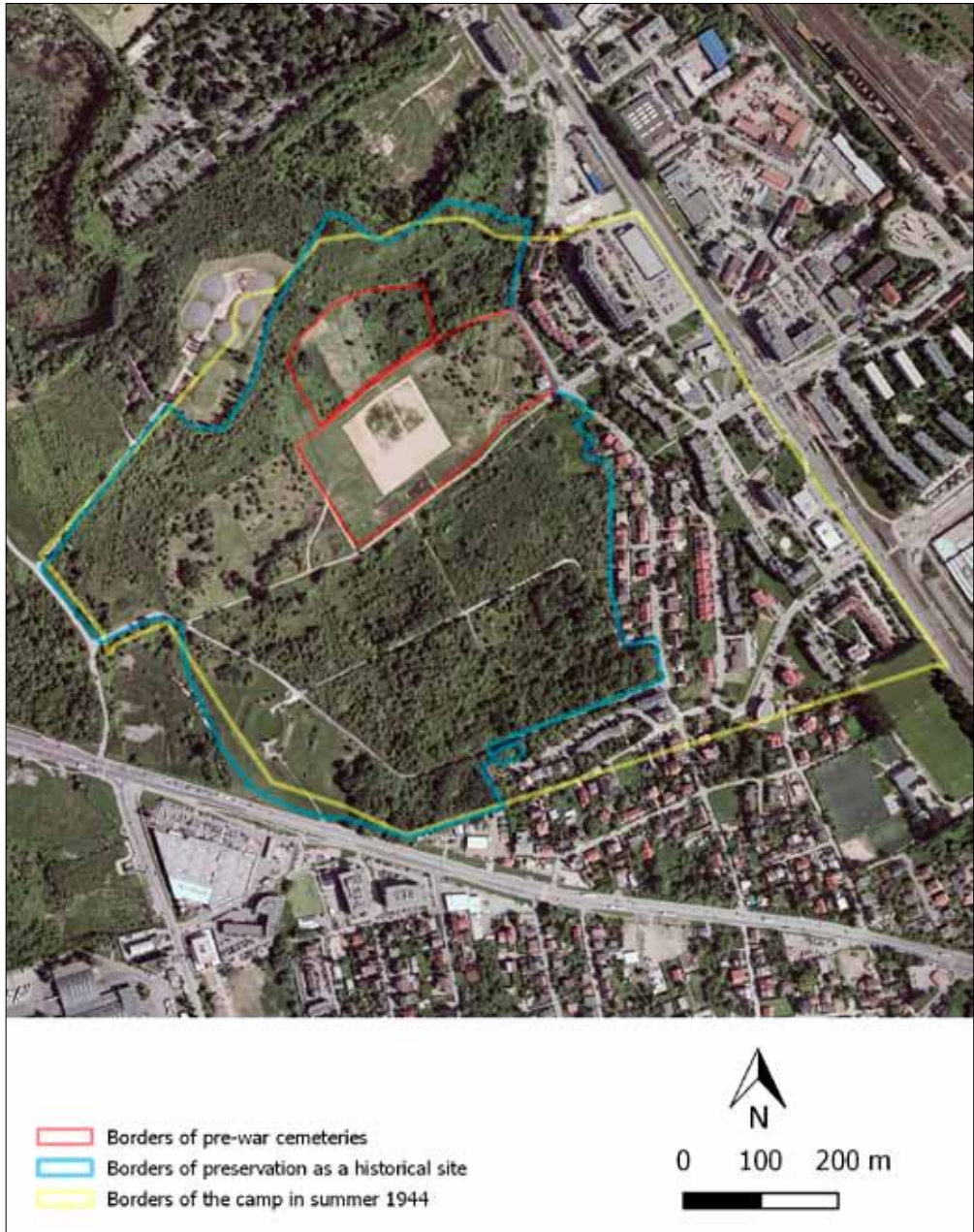
Due to the fires, dense buildings infrastructure was changed, also new water ponds were dug. An extension of the industrial part is still possible to mark. The new companies were located in further workshops on the so-called Neue Gelände. In June 1944, there were 24,000 people in KL Plaszow. About 200 independent buildings were a part of camp's infrastructure.

In 1944, KL Plaszow also served as a transitional camp for Jews from Hungary, deported to KL Auschwitz. From the spring of 1944, prisoners from the camps from the Lublin and Radom districts were evacuated and transported to KL Plaszow. Most of them were taken from KL Plaszow to other labor camps and concentration camps. It is estimated that over the camp's existence, more than 30,000 people were imprisoned there, and the number of victims murdered in the camp was about 5,000.

The third stage of the Plaszow camp's history is connected with the overall situation of the war and the activities aimed at extinguishing the camp. In May 1944 a so-called a „great selection” was conducted. In result, about 1,400 people were sent to Auschwitz. Other prisoners were sent to camps in West, like Gross-Rosen, Mauthausen, Auschwitz, Ravensbrück, and Buchenwald. From September, exhumations of the bodies of the mass graves have begun, followed by the cremation of human bodies. With the last months of 1944, the demolition work of the barracks was over. Ultimately KL Plaszow ceased to exist in January 1945 (Gawron 2012, 421).

The abandoned camp was occupied by Soviet troops and became a military area. Preserved buildings were used as storage facilities. Entry into the area of the former camp was absolutely forbidden. In the report of the Municipal Offices of this period, the presence of Soviet soldiers was reported, which dealt with the demolition of the remaining buildings and the removal of barbed wire spikes (Kotarba 2009, 154; cf. Kocik 2016, 100).

During the next decades, many traces of camp's history were disappeared. The rests of funerary parol are still demolished next its original location. During the post-war period, many memorizations were constructed in the post-camp terrain, including most spectacular one- the Monument of Victims of Fascism in the place of Cipowy Dołek. In the 80s in the range between Wielicka and Jerozolimaska Streets, a new blocks of flats were built.



Ryc. 1. The area of concentration camp on the background of present-day orthophoto

Gripping the context of camps' archaeology

Until mid-1980s no extensive surface studies were carried out on post-camp sites. One exception is the work near the gas chamber and crematory at KL Auschwitz conducted in 1967. Around 16,000 personal objects of the victims were found, but they were placed in the Auschwitz-Birkenau State Museum only in 2016 (Cajzer 2017). In 1987 the first stage of excavations was started at the former Kulmhof camp in Chełmno nad Nerem, aimed at determining the topography of the camp (Pawlicka-Nowak 2004, 2015). The first project of major importance was the archaeological work in the former extermination camp in Bełżec. The research covered almost the entire area of the camp and the results influenced the shape of the remembrance exhibition which had been underway Kola 2000a, 2015). Similar work was conducted in 2000–2001 in the former camp in Sobibór (Kola 2000b, 2001). Excavations were resumed in 2007 and the last stage ended last winter. Also here the archaeologists' findings, showing the location of gas chambers and the so-called death path, very strongly influenced the shape of the exhibition (Bem, Mazurek 2012; Gilead *et al.* 2009). There are other projects where excavations are minimal or completely absent. Examples of this approach include the interdisciplinary project Sztutowo or Stutthof? (Banaszek 2011, 27–31). The taming of the cultural landscape, and the Holocaust Landscape Project, studying the former camp in Treblinka (Sturdy Colls 2012a, 2012b) In those two places the area of the former camps was carefully surveyed and then various methods of geophysical prospection were used. Finally, in 2013, surface studies and minor excavation work have taken place. From 2015 to 2017 Polish team of IT specialists, historians, surveyors, geo-physicists and cartographers conducted research works in Labor Camp Treblinka I (Różycki *et al.* 2017). Archaeological research on post-camp sites constitutes an attempt at finding a balance between using currently available non-destructive archaeological techniques and classic excavations in a way that produces the broadest range of data regarding memory sites. In addition, the special context of the post-camp grounds makes it an absolute necessity to preserve all ethical and religious standards during archaeological work (eg. See a critique of research in Sobibór in Weiss 2003).

This problem also manifests itself in KL Plaszow. Parts of the camp grounds have merged with the urban fabric, as it has been built over, while the rest is now treated as a recreational area. The lack of visible

traces of the past makes the camp site seemingly empty, absorbed by the changing landscape of today's Kraków.

Objectives of research

The current research is the first project of this kind at KL Plaszow. The main task of the investigations was the description and preparation of preservation programme of area of the Plaszow camp before the investment process for memorial site's museum. Taking into account the experience of other archaeological projects, the balance between the invasive and non-invasive research. In her book, Caroline Sturdy Colls (2015) present the possible issues and solutions during the archaeological investigations of Holocaust sites. According to her, the research at presented project were divided into main stages:

1. Desk-based investigation,
2. Above-Ground Field Investigations,
3. Below-Ground Field Investigations,
4. Excavation.

Desk-based investigation

As the desk-based investigation we can treat the personal account and analysis of archival photography, plans and maps. The personal accounts and testimonies that are relate directly to war events take different forms. Credibility of some of them may be questioned. Nevertheless, in the case of this studies, these accounts are a better source of information about the model of the functioning of the camp, neither its infrastructure. In essence, the quality of testimony depends on time that passed by after the event. Sturdy Colls (2015, 118) means that the most credible are those accounts written directly in 1945 and immediately after the war. They are the most detailed, and the compositions of the personal accounts were often accompanied by local visions that refer to specific places. So, as opposed to historical research, the accounts and testimony in archaeological research are of limited utility. In the case of KL Plaszow research, a report was made in the archives of the Jewish Historical Institute, Yad Vashem and published memories. Most accurate and useful for the establishing the topography of the camp were the accounts of Jakub Stendig and

Henryk Wohlfeiler. Both of them were engineers, that were forced for take part in the construction of the camp and coordination of works.

The cartographic data are one of most useful in analysis of Holocaust archeology's sites. The beginning of 20th century allows for studies of various type. In the analysis of Plaszow camp, among others standard sources, there are also more precise cartographic detail, like city plans and others. The combination of all were most useful for description of possible architecture structures.

The first of the accurate cartographic sources is a collection of field sketches from August 1909. During the preparation of sketches the northern part of the future camp was elaborated, including the Jewish cemetery of Podgórze Commune and the old funerary parol.

Another map was prepared around 1910. On the schematic draw entitled *Plan budowy Sieci tramwajowej Wielkiego Krakowa* (The plan of tram network of Great Kraków), tram lines were passing through Kraków and Podgórze, as well as overline of cemetery's borders are marked. The more detailed documentation of both cemeteries, especially with the documentation of construction is now in the possession of National Archives in Kraków. Nevertheless, the files of each single building are only a part of wider context of urbanized area. More precise is topographic map from 1934. The reprint of map was done in 1944 by Nazi occupants. However, the existing camp buildings were not put on the map. Most precise is analysis of two plans, mentioned by Kotarba (2009, 40–41).

As part of the project, an archival query was carried out in the National Archives of the United States (National Archives and Records Administration – NARA) concerning on archival sources of Plaszow camp in the years 1939–1945. The query concerned the collections of group 373. Collections from group 373 include aerial and satellite photographs, cartographic and architectural materials. The survey covered series 373.3, including aerial photographs from 1935–1960 made by German and Photographic Reconnaissance Units. The result of the query is shown in Table XXX.

The photos shown in Table XX were scanned with an Epson Expression 12000XL scanner with a resolution of 600 DPI. Both paper photographs (German photos) and negatives available in the archive were scanned.

For preparation of metric plan of the Plaszow camp, aerial photographs from August and May of 1944 were used as the most suitable. Both photographs depict the camp on a scale allowing recognition of individual

Table 1. The collection of archival aerial photographs of Plaszow camp

Lp.	Date	Scale	Source	Remarks
1.	Unknown	1:46 000	Luftwaffe	Whole camp is visible
2.	Unknown	1:39 000	Luftwaffe	Whole camp is visible
3.	18.07.1942	1:9200	Luftwaffe	Only north part of camp is visible (cemetery of Podgórze Commune, and fragment of cemetery of Kraków Commune)
4.	3.05.1944	1:15 500	Luftwaffe	Whole camp is visible
5.	20.08.1944	1:14 000	US Airforce	Whole camp is visible
6.	28.12.1944	1:26 000	Luftwaffe	Whole camp is visible
7.	9.02.1945	1:44 000	Luftwaffe	Bad weather conditions (cloudy)
8.	20.02.1945	1:20 000	Luftwaffe	Whole camp is visible
9.	28.12.1945	1:26 000	Luftwaffe	Whole camp is visible

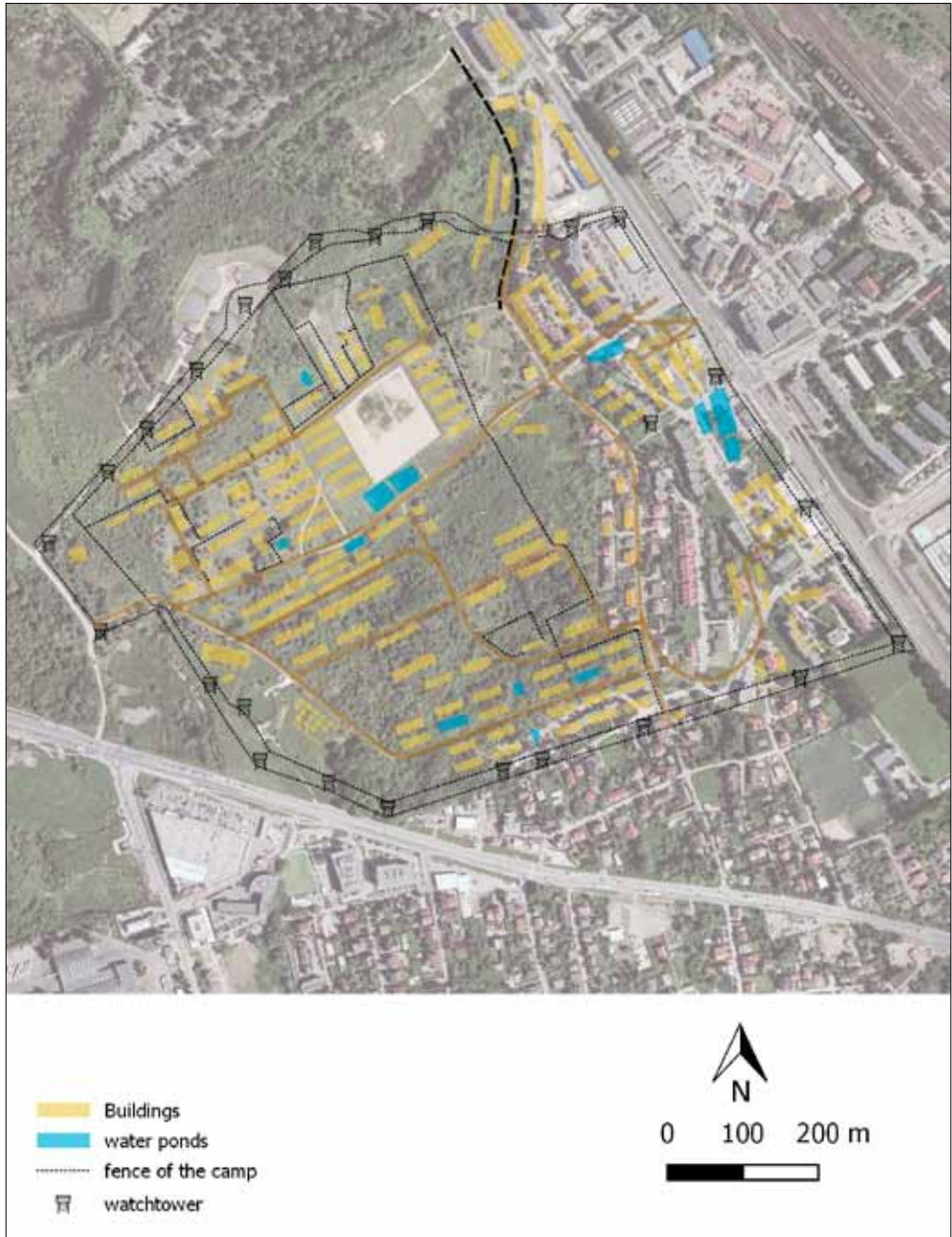
buildings, fences or camp routes. At the same time selected photos are of good quality – they were taken during good weather conditions.

Other photographs (not including photographs with cloud cover) can only be used for comparative analyzes. The possibility of recognizing objects related to the topography of the camp on them is limited. They can be used to interpret and describe the main buildings and roads.

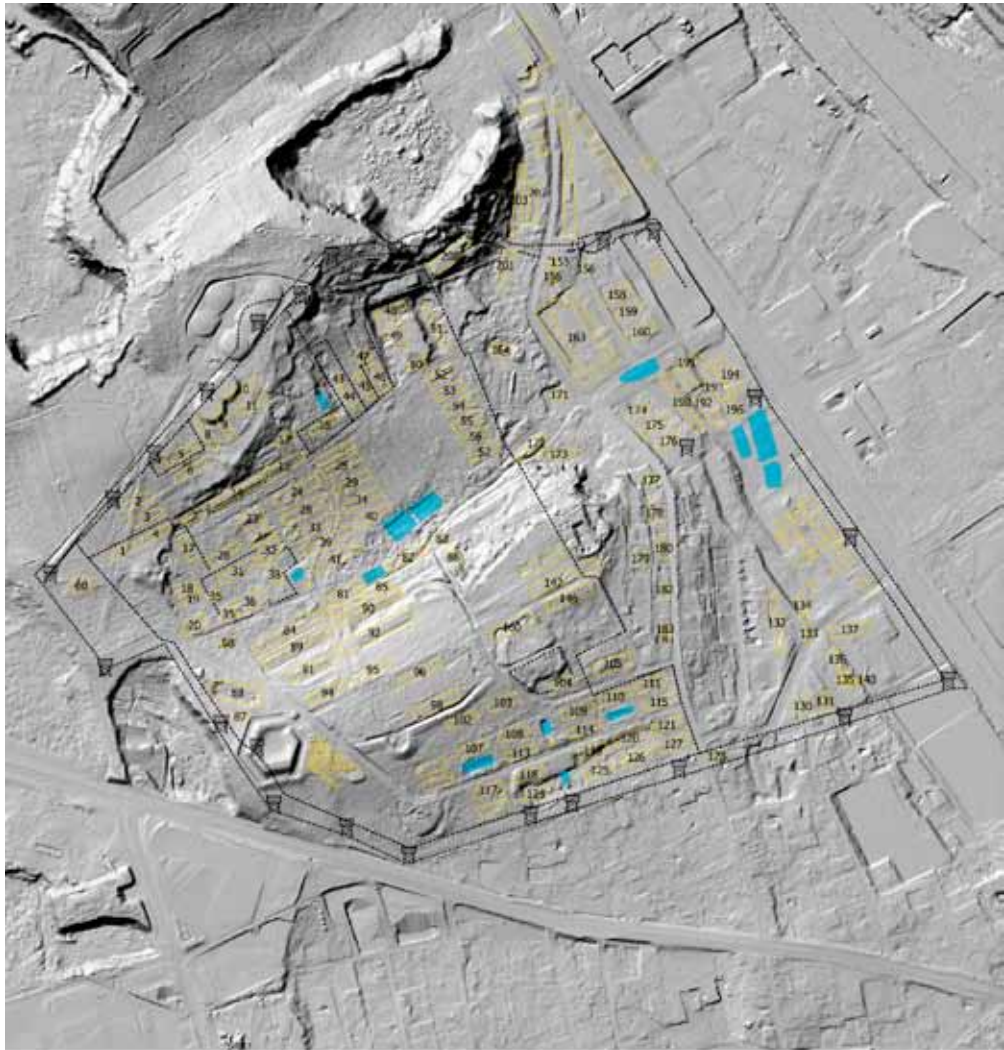
Before proceeding to the stage of preparing the plan, a geometric correction process of selected aerial photographs had to be made. Geometric correction is a multi-stage process. There are several different approaches to this process depending on the geometric model used. The geometric model defines the mathematical relationship between the coordinates of the points (eg B, L, H) and the coordinates of the image (row, column). Due to the lack of camera metrics, the obtained one photo (one from both dates) and the scale of about 1: 20,000 it is justified to carry out the correction process using the polynomial method.

Correction of archival aerial photographs made it possible to compare these materials with actual data (orthophotomaps, topographic maps, cadastral data), but also enabled the creation of metric plans for the camp by using GIS software.





In the first stage of the work, it was necessary to obtain vector layers depicting the camp in May and August 1944: buildings, fences, internal roads, watch towers and water reservoirs. The plans were created by stroking the above-mentioned objects.

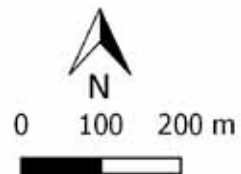


Ryc. 2. The plan of Plaszow camp on the background of orthophoto (*prepard by S. Różycki*)



Legenda

-  Buildings
-  water ponds
-  fence of the camp
-  watchtower



Ryc. 3. The plan of Plaszow camp on the background of hillshade visualization of ALS
(prepared by S. Różycki)

The second stage was adding attributes to each building describing their numbers and function. These attributes were obtained from the Map of Plaszow Camp published by the Historical Museum of the City of Krakow in 2016 based on mentioned original plans of the camp.

The analysis of the developed plans of the camps depicting topography from August and May 1944 allows to conclude:

1. The fence of the camp: a photo from August 1944, allowed to determine the course of the outer fence. Only in small fragments of shape and the course departs from the fence marked on the camp plan published by the Museum. However, there are significant changes in the course of the so-called the second inner fence and internal divisions determined on the basis of the aerial photograph compared to the plan. The pictures clearly show the second fence line running, among others in the vicinity of the hospital for the camp Staff and along Wielitzerstrasse. In these fragments the border was not put on the one of original plans. The internal fence also intersected the „Cipowy Dołek”, and it did not go around as it was presented on the plan published by the Museum. The designated external fencing allows to calculate the fenced area of the camp, which in August 1944 amounted to 57.61 hectares;
2. Watch towers: on a map prepared from photographs from August 1944 watch towers were placed. On the plan published by the Museum, the number of towers marked is smaller than on the plan prepared from the aerial photo;
3. Water reservoirs and ponds. These objects are visible in aerial photographs and have been designated. The quality of the photos allowed for the marking their exact shapes. The gray tones in the picture also allow you to specify which tanks were dry;
4. *Appellplatz*: This object is clearly visible in the pictures. It is difficult to clearly determine its exact outline. It was connected with internal roads, and its surface allowed vehicles to move around;
5. Railway line: in August 1944, the railway line was brought to the north-west corner of the barracks of *Wachmans*. The tracks could not go any further, towards the camp's camp office in Gray House, because they would encounter the rests of funeral parol. The quality of the August photo allows us to state that the ruins has been preserved to the extent that it is still present. This is also confirmed by the photo from February 10, 1945;

6. The tombstones (matzevas). The quality of aerial photographs does not allow to notice significant changes in the surface, which, according to the report and the map published by the Museum, were associated with the use of tubstones to pave camp roads;
7. Warehouse for metalworking shops: between May and August 1944, two large round warehouses and seven small ones were built. The number of storage facilities visible in the aerial image agrees with the above-ground photograph published on the camp's plan published by the Museum. It can be assumed that the picture could have been made in August of 1944 or later;
8. Camp roads: the aerial photograph from August 1944 allowed for marking the internal roads. Extreme roads are difficult to interpret. This means that the roads were intensively used. The pictures also show roads and walking paths. Roads connecting guard towers are well-readable;
9. Funeral parol: it is immortalized in its entirety in a photo from May 3, 1944. In the picture from August 20, 1944, the funeral parol is demolished – only its western part remained;
10. Camp buildings: the plan issued by the Museum is slightly different from the topography of the camp visible in the photographs from May or August 1944. Based on the interpretation of aerial photographs, we are able to introduce corrections and changes to the plan related to the specification of the shapes of individual buildings or slight adjustments to their location. The biggest differences between the plan published by the Museum and photographs of 1944 are:
 - a) no buildings number 161, 162, 163, 164, 141, 142, 143 and 144 in the area of the „Cipowy Dołek”. These buildings were not in August 1944,
 - b) lack of a new headquarter building in August 1944. In August, there is also no trip through the command building to Wielitzerstrasse,
 - c) in May 1944, there were no small buildings serving as rooms for hens, geese and rabbits. These objects appeared only in August 1944,
 - d) incompatibility of the location of buildings No. 25, 29, 34, 40 9 42 on the camp's plan issued by the Museum in comparison to the buildings of the Jewish section visible in the photographs from May and August 1944.

The next step in the desk-based investigation was also the analysis of photographic sources. Now, more than 800 pictures of various times

and stored in many archives are known (like Archives of Photography of The Historical Museum of Kraków, Institute of National Remembrance, National Archives in Kraków, Ghetto Fighters' Museum, Yad Vashem The World Holocaust Remembrance Center, Jewish Historical Institute of Poland, United States Holocaust Memorial Museum and private collections). Mainly it is a post-war documentation of area of the camp. Earliest photographic documentation of the Jewish cemeteries at Jerozolimaska Street was made in mid-1909. On June 5, 1909, a catastrophe occurred, caused by a lightning strike in the nearby powder house No. 5 of Austrian stronghold's buildings, located in the immediate vicinity FS-21 swing. During the survey and military inspection, some pictures were taken. In two of them, in the background the area of old cemetery is available to see. Only two photographs related to the occupation period, which may depict the area of one of the Jewish Cemeteries are known. The first one was donated to the Guido Morber to The Historical Museum of the City of Kraków in 2012. The photo is a part of the collection of occupation photographs made in Kraków. However, there is no exact location. On the reverse is the inscription: *Das ist ein Juden Friedhof*. It is difficult to ascertain with certainty whether the photograph originates in one of Krakow's necropolis. If this assumption is to be probable, it should be located in one of the two cemeteries in Podgórze. The cemeteries at Miodowa Street and Remuh had different characteristics.

On the second picture there is a group of people, in the background, the funerary parol of the new cemetery, on the left is the eastern wall of the old necropolis are possible to mark.

The largest and most complete source for verifying the topography of the camp is a collection of about 200 photographs from 1943–1945. Of particular importance is the collection of 70 of them. There are both general views and fragments of single parts of the camp, such as residential area, industrial area, as well as a documentation of the destruction and demolishing of the new funeral parol. The photographs were probably made by one of the military officer lower in rank, who moved freely around the camp, like in the private rooms or the guard towers. The collection of photographs is not an official document. Photos are of unknown origin. They were found in the archives of *Okręgowa Komisja Ścigania Zbrodni Hitlerowskich w Polsce* (the District Commission for the Investigation of Nazi Crimes in Poland) in 1980

(Kotarba 2009, 8). Other parts of known photo sources are photographed are also from the collections of the private commander of the camp, Amon Goth, and have been stolen from his luggage, kept at the Oskar Schindler's factory in Brunnlitz after the evacuation of the Deutsche Emailwarenfabrik from Krakow.

In post-war times the numerous photographs had been made, including the documentation of investigations of Nazi crimes in 1945, as well as the documentation of the area in 60. during the construction of the Memorial of Victims of Fascism. They have been analyzed in terms of post-war land changes

Above-Ground Field Investigation

In the first stage of research project also an orthophotomap was prepared, that this a detailed It allowed for more precisely determine the siting of the foundations of barracks and other camp features. Laser scanning (LIDAR) was also done, providing the data for a Digital Terrain Model (DMT). Next, a three dimensional model of the surface of the camp was built, omitting vegetation, which in many cases obstructs observation of changes of the terrain. When the data provided by these two methods were compared, both the topography of the former camp

Ryc. 4. The reconstruction of photopanorama form 1944 with the permeation of present-day landscape (*prepeard by K. Karski*)



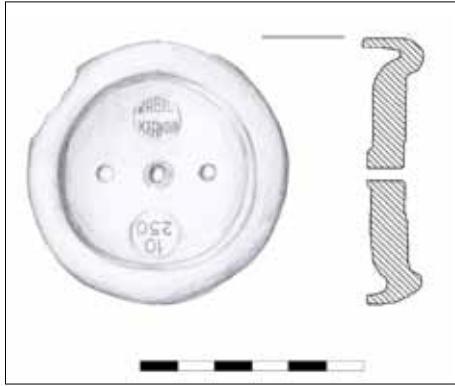


Ryc. 5. The relicts of cemetery of Podgórze Commune (photo by K. Karski)

and the post-war changes became more clear. The work was carried out in the winter when various architectural features are more visible (gutters, fragments of the icehouse or the SS hospital). The absence of grass and shrubs exposed the earthworks of the „Hujowa Górka” and made it possible to determine its real size. During the interpretation of the DMT more distinct, architectural features and traces of barracks foundations were discovered. The imaging also included the post-war transformations of the terrain, for example, the changing course of the main water pipeline, crossing the area of the former camp along the north-south axis.

The GIS map and DMTs’ analysis brought the best results in observation also with the previous analysis of archival photographic data. A large-width panorama made in 1944 was able to reconstruct. In that case, there was a possibility to indicate every single building put into the pictures with references to plans and maps.

In the early spring of 2017, surface surveys and listing of architectural relics were prepared. They consisted in crossing the entire area of the



Ryc. 6. Electric socket fitting produced in Kabel Krakau found during the surface surveys (draw by K. Karski)

camp on foot and gathering objects lying directly on the ground; they could have been there as a result of natural drenching and leaching processes, or of animal interference. Also possible looters' pits were marked. As a result, more than 100 artifacts in 60 localizations were found. We could mention an electrical socket with an inscription Kabel Krakau; fragments of barbed wire; a pre-war mug produced in the Światowid factory Myszków; a cocoa can with a barely legible inscription *Ovomaltine*; and a whole array of old ammunition parts – shells and bullets for German Mauser rifles. The listing led to the

conclusion that relicts of more than 50 structures are available to see. Many of them are a concrete foundations of barracks and machines in the industrial area. In other parts of camp, only a few elements are possible for observation. Mostly the places of barracks are able to distinguish as a revelation of terrain, without any architectural rest over the earth surface. Best preserved components of the architecture of the camp are the relicts of laundries next the male residential area. There also rests of the stone-walled basement of SS hospital.

Below-Ground investigation

The first stage of the work in 2016 also included geophysical prospection using magnetometry in the area of more than 20 hectares. The collected data was also used for a partial reconstruction of the historical topography of the camp. The visualizations clearly show such elements as a cemetery wall, preserved in the northern section of the new cemetery of the Jewish Commune in Kraków; traces of former gutters by the laundries and the male latrine; and groups of minor anomalies coinciding with the contours of specific barracks. On the site of the old Jewish cemetery in the Podgórze district, several anomalies were identified, which could be interpreted as an effect of high temperature. Their source seems to have been the boilers by the camp laundry buildings. The place of the bath was examined, as well as a possible mass grave. The anomalies suggest the occurrence of high

temperature here. Disorders of this type and such a clear structure occurred only in these two locations in the scale of the entire camp. It seems reasonable to accept the possibility that this is the result of secondary residual magnetization caused by boilers for heating water. In the accounts, mainly of Jakub Stendig, there is a description of the functioning of the baths and the circumstances of, among others, overheating of boilers due to their overloading. The water was heated in such a way that the heated water vapor was used also for disinfection of clothes, mattresses and other textiles.

In the western part of the former cemetery, there is a mosaic anomaly interpreted by the as the eastern boundary of burials. Unfortunately, the area to the east cannot be effectively examined by the magnetic method due to the unfavorable terrain. Nevertheless, it would seem that this anomaly could, to a certain extent, be a picture of the first mass grave in the cemetery.

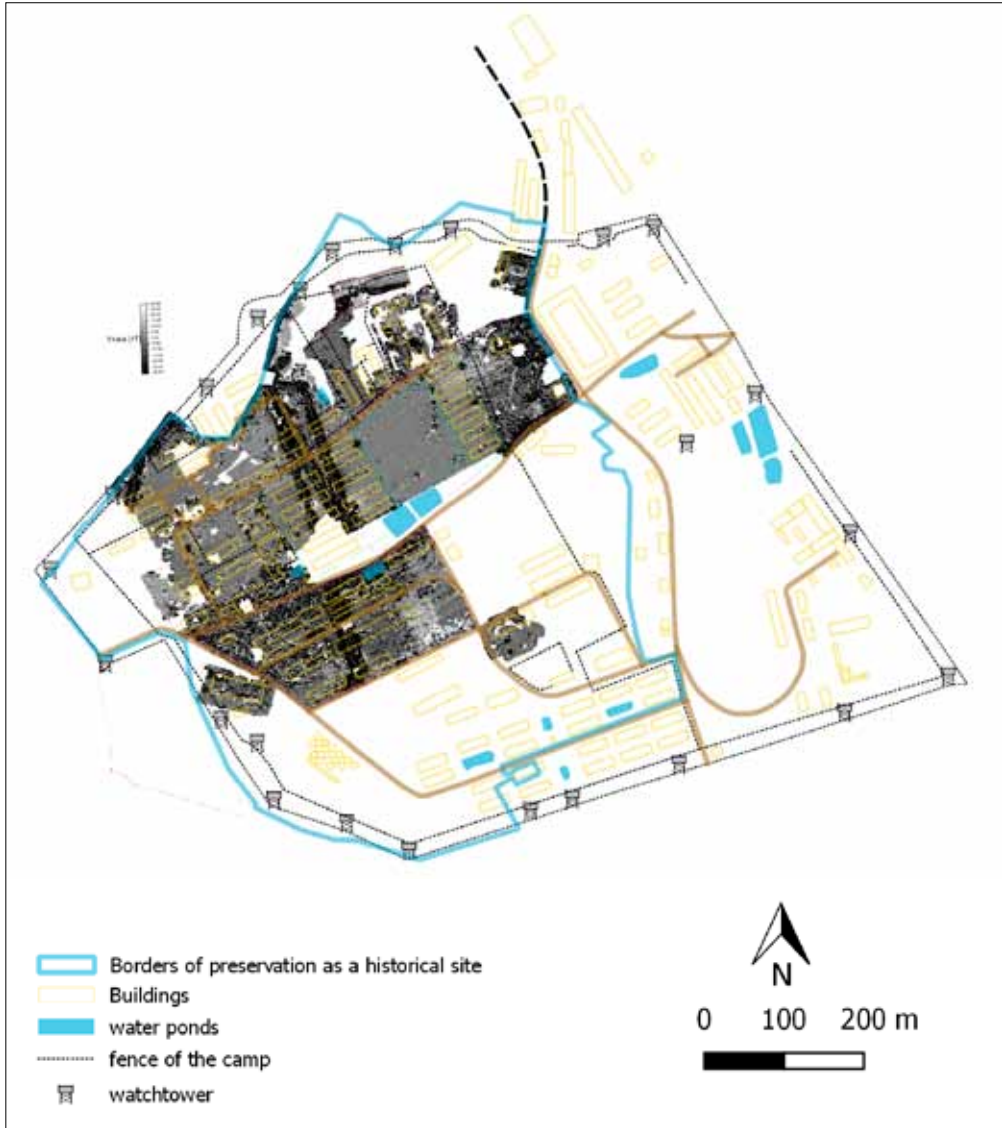
In the industrial part of the camp, the magnetic method did not bring unambiguous effects. The image of the tests is not legible. One of the reasons may be a shallow foundation of limestone, a large accumulation of metal objects and reinforced relics of camp infrastructure as well as post-war garbage dumping in this area.

In 2017 the magnetic method was supplemented with three others: electromagnetic, electric resistivity/conductivity and ground-penetrating radar. The use of a whole range of methods made it possible to compare the readings and data. This resulted in a precise identification and locating of the preserved rests of barracks and other features within the former KL

Plaszow. We also wanted to identify buildings which had stood on the sites of cemeteries and mass graves, where excavations are not possible due to the ethical issues.

On the basis of electric resistivity research in this area, two types of anomalous zones can be indicated. The first one shows areas of increased resistance. It should be recognized, therefore, that in the case when there were no buildings, the noted anomaly was an effect of artificial interference, e.g. through the pouring of lime debris, paving the way for the excavator (called *bagier* in Polish). In addition, the fence (or rather its remains) is partially visible on the archival photography presented above.

The second form of anomaly visible in the electro-resistance studies is a small point disorder with increased resistance. This is probably related



Ryc. 7. Visualization of data from a geomagnetic test

to the relics of grave cellars that have not been completely destroyed. In the case of electromagnetic research, anomalies are also visible, however, with a much smaller range. A similar disorder, unfortunately, could not be captured in such a visible form in the case of building No. 49- a new bathhouse. However, a small point disturbance was recorded at the place

of the expected boiler/installation. As in the case of research, electro-resistance can point to point anomalies, which most probably should be combined with undamaged grave cellars.

Some works were also conducted in the places of planned excavation, especially in the area of males barrack No 24. In the image of magnetic tests, the concentration of anomalies in the southern part of the barrack is visible, coinciding with the outline of the wall. In addition, an additional group of disturbances may be indicated on the area occupied by the barrack, possibly related to the furnace/heating device. In the image of electromagnetic resistance research, the zone with increased resistance along the southern wall of the barracks and in its central part was confirmed. Similar results were obtained in the case of electromagnetic tests. Therefore, it seems likely that the foundations of the zone have been preserved, or relics of foundations under the barrack. On the basis of georadar tests, it can be determined that a certain continuity of the layer occurs at a depth of 0.8–1.2 m, which is probably the boundary between unmixed layers.

In the course of further work in the area of the Old Jewish Cemetery, further research work was carried out involving the implementation of GPR measurements. As in the case of earlier results of the non-invasive investigation, a clear anomaly running was confirmed. Nevertheless, the results of GPR method were into the discussion. The research was prepared once again by the Rabbinical Commission for Jewish Cemeteries. In fall of 2017, the research was planned for the western part of the graveyard as well as a possible location of the first *Appelplatz*. The results of the investigations are now under the interpretation.

Verification

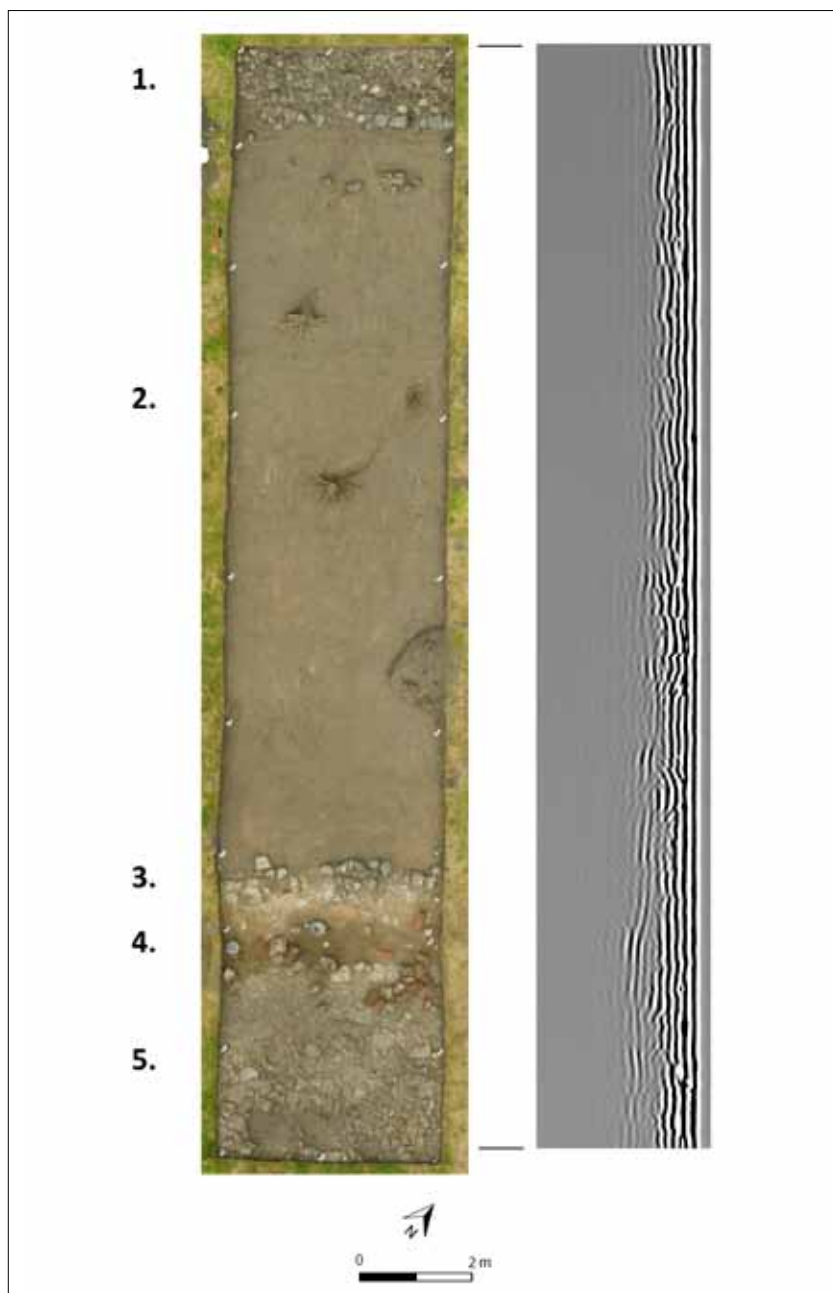
The verification of the non-invasive methods were possible after the excavations. Excavations covered the area of 100 square metres out of the extant 40 hectares of the camp grounds and were conducted from mid-May till the end of July 2017. They constituted the final stage of archaeological research planned for 2016–2017. The main aim was to determine the topography and stratigraphy of the camp area on the basis of previously acquired data. The explored buildings and other sites included the male barrack No. 24; two laundries and the male latrine (buildings No. 23, 27, 32); the bakery (building No. 38); the

presumed Polish hospital (building No. 17); the surgery ward barrack (building No. 20 in the hospital sector); the fire-fighting pond and the children barrack; the so-called Kinderheim (building No. 5) in the women's section; and the barracks of the ironworks, sheet-metal shop (building No. 84), paper mill (building No. 90), and printing house (building No. 92) in the industrial section. Small test-pits were also made to determine the archaeological layers in the industrial sector of the former camp. It soon transpired that the relics of the camp infrastructure are located just below the surface. After removing the top layer of soil, fragments of camp roads between the barracks were uncovered. They were built of finely crushed limestone and numerous pieces of matzevas. Previously it was believed that the tombstones had been mostly used for paving only the roads close to the former bakery building and by the path running to the female sector. But now it should be assumed that crushed tombstones from the desecrated cemetery were used for paving roads throughout the camp.

During work by the camp bakery a pavement with curbs was uncovered, as well as a limestone tract with a small drainage duct, probably running along the eastern wall of the building. We may presume that it is a pre-war road from the times when the building housed a sanatorium for children with tuberculosis run by the Jewish Society for Health Protection. Open gutters run along the main camp roads and small drainage systems were situated around the barracks. In the gutter by the barrack No. 24 numerous artefacts were discovered; they probably had found their way there during the demolition of the building.

The drains in the laundry and male latrine buildings were located outside. A gutter with fragments of a concrete slab at the bottom was discovered in the male latrine building. In the laundry, the drain was entirely covered and probably located by the southern wall. Most barracks were light timber constructions on shallow foundations, as has been confirmed by excavations at the male barrack No. 24, which uncovered an underpinning below the longer wall of the building. The most clear remnants of a wall are found in excavation No. 7. The relatively shallow foundation was laid directly under a layer of stones joined with mortar. Foundations of the longer walls of the male latrine were built of stones joined with mortar, with a concrete

slab on top. A limestone wall thickly covered with mortar was detected by the bakery building; it was probably raised during the



Ryc. 8. The combination of GPR results and its verification by excavation in the area of barrack No 24; 1. – the paved route; 2. – interior of the building; 3. – foundations of southern wall; 4. – gutter; 5. – the paved route (photo by I. Pieńkos, GPR investigations by A. Schwarz; analysis by K. Karski)

reconstruction of the TOZ building for camp purposes. But only a small amount of crushed brick was found. Presumably it was reused as building material after the war. But brick remnants were found in the uncovered fragment of barrack No. 31, a food store where an underpinning was detected, and by the shorter wall of the laundry (building No. 27). Some buildings also had concrete foundations, the remnants of which are now visible, mostly in the industrial sector of the camp (for example, by the ironworks and metal-sheet shop-building No. 84). Very little was found on the site of the former laundries, besides fragments of dismantled buildings and loose building material.

Final remarks

Thanks to the non-invasive research of the post-camp area, it was possible to determine the degree of authenticity of the area. The preserved elements of the infrastructure and topography were indicated. The results of the research will be used to prepare an effective program for the protection of this place during the work on the scenario of the future museum in the place of memorial site. The authenticity of the post-camp area and preservation programme of its historical value is one of the aims of the emerging development process.

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and City of Kraków as well as the research programme of Rabbinical Commission for Jewish Cemeteries in the Office of Chief Rabbi of Poland.

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