



**ENGINEERING DOCUMENTATION OF ARCHAEOLOGICAL
EXCAVATIONS OF THE SITE “EARLY (WOODEN)
FORTIFICATION” IN THE INNER CITY OF PLISKA AS PART OF
THE CULTURAL AND HISTORICAL HERITAGE OF THE REPUBLIC
OF BULGARIA**

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ABSTRACT: *The current paper presents briefly and in general terms the horizontal geodesic survey done by angle measurement, as well as the engineering documentation of the results of the stage from the archaeological excavations of the site “Early (wooden) fortification” in the Inner city of Pliska in 2019.*

KEY WORDS: *cultural and historical heritage, engineering documentation of archaeological excavations, geodesic survey*

The immediate aim of the applied variety of facts in one area is the application of the theoretical knowledge in order to solve practical tasks.

The basic practical field geodesic activities when engineering the documentation of medieval sites as part of the cultural and historical heritage of the Republic of Bulgaria are:

- development (construction) of Operational geodesic basis (OGP);
- laying of Operational plan square grid (OPSG);
- geodesic activities when surveying – stage survey and final survey
- development of plans – graphical documentation of the results from the archaeological excavations [7, p. 165 – 166; 9, p. 298 – 299; 10, p. 5 – 6].

Length measurement (when coordinating the uncovered structures according to the temporary stabilized with wooden markers points from the terrain which fix the respective archaeological excavations and drillings) and angle measurement (when surveying the temporarily stabilized with wooden markers points from the terrain which fix the respective archaeological excavations and drillings) are basically used in the geodesic work for graphic engineering documentation of archaeological excavations of medieval sites. They are based on OGP which is a prerequisite for complex and precise geodesic survey of the results from the archaeological excavations.

Continuing the work in excavations XIV, XV and XVI of the site “Early (wooden) fortification” in the Inner city of Pliska [scientific supervisor of the archaeological excavations is Assoc. Prof. Pavel Georgiev] in 2009, new archaeological excavations (№ XVII, XVIII and XIX) and drillings (№ 1, 2 and 3) have been started [2, p. 435, p. 436].

Upon instructions of the scientific supervisor, the terrain sections which were identified by him, are cleaned. The prepared area is traced and is temporarily stabilized by wooden markers OPSG with squares 5 x 5 m and the geodesic foothold OPSG is OGP in the Inner city of Pliska [1, p. 71].

Conventional geodesic devices are being used for the measurement.

- engineering theodolite;
- leveler;
- measuring pole;
- markers;
- measuring tapes, etc. [8, p. 100 – 107].

The discovered structures in the archaeological excavations and drillings are coordinated by means of length measurement according to OPSG using steel measuring tape and plumb.

The terrain geodesic work continues with geometric leveling of the detailed points according to the leveling points (LP) from the OGP and the normal heights are calculated by this way:

$$(1) \quad E_{cp} = (E_{lp} + R_{lp}) - R_{cp}, \text{ where}$$

E_{cp} – Elevation (normal height) of a characteristic point

E_{lp} – Elevation (normal height) of LP (leveling point)

R_{lp} – reading from the measuring pole, positioned on the leveling point

R_{cp} – reading from the measuring pole, positioned on the characteristic point.

For excavation XVII the results are:

- for p. 1 → $187,375 = (185,565 + 2,820) - 1,010$;
- for p. 2 → $187,465 = (185,565 + 2,820) - 0,920$;
- for p. 3 → $108,845 = (185,565 + 2,820) - 0,895$;
- for p. 4 → $108,820 = (185,565 + 2,820) - 1,035$ etc.

By using the elevations of the characteristic points, their positive or negative lath are defined towards a leveling point XVI from OGP from which it was chosen as basis, i.e.&

$$(2) \quad \pm P_{bp} = E_{cp} - E_{bp}, \text{ where}$$

$\pm P_{bp}$ – Positive or negative lath of a characteristic point towards the basis LP

Ecp – elevation (normal height) of a characteristic point

Ebp – elevation (normal height) of the basis LP.

For excavation XVII the results are:

- for p. 1 $\rightarrow 1,810 = 187,375 - 185,565$;
- for p. 2 $\rightarrow 1,900 = 187,465 - 185,565$;
- for p. 3 $\rightarrow 1,925 = 187,490 - 185,565$;
- for p. 4 $\rightarrow 1,785 = 187,350 - 185,565$ etc.

After finding the laths, the geodesic measurements continue with horizontal survey of the separate archaeological excavations by measuring angles. The aim is to situate them in the proper ratio over the cadastral plan with the written OGP in the Inner city of Pliska. The work proceeds and the engineering theodolite is stationed over leveling point LP XVI which is at the same time first station (St. 1) for horizontal geodesic survey of excavation XVII. The rectification and definition of zero direction $0^g = LP IX$ from OGP, coinciding with the zero on the horizontal circle of the device, are a prerequisite for the beginning of the measurements of St. 1.

With the release of the upper clamp screw of the engineering theodolite, the zero of the horizontal circle is oriented which is the beginning of the survey work. It is focused towards every characteristic point on the contour of the excavation. The respective numbering is kept (already temporarily fixed wooden markers characteristic points from the OPSG which fix excavation XVII). It is focused in the basis of the marker with which the assistant gives a signal to the operator from the point, i.e. for St. 1 we get:

- to p. 1 $\rightarrow 360,945^g$;
- to p. 2 $\rightarrow 362,270^g$;
- to p. 3 $\rightarrow 365,515^g$;
- to p. 4 $\rightarrow 364,330^g$.

The data is recorded and the records (on the horizontal circle of the engineering theodolite), like with the leveling, are focused two times (before and after the recording) for safety and accuracy. Parallel with this, the circle and alidade levels of the instrument are checked – for perfect horizontality.

After the horizontal geodesic measurements of excavation XVII of St. 1 finish, the same are performed by the second station (St. 2). With the stationing of the engineering theodolite upon leveling point LP IX from OGP, the condition has been satisfied.

A prerequisite for the beginning of the measurements from St. 2 are the rectification of the engineering theodolite and the defining of the zero direction $0^g = HP XVI$. It coincides with the zero on the horizontal circle and the operational method is the same like the one from St. 1, i.e. for St. 2 we get:

- to p. 1 $\rightarrow 68,785^g$;
- to p. 2 $\rightarrow 74,170^g$;
- to p. 3 $\rightarrow 72,940^g$;

- to p. 4 → 67,140^g.

The geodesic activities continue with horizontal measurements of excavation XVIII where St. 1 is leveling point LP XXII from OGP with zero direction 0^g = LP XVI. Here St. 2 is leveling point LP E2 from OGP with zero direction 0^g = LP XVI, which is coordinated with the terrain positioning of the archaeological excavation.

The geodesic survey at the stage of the archaeological excavations finishes with the horizontal measurements of excavation XIX and drillings 1,2 and 3. In this case St. 1 is leveling point LP XVI with zero direction 0^g = LP and St. 2 is leveling point LP XXII from OGP with zero direction 0^g = LP XXII.

With the completion of the geodesic measurements of archaeological excavation XIX and drillings 1, 2 and 3, the horizontal survey is done.

In order to depict correctly the characteristic points from the OPSG, which fix the separate archaeological excavations and drillings, on the cadastral plan, the measured horizontal angles are drawn with circular protractor, first centered in the corresponding St. in the zero direction. The same is done for the corresponding St. 2 as the characteristic points are measured by crossing the two directions from the two stations.

The developed in this way plan, together with data filled in charts, presents horizontal geodesic measurement by measurement of angles, as well as the engineering documentation of the results from the stage archaeological excavations of site “Early (wooden) fortification,, in the Inner city of Pliska in 2009.

The archaeological research in excavation XXI of the site “Early (wooden) fortification” in the Inner city of Pliska [scientific supervisor of the archaeological excavation is Assoc. Prof. Dr. Pavel Georgiev] are performed in 2015, 2017 and in 2018 they are completed [3, p. 441 – 442, p. 443 – 444; 4, p. 637, p. 638 – 639, p. 640].

The work process during the last year required undertaking two enlargements by the instruction of the scientific supervisor, e.g. from the west and from the east. The object is situated in the northwest corner of the Inner city of Pliska (Fig. 1). Lowering the paths allows the research of the upper construction horizon with its adjoining structures from X – XI century. Parts of dwellings, as well as two milling devices that were discovered last season, have been finished. This is a proof that these facilities are typical for the dwellings in the sector. An anonymous folis class A1 (969 – 976) has been discovered which is reprinted over the folis of Nikephorus II (963 – 969). New fragments from glazed vessels have been found. In this regard, the so called Early dug in building I (EDB I) (Fig. 1) remains under structures from X and XI century. It is located 1,60 – 1,70 m deep from the old surface and it has longitudinal axis east – west (E – W). The west part of the Early dug in building (Fig. 1) is outside the excavated terrain and the east part is under the uncovered structures in

excavation XX of the same site. The structure presents a “chain” of three big rooms and there is a small “vestibule” attached to them from the east. Pieces of water pipes have been identified, as well as heating devices, i.e. a stone fireplace and close to it – a clay furnace. The lack of data from the production suggests the statement of the excavators about the household characteristics of the EDB. The inventory is modest. The characteristics of the family dwellings spindle whorls are not present which led to the conclusion that groups of men under control were settled there. The fact that there are no dices for games, stone sharpeners, etc. excludes that soldiers were living there. It has to be considered that the household ceramics is mostly pots with sandy structures and engraved decoration and about 5-6 vessels have been restored. The grey and black pots are two and there is one jug; the fragments from amphora-shaped vessels from purified clay and the fast wheel are rare. One amphora-shaped pitcher is reconstructed. Tableware and few animal bones from small grazing animals, birds and fish have been found. According to the excavators the household ceramics can be traced back to the first half of the X century and the date of the construction of the EDB I is during the first half of the IX century but considerably later after the destruction of the Small wooden fortification (SWF) in 811 which is shown from the observation of excavation XVI of the site “Early (wooden) fortification” in the Inner city of Pliska in 2009 [5, p. 441, p. 442, p. 443].

For the site “Early (wooden) fortification” in the Inner city of Pliska, OPSG is traced and temporarily stabilized with squares 5 x 5 meters upon the instructions of the scientific supervisor, coordinated with the existing OGP.

The technical measurements of the archaeological excavations and the discovered structures in them are coordinated usually by means of measuring the lengths with the OPSG. The activities continue with horizontal and vertical measurements of the archaeological excavations in order to create technical documentation.

The field geodesic work is accompanied with geometric leveling of detailed and characteristic points and calculation of their normal heights. This is done to define their positive or negative laths (Δh) towards a leveling point from OGP (LP XVI = 185,565 m \rightarrow $\Delta h = 0,000$ m) which was chosen for a basis. Conventional devices are used to perform the geodesic activities of engineering documentation of archaeological structures.

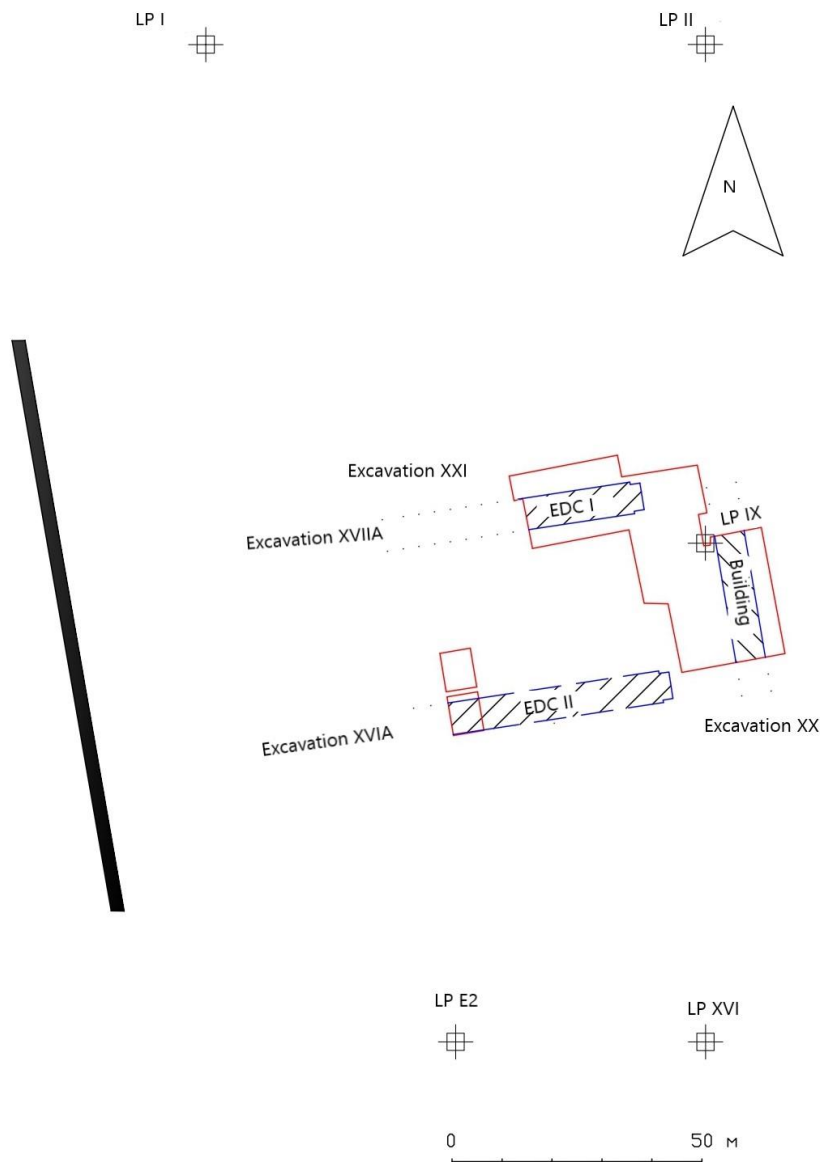


Fig.1. Situational plan for excavations XX, XXI, XVIIA u XVIIIA from the site “Early (wooden) fortification“ in the Inner city of Pliska in 2019 [from Pavel Georgiev]

- engineering theodolite;
- leveler;
- markers;
- measuring poles;
- measuring tapes with metal or non-metal tape;
- plumb, etc.

After finishing the above-mentioned activities, a geodesic survey is performed for excavation XXI, as well as for excavation XX. The following are used for the activities:

- digital optical tachymeter;

- synchronized automation program system for engineering and construction computer processing of graphical data.

The basis for the performed activities is the permanently stabilized OGB in the Inner city of Pliska. First the digital optic tachymeter is stationed south of excavation XXI in order to secure maximum visibility towards the characteristic points on the contour of excavation XX.

The terrain situating of both excavations suggests that the leveling points LP I and LP II from OGB are to be used as basis and their rectangular coordinates and normal heights are input in the digital optic tachometer. Consequently, we are focusing towards LP I and LP II with which the records are fixed, namely:

- for LP I $\rightarrow X = 4671000,025; Y = 9460599,973; Z = 189,808;$

- for LP II $\rightarrow X = 4671000,044; Y = 9460699,987; Z = 189,994.$

The identification of the above numbers gives the spatial position of the digital optic tachymeter [the stationing point (St.)] with fixed rectangular coordinates and normal height, i.e.:

- for St. $\rightarrow X = 4670887,956; Y = 9469677,794; Z = 189,271.$

The successive focusing towards every characteristic point from the contour of the two excavations comes next and their rectangular coordinates and normal heights are specified and they define their spatial position, i.e.:

• for excavation XXI:

- for p. 1 e. $\rightarrow X = 4670913,509; Y = 9460660,727; Z = 188,082;$

- for p. 3 e. $\rightarrow X = 4670917,693; Y = 9460682,385; Z = 188,185;$

- for p. 16 $\rightarrow X = 4670902,730; Y = 9460684,668; Z = 187,824;$

- for p. 17 $\rightarrow X = 4670898,984; Y = 9460684,668; Z = 187,783;$

- for p. 20 $\rightarrow X = 4670908,932; Y = 9460663,432; Z = 187,915;$

- for p. 19 κ. $\rightarrow X = 4670908,543; Y = 9460661,688; Z = 187,983;$

• for excavation XX:

- for p. 4 $\rightarrow X = 4670913,357; Y = 9460683,217; Z = 188,128;$

- for p. 5 $\rightarrow X = 4670915,690; Y = 9460698,377; Z = 188,081;$

- for p. 6 $\rightarrow X = 4670906,118; Y = 9460700,294; Z = 188,547;$

- for p. 7 $\rightarrow X = 4670905,793; Y = 9460698,582; Z = 187,857;$

- for p. 8 $\rightarrow X = 4670899,514; Y = 9460699,636; Z = 187,759;$

- for p. 9 $\rightarrow X = 4670899,653; Y = 9460700,944; Z = 187,710;$

- for p 10 $\rightarrow X = 4670901,252; Y = 9460701,000; Z = 187,757;$

- for p 11 $\rightarrow X = 4670903,209; Y = 9460711,161; Z = 187,872;$

- for p. 12 $\rightarrow X = 4670877,913; Y = 9460715,934; Z = 187,329;$

- for p. 13 $\rightarrow X = 4670874,120; Y = 9460695,288; Z = 187,355;$

- for p. 14 $\rightarrow X = 4670887,887; Y = 9460692,529; Z = 187,477;$

- for p. 15 $\rightarrow X = 4670888,010; Y = 9460687,716; Z = 187,524.$

The lath is calculated towards leveling point LP XVI. The results are the following:

- for excavation XXI:
 - for p. 1 e. $\rightarrow \Delta h = 188,082 - 185,565 = 2,517;$
 - for p. 3 e. $\rightarrow \Delta h = 188,185 - 185,565 = 2,620;$
 - for p. 16 $\rightarrow \Delta h = 187,824 - 185,565 = 2,259;$
 - for p. 17 $\rightarrow \Delta h = 187,783 - 185,565 = 2,218;$
 - for p. 20 $\rightarrow \Delta h = 187,915 - 185,565 = 2,350;$
 - for p. 19 κ. $\rightarrow \Delta h = 187,983 - 185,565 = 2,418;$
- for excavation XX:
 - for p. 4 $\rightarrow \Delta h = 188,128 - 185,565 = 2,563;$
 - for p. 5 $\rightarrow \Delta h = 188,081 - 185,565 = 2,516;$
 - for p. 6 $\rightarrow \Delta h = 188,547 - 185,565 = 2,982;$
 - for p. 7 $\rightarrow \Delta h = 187,858 - 185,565 = 2,293;$
 - for p. 8 $\rightarrow \Delta h = 187,759 - 185,565 = 2,194;$
 - for p. 9 $\rightarrow \Delta h = 187,710 - 185,565 = 2,145;$
 - for p. 10 $\rightarrow \Delta h = 187,757 - 185,565 = 2,192;$
 - for p. 11 $\rightarrow \Delta h = 187,872 - 185,565 = 2,307;$
 - for p. 12 $\rightarrow \Delta h = 187,329 - 185,565 = 1,764;$
 - for p. 13 $\rightarrow \Delta h = 187,355 - 185,565 = 1,790;$
 - for p. 14 $\rightarrow \Delta h = 187,477 - 185,565 = 1,912;$
 - for p. 15 $\rightarrow \Delta h = 187,524 - 185,565 = 1,959.$

The final result from the tachymetric geodesic survey is engineering documentation with realization of situational plan by means of synchronized automated program system for engineering and construction computer processing of graphic data (Fig. 1).

In 2019 the work continues in excavations XVI and XVII from the site “Early (wooden) fortification) in the Inner city of Pliska [scientific supervisor of the archaeological excavations is Assoc. Prof Dr. Pavel Georgiev to whom I am grateful for the presented in 2019 unpublished data and information] and the respective excavations are enlarged by the instructions of the scientific supervisor in the four geographic directions and they are given the respective numbers XVIA and XVIIA (Fig. 1)

The research is focused directly around the partly researched in 2009 excavations XVI and XVII in which the track of the west base from SWF is found and also an unknown dug in construction with well-preserved cupola oven, built above the remains of the fortification. The above mentioned two excavations are situated in an unresearched northwest sector from the Inner city of Pliska, southwest of the researched in 2015 and 2017 – 2018 excavation XXI. An Early dug-in construction (EDC) is found in its lowest construction and dwelling horizon which is similar to the dug-in structure with cupola oven in excavation XVI from 2009. A major finding from the excavations in 2019 is the proven new “Early dug in construction” (EDC II) (Fig. 1), which was found only within the boundaries of excavation XVIA and there is a possibility of an

extention to the structure to be in western and eastern direction from the excavation contour. In relation to the above mentioned, the found materials in EDC II when it was filled, are fragments from pots from the first half of IX century, most of them with coarse structure and with drawn slow pottery circle and the found bones belong to birds, small mammals and fish. They are not numerous. A piece of river clam was also found. There are no remnants from household items like the normal dwellings (spinning whorls, bone pricklers, whetstones, etc.) The exceptions are few pieces of thick tegula or brick with cuts from sharpening of probably metal blades. Two of the trenches of the Western wall of the Wooden fortress are traced in and under the floor of the discovered EDC II. The end trench from the west belongs to the Big wooden fortification (BWF). It is a continuation of the found directly from the north wall of the EDC base with stone construction and bed for palisade. A small piece of a tile with carved with fingers “epsilon” has been found among the stones. The east trench under the floor of EDC II is the base of the SWF and it remains under its cupola oven and the additional trench remains next to its east side. When constructing the EDC II, the two trenches – BWF and SWF – are cut by its deep trench, their stone construction is removed and they are bridged by the lining small wall which consists of pressed loess soil in a framework and small ordinary pebbles. Registering this peculiarity allows the excavators to conclude that EDC II is constructed after the destruction and abandonment of the first fortification of Pliska in 811. This fact is a sufficient reason for the excavators to continue to state that like EDC I (in excavation XXI), also the newly discovered early dug in construction (EDC II) has a construction period that should be dated in the first half and not later than the middle of IX century. The definite finding of the second dug in construction (EDC II) from the capital period of Pliska confirms the conclusion from 2018 that constructions with the outlook of deeply dug in and connected to each other big semi-dugouts with characteristics of buildings “dormitories” were built next to the Western fortress wall and above the remains of the Wooden fortress. [6, p. 1087 – 1088, p. 1089 – 1090].

The geodesic survey of the archaeological excavations and the discovered structures in them are coordinated by means of measuring lengths towards the characteristic (angular) points on the excavations contour. The activities continue with horizontal and vertical measurement of the archaeological excavations in order to create technical documentation.

The field geodesic work is accompanied by geometric leveling of detailed and characteristic points and the calculation of their normal heights. This is a prerequisite to define positive or negative laths (Δh), according to a leveling point which is chosen as a basis (LP XVI = 185,565 m \rightarrow $\Delta h = 0,000$ m) from OGB. The results are the following:

- for excavation XVIA:
- for p. 1 $\rightarrow \Delta h = [(185,565 + 3,015) - 0,910] - 185,565 = 2,105;$

- for p. 2 $\rightarrow \Delta h = [(185,565 + 3,015) - 0,955] - 185,565 = 2,060$;
- for p. 3 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,020] - 185,565 = 1,995$;
- for p. 4 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,045] - 185,565 = 1,970$;
- for excavation XVIIIA:
 - for p. 5 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,280] - 185,565 = 1,735$;
 - for p. 6 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,300] - 185,565 = 1,715$;
 - for p. 7 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,090] - 185,565 = 1,925$;
 - for p. 8 $\rightarrow \Delta h = [(185,565 + 3,015) - 1,090] - 185,565 = 1,925$.

Conventional devices are used to perform the geodesic activities of engineering documentation of archaeological structures.

- engineering theodolite;
- leveler;
- measuring pole;
- markers;
- measuring tapes with metal or non-metal tape;
- plumb, etc.

After finishing the above-mentioned activities, a geodesic survey is performed for excavation XVIA, as well as for excavation XVIIIA by measuring angles. The above-mentioned devices are used for the activities.

The basis for the performed activities is the permanently stabilized OGB in the Inner city of Pliska. The terrain situating of excavations XVIA and XVIIIA suggests their consecutive measurement from every station (Fig. 1) The work has started and the engineering theodolite is stationed above leveling point LP XVI which is at the same time first station (St. 1) for horizontal geodesic survey of excavations XVIA and XVIIIA. The rectification and the defining of the zero direction $0^g = LP E2$ from OGB, coinciding with the horizontal circle of the instrument are a prerequisite for the beginning of the measurements from St. 1. By releasing the upper clamp screw of the engineering theodolite, the zero of the horizontal circle is oriented which is the beginning of the geodesic work. It is focused towards every characteristic point on the excavations contour. The respective numbering is followed (they are temporarily stabilized with wooden markers characteristic points which fix excavations XVIA and XVIIIA). It is focused in the base of the marker, with which the assistant signals to the operator from the point (Fig. 1), i.e. from St. the records are:

- for excavation XVIA:
 - to p. 1 $\rightarrow \varphi = 61,880^g$;
 - to p. 2 $\rightarrow \varphi = 65,770^g$;
 - to p. 3 $\rightarrow \varphi = 63,610^g$;
 - to p. 4 $\rightarrow \varphi = 63,300^g$;
- for excavation XVIIIA:
 - to p. 5 $\rightarrow \varphi = 60,685^g$;
 - to p. 6 $\rightarrow \varphi = 56,230^g$;

- to p. 7 $\rightarrow \varphi = 59,120^{\circ}$;
- to p. 8 $\rightarrow \varphi = 59,470^{\circ}$.

The data is recorded and the records (from the horizontal circle of the theodolite), as well as with the leveling, are focused two times (before and after the recording) for security and accuracy. The circle and alidade level of the engineering theodolite are checked simultaneously for strict horizontality.

After finishing the horizontal geodesic measurements for excavations XVIA and XVIIA from St. 1, the same are performed for second station (St. 2). The condition has been satisfied (Fig. 1) by stationing of the engineering theodolite over leveling point LP E2 from OGB.

A prerequisite for the beginning of the measurements from St. 2 are the rectification of the engineering theodolite and the definition of the zero direction $0^{\circ} = \text{LP XVI}$. It coincides with the zero on the horizontal circle and the way it works is similar to that of St. 1 (Fig. 1), i.e. from St. the records are:

- for excavation XVIA:
 - to p. 1 $\rightarrow \varphi_1 = 297,420^{\circ}$;
 - to p. 2 $\rightarrow \varphi_1 = 302,370^{\circ}$;
 - to p. 3 $\rightarrow \varphi_1 = 303,775^{\circ}$;
 - to p. 4 $\rightarrow \varphi_1 = 303,970^{\circ}$;
- for excavation XVIIA:
 - to p. 5 $\rightarrow \varphi_1 = 305,745^{\circ}$;
 - to p. 6 $\rightarrow \varphi_1 = 299,545^{\circ}$;
 - to p. 7 $\rightarrow \varphi_1 = 298,410^{\circ}$;
 - to p. 8 $\rightarrow \varphi_1 = 298,295^{\circ}$;

The field geodesic measurements for surveying excavations XVIA and XVIIA by measuring angles have finished.

The results have been used for engineering documentation with creating a situational plan by means of synchronized automated program system for engineering construction computer processing of graphical data (Fig. 1).

In order to be precise and accurate, the distances from St. 2 (LP E2) are measured to every characteristic point on the excavations contour by means of a metal measuring tape, i.e.:

- for excavation XVIA:
 - to p. 1 $\rightarrow L = 78,00 \text{ m}$;
 - to p. 2 $\rightarrow L = 78,96 \text{ m}$;
 - to p. 3 $\rightarrow L = 71,33 \text{ m}$;
 - to p. 4 $\rightarrow L = 70,34 \text{ m}$;
- for excavation XVIIA:
 - to p. 5 $\rightarrow L = 62,73 \text{ m}$;
 - to p. 6 $\rightarrow L = 61,46 \text{ m}$;
 - to p. 7 $\rightarrow L = 69,24 \text{ m}$;
 - to p. 8 $\rightarrow L = 70,23 \text{ m}$.

The result is that from St. 2 the polar coordinated have been defined, i.e. angle (φ) and distance (L) of every of the characteristic points on the excavations contour.

The created in this way plan presents the horizontal geodesic survey by measuring angles as well as the engineering documentation of the results at the stage archaeological excavations of the site “Early (wooden) fortification” in the Inner city of Pliska in 2019.

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