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Society for the Exploration of Eurasia, Switzerland

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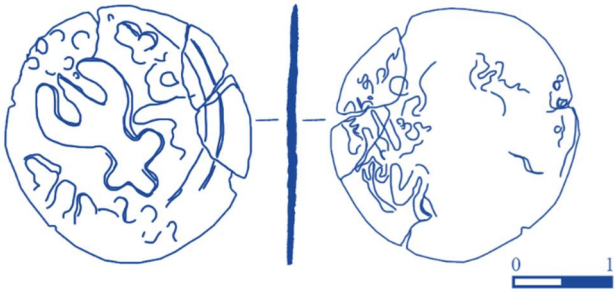
LLC RUTRUM

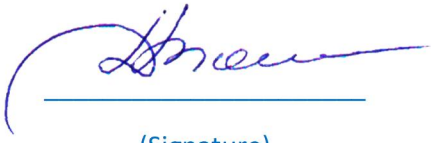
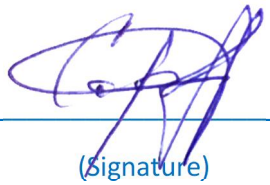
FIELD REPORT
ON THE
ARCHAEOLOGICAL EXCAVATIONS
AT KESKE KUYUK KALA,
KAZAKHSTAN IN 2023



copper coin with a tamga in the form of a trident

Almaty 2024

LIST OF EXCAVATORS

Head of expedition	 (Signature)	Dmitriy Voyakin
Director	 (Signature)	Mikhail Gurulev
Asst. Director	 (Signature)	Denis Sorokin
Surveyor	 (Signature)	Alexandr Dolgushev
Surveyor	 (Signature)	Gino Ramon Caspari
Ceramist	 (Signature)	Anna Kuzminova

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INTRODUCTION

In 2023, work continued at the Kesken-Kuyuk Kala site to study and identify new construction layers and horizons in the previously excavated and studied stratigraphic trench. The stratigraphic trench, measuring 10x5 meters, is located in the southwestern part of the shahristan, at the site of the presumed citadel (Appendix B, Figure B.1).

Objectives:

In 2023, the objective of the work was to continue studying the stratigraphy of the settlement by deepening the stratigraphic trench.

Results:

To study the stratigraphy of the settlement, work continued on the stratigraphic trench located in the southwestern part of the shahristan. For this purpose, the existing trench was deepened to 6.7 meters. Detailed documentation of the stratigraphy was carried out, a three-dimensional model of the profiles was created, and a detailed description was prepared.

Two carbon-14 analyses were collected and processed from the stratigraphic profile of the trench (Excavation No. 1).

During the excavation work on the site of the trench, seven construction horizons with structural elements were identified, consisting of four walls at different levels, a ditch with refuse fill from different periods (85, 104), two refuse pits (91, 100), a hearth (80), and a floor hearth (96) with a posthole (97).

In addition to the identified elements, materials from ceramic, osteological, and metal complexes were discovered during the clearing of the soil fill.

The materials of the ceramic complex are represented by fragments of handmade and wheel-thrown vessels: rims, handles, ornamented and unornamented walls of red clay and gray clay vessels.

The materials of the osteological complex are represented by fragments of bones of large and small ruminants, as well as fish bones. All materials were found in layers of different construction horizons: in soil fillings, as well as in refuse pits of various periods.

The materials of the metal complex are represented by two bronze items. The stone item is represented by fragments of stone millstones.

Modern documentation methods were used in the work process with the application of high-precision geodetic equipment; material processing was conducted in AutoCAD, ArcGIS, Agisoft Metashape.

MAIN PART

1 Goals and Objectives

Goal №1

Continuation of the study of the settlement's stratigraphy by deepening the stratigraphic trench.

Tasks:

- Deepening and expanding the existing stratigraphic excavation, preparing detailed documentation, including creating a three-dimensional model of profiles, photo documentation, descriptions, drawings.

- Collecting samples for radiocarbon dating.

Goal №2

Study of ceramic material, preparation of a scientific report.

Tasks:

- Conducting the collection of ceramic material at the settlement;

- Washing, encoding, drawing, compiling statistical tables;

- Preparation of a scientific report based on the results of the work.

2 Methodology of the Conducted Works

Based on the set goal and formulated tasks, a scientific research archaeological expedition was organized, comprising several specialized groups and individual specialists responsible for conducting planned types of work:

Group of Specialist Archaeologists

The task of this group included conducting a series of comprehensive scientific research archaeological works on the clearing and identification of construction structures.

The activities of the specialist group are aimed at detailed documentation of cultural layers and materials identified during the archaeological work: anthropological, metallic, ceramic, and osteological complexes, as well as other artifacts.

The group specialists conducted activities for the detailed step-by-step description of the archaeological work process, the search for and documentation of structural elements. Samples of necessary materials were collected for natural scientific research, and organic materials were also collected for radiocarbon dating.

A group of specialist documentarians conducted documentation of the entire process of planned scientific research work with analysis of the results obtained in the study of individual excavation components using advanced geodetic equipment.

The result of the work of this group was the construction of 3D models, the creation of orthophotoplans and stratigraphic profiles, detailed excavation plans, microtopography, and the creation of plans for the location of discovered materials.

Documentation was carried out using a Leica TCR-307 total station with subsequent data processing in AutoCAD, ArcGIS, Agisoft Metashape, and parallel photo documentation of structural elements and photogrammetry using Phantom 4 unmanned aerial vehicles.

The group of technologists-ceramists was engaged in processing materials identified during the comprehensive scientific research archaeological works.

The task of the group was to fully process the discovered material and study the production technology with a description of the ceramic complex and other discovered artifacts. Artistic rendering of ceramic fragments and finds in the form of compiled tables, partial reconstruction of archaeologically complete ceramic vessels, collection of statistical data.

The group of specialists in laboratory processing was engaged in the restoration and cleaning of the found materials. The task of this group included the processing of discovered materials from ceramic, metal, and osteological complexes, as well as other artifacts through washing and cleaning.

Metal materials were processed in accordance with methodological recommendations and interpreted by specialists. All materials were carefully processed, encrypted, and described with

the recording of an individual code number on each unit of material. All obtained data are displayed in the appendices of this report.

Monuments where it is possible to obtain additional information using natural science methods should be studied with the involvement of specialists in natural science profiles by taking appropriate samples for subsequent analysis (soil scientists, geologists, geomorphologists, paleobotanists, etc.).

The implementation of archaeological excavations of the monument should be preceded by a detailed survey of both the monument itself and the surrounding area, as well as the mandatory preparation of an instrumentally executed topographic plan and photo documentation.

The choice of location for excavation trenches at the site and the determination of their sizes are dictated by research objectives, previous years' excavations, technical feasibility of the excavations, and other factors.

Since the excavations are ongoing, initial photo documentation of the area is carried out, a topographic plan is drawn using a laser total station, and surface material is collected.

The process of earthworks is accompanied by photo documentation. The uncovered structures are subject to cleaning, instrumentally recorded, and described. Photographic documentation of the entire excavation process is mandatory, starting from the general view of the site and its section chosen for study, the excavation at different levels of layer removal, as well as all uncovered objects: wall bases and foundations, hearths, sufas, courtyards, alleys, clusters and individual stones, vessels and their fragments, stratigraphic profiles, etc.

All types of work related to the uncovering and dismantling of the cultural layer, cleaning of structural elements, layouts, and finds, are carried out exclusively by hand using shovels, trowels, scoops, and brushes. Across the entire excavation area, the top layer of soil (turf) is removed to a depth of one spade (25 cm) and is evenly cleaned to identify the presence of construction traces, the location of garbage pits, various stains, and ash accumulations. As the excavation progresses, the soil is removed from the excavation site into spoil heaps. Layer-by-layer collection of finds is carried out: fragments of ceramics, kitchen remains of domestic animals (osteological material), metal or other objects.

The soil is excavated layer by layer with careful examination of the soil for the discovery of finds, leaving exposed elements of structures and layouts. After removing each layer, the surface is cleaned and the locations of architectural and other elements are visually determined. Clusters of stones are left on earthen pillars.

A mandatory part of the excavation process is the daily maintenance of field records, reflecting all the features of the cultural layers and various observations. Field notes serve as the basis for compiling a scientific report.

All discovered artifacts must be recorded, described, documented, and entered into the collection inventory. Upon completion of the scientific research, the excavation site is subject to reclamation (complete backfilling) or archaeological conservation (partial backfilling of structures). The entire work process must be fully documented, and its results presented in the form of a written report, descriptions of findings, their drawings, photo attachments, and drawing-graphic attachments.

Photographic documentation is carried out using a scale ruler (rod), with an explanation of the direction in which the camera lens was pointed.

The documentation collection system is based on the system developed by specialists from Aachen University under the guidance of Professor Michael Jansen and Dr. Thomas Urban. The system is based on filling out specially designed forms, through which a certain level of data collection is achieved. While the presence of a field diary does not serve as the basis for achieving the desired level, the researcher is provided with a series of forms known as the 'main form,' which includes a general description of the monument or individual excavation, as well as descriptions of plans, goals, objectives, and methods for achieving them.

- the 'action sheet' is a kind of field diary in which the researcher records information about the actions taken each day, as well as the objects found, their sizes, etc.; 'element sheet.'

- each discovered structure, removed layer, noted feature, etc. is called an 'element' with a subsequent assigned serial number; 'find label' - a form specifically created for certain finds that clearly differ from the main mass of excavated material; 'photo index' - a kind of database catalog of photographs taken during the excavation, indicating the location, direction code, brief description, etc.

3 General overview of the stratigraphic situation

3.1 The historical development of the Kesken-Kuyuk Kala settlement in light of stratigraphic and planigraphic research

The possibility of writing the history of a major urban center in the Eastern Aral Sea region, which includes one of the largest settlements in the area, surpassing the settlement of Jankent in size – the presumed capital of the Oghuz – is limited by comprehensive archaeological investigations, particularly: planigraphic and topographic studies, which have been continuously conducted in various parts of the Kesken-Kuyuk Kala settlement since 2006, mostly focused on the study of the upper (later) construction horizons, the necropolis of the settlement, the irrigation system; as well as works on the study of stratigraphy.

Stratigraphic research 2022–2023 allowed to identify and interpret the development of urban planning within the shahristan of the settlement during the period of the 7th – 11th-12th centuries.

Stratigraphic research, associated with chronological correlation carried out through the analysis based on nine radiocarbon samples, along with other available data, allows for a more detailed examination of the broad temporal range from the 6th-7th to the 20th centuries, indicating different stages of life in the medieval settlement of Kesken-Kuyuk Kala. In light of the obtained data, with a relative degree of probability, it can be said that the territory of Kesken-Kuyuk Kala was settled and used before the 6th century (the lowest level of the stratigraphic trench of 2023), with active urban development in the 14th-15th centuries, a period of abandonment and deterioration from the 18th-19th to the early 20th centuries, and finally, complete ruin of the structures in the 12th-13th centuries. In the 20th century, the territory of the medieval city was used as an elevation on which local shepherds set up seasonal light reed shelters.

Stratigraphic trench 1 *(overview of 3 profiles: southern, eastern, and western. The northern profile was used as a technical structure for soil extraction and physical access to the lower layers of the trench).* (Appendix B, Figures B.1, 24-26, 30, 31)

Upper horizon (level of the modern-day surface)

Dating based on relative analysis of the ceramic complex: 11th-12th centuries. (white-bodied ceramics with brown painting and transparent glaze). The city was occasionally inhabited in the 12th–13th centuries. (ceramics with green and yellow glaze). A significant amount of surface material has been collected at the site, including a numismatic complex, items made of non-ferrous metal, bone, and ceramic products. See also the dating of the first construction horizon. The numismatic complex as a whole confirms the obtained radiocarbon dates.

The identification of construction structures of this horizon is practically impossible due to the fact that erosive processes have led to the almost complete dispersal of this horizon. It is possible that the construction structures largely repeated the layout of the structures of the 1st construction horizon, which actually served as the foundation for the structures of the dispersed upper cultural layer. Individual reconstructions of the 1st construction horizon were recorded in the excavation materials of the shahristan quarter, which generally did not change the main configuration of the medieval city's buildings.

Thus, the uppermost horizon (39) is completely destroyed. It is represented by a gray-colored sandy loam loose mass – a product of denudation and aeolian origin. The layer is very well marked and separated from the cultural deposits related to the so-called 1st construction horizon, located below. (Appendix B, Figures B.11, 12)

Archaeological excavations in different parts of the medieval city have established the presence of traces of modern economic activities. For example, traces of vertical embedding of reed mats for the installation of light temporary structures in the form of light wall barriers.

The first construction horizon is primarily represented by layers (40, 41, 51)

Dating: Several radiocarbon measurements were conducted on organic samples excavated from the site at Kesken-Kuyuk-Kala. One piece of charcoal excavated from mudbrick debris, which could possibly belong to the second building horizon, considered to be the period of destruction and abandonment, was dated to 1136 ± 35 BP, giving it a calendar date of 780–990 CE. A bone from the same layer, and above the floor in the room with four columns, belongs to the second well-preserved horizon (see below) dated to 1277 ± 44 BP, which corresponds to 660–870 CE, within a 2-sigma probability range. Thus, the calendar dates of the second building horizon are between the 7-th and the late 10-th century CE. A 9-th to 10-th century CE dating appears to be more appropriate based on the ceramic collection, which revealed rare, white glaze pottery sherds. Based upon this information, the uppermost layer, or the first building horizon, could belong to the 11-th century CE. In a recently published preliminary article, a dating of the 13-th century was mentioned as the last chronological period of habitation (Baipakov/Voyakin/Ilin 2012: 42). This information, however, is based only on some surface finds of green or greenish-yellow glazed pottery, which is traditionally associated with the 13-th century and, therefore, could not be taken a priori as convincing evidence.[1] (Appendix B, Figures B.10-12, 27-29)

[1] Baipakov, K.M., Voyakin, D.A., Ilin, R.V. The Towns of Huwara and Yangikent – the Old and the New Capitals of the Oghuz State, *Bulletin of the International Institute for Central Asian Studies*, 2012. 16, 22–44.

It also includes element (45), located in the western part of the southern profile - a dense light brown loam, very bright. It is possible that these are remnants of adobe structures, which also chronologically belong to the first construction horizon.

Further, the horizon is represented by very loose sandy loam, which is also visible in the eastern profile (01–03). This sandy loam mass of soil, except for the pit (or pits) (52–53), which appears somewhere at the level of layer (51). For some reason, in its upper part, the pit is filled with fine-grained sandy loam layers, while it penetrates the lower horizon, designated as the second construction horizon (54). Apart from the pit (52-53), no elements chronologically related to the first construction horizon were found. This layer (43) also overlays a layer of coal and ash (44).

The second construction horizon is represented by adobe bricks (eastern side of the southern profile) (10x34x? cm) and a collapse of adobe (central part of the southern profile) (54) (10x34x? cm), and transitions to the western part of the profile again into a well-readable adobe masonry (46).

Dating: carried out based on an organic sample from layer (06) from the eastern profile. The combined calibrated time interval with a probability of 87.8% gives a time range from 534 AD to 610 AD (6th – early 7th centuries). At the same time, with a probability of 68.3%, the date interval is 550-594 AD.

Meanwhile, a sample from the lower, logically earlier layer (08), gives a combined calibrated time interval with a probability of 95.4% from 664 AD to 774 AD (7th – second half of the 8th century). At the same time, with a probability of 36.2%, the date range is 739–772 AD.

When analyzing the datings preceding the third and fourth construction periods, the second construction horizon dates back to the 8th-9th centuries.

To verify the dating, two more organic samples were taken from the raw brick masonry. One sample gave an erroneous early date of the 18th–17th centuries BC. for this reason, it was not included in the analytical circle. The second sample (layer – (28) – western profile) has a combined calibrated time interval with a probability of 95.4%, giving a time range from 554 AD to 642 AD (mid-6th century – first half of the 7th century). At the same time, with a probability of 59.4%, the date interval is 567–606 AD. (Appendix B, Figures B.27-29)

It is quite likely that in the western part of the southern profile, stratigraphic elements (46) and (45) indicate the continuity of the location of construction structures of the first and second construction horizons (the walls of the later horizon repeat the location of the structures of the early horizon). This, as mentioned above, most likely also applies to the latest upper dispersed horizon.

The brickwork (46) on the eastern side is 'pierced' by a pit (?) layers (151), in the layers of the pit, collapsed adobe bricks can be seen. The entire massive layer (46, 54), apparently, 'acts as a single mass' and also transitions to the eastern profile (05). In the eastern profile, the second construction horizon is clearly visible. The pit (04), visible in the eastern profile, which, like the pit (52–53) of the southern profile, belongs to the first construction horizon, cuts through layer (05) with significant traces of adobe structures. All these are traces of the second construction horizon - the period when the medieval city was actively being built up. At the same time, the inhabitants of the first construction period, after the medieval city was abandoned for some reason (possibly evidenced by traces of a fire (?) element (44)), and perhaps even partially destroyed, began to rebuild the city. The foundation of the construction was chosen to be the walls of the second construction horizon, which, naturally, were visible during the restoration period.

The second construction horizon 'rests' or is marked in the eastern profile by a dense loamy layer (06). In the southern profile - by a dense yellowish-brown loam (56), as well as by the levels of the so-called surface of the second construction horizon, the floor level. Which, in turn, are already (eastern profile) on some possible garbage layer (08–09). In the eastern profile, these layers are greenish-brown in color, indicating the presence of ferrous oxide - evidently, there was water here, and there are also many carbonates and carbonate interlayers. They are located everywhere in large quantities, which indicates that this was a layer affected by moisture and which, in a moist state, was 'preserved' by some soil, resulting in the appearance of carbonate interlayers and the layer acquiring this greenish tint. In the southern profile, this same layer is also characterized by a large inclusion of carbonates; a layer of greenish-brown color of very dense loam (57-58) – evidence of moisture presence. Above the dense layers are sandy loose fillings, charcoal, ash (56). That is, the sequence: dense loam (floor or ground level) (57-58), with loose sandy soil with ash and charcoal (56) on top of it – all these are traces of the existence and destruction of the third construction horizon. It is precisely on these layers that the city's inhabitants build their structures, living and shaping the second construction period with their activities.

The third construction horizon

Dating: indirectly carried out by analyzing a sample taken from layer (21), located below or synchronous with the third construction horizon of 'pakhsa blocks'. The cumulative calibrated time interval with a probability of 95.4% spans a period exceeding a century – from 657 AD to 775 AD (mid-7th to the second half of the 8th century). With a probability of 39.4%, the date range is 742-772 AD. (Appendix B, Figures B.20, 27-29)

In connection with the specification of the date for the fourth construction horizon (earlier) of the 8th century AD, the third construction horizon can with high probability be attributed to the period of the 8th-9th centuries AD.

Thus, the 3rd construction horizon is the so-called 'horizon of pakhsa blocks' (62). In the southern profile, several pakhsa blocks are recorded (size 118-93x93-89x99 cm). They are also marked in the eastern profile, but in this part, the pakhsa masonry (13) is interrupted by a pit (14) with numerous alternating loose sandy loam and loamy layers, with carbonate interlayers indicating a period of high moisture. The pakhsa construction, possibly a wall, is stretched along the east-west line. This entire massive pakhsa horizon is held very firmly on a highly stable dense loamy base (73, 86), located below the pakhsa horizon. It is evident that the so-called 'loamy base' is nothing more than a construction structure related to an earlier (fourth) construction period. As will be seen below, the 'loamy base' of the pakhsa horizon is associated with the existence of a powerful fortification wall (94), the line of which in the trench section runs in a north-south direction. (Appendix B, Figures B.10-17)

Above the dense loam (73, 86), which became the stable foundation base of the pakhsa masonry, lie loose sandy loam layers of a grayish-greenish hue with a large number of carbonate inclusions (69?), formed after the wall (94) ceased to bear its primary functional load and the associated repair works had long been discontinued. The overlapping layers (64, 65, 69, 70, 71, 72, 79, 120, 121, 123) actually slide or fall eastward towards the depression, interpreted as a ditch (layers - 85, 99, 148, 149, 100, 101, 150, etc. in the eastern profile: 101, 104, 119, 122-131). The line of pakhsa masonry above the 'loamy base' (73, 86) looks very clear and interesting - in this part it is stable, and above the layers of the ditch (layers - 85, 99, 148, 149, 100, 101, 150, etc. in the eastern profile: 101, 104, 119, 122-131) - in this part, the pakhsa blocks, being very heavy, press down the soft layers of the ditch and the later layers that overlap the wall and the ditch (64, 65, 69, 70, 71, 72, 79, 120, 121, 123). The masonry, lacking a stable foundation, subsides; the pakhsa blocks develop numerous cracks, collapse in places, and, accordingly, this part of the masonry shows a negative inclination towards the east - it effectively 'falls' into the ditch. Meanwhile, in the area of the dense horizon (73, 86), the pakhsa blocks are stable. It is quite possible that the builders, who constructed the structure consisting of pakhsa blocks, saw this slight elevation (73, 86), which was a continuation of the fortification (94), but did not level it. The soft refuse layers (layers - 85, 99, 148, 149, 100, 101, 150, etc. in the eastern profile: 101, 104, 119, 122-131) filled the ditch and thus concealed it. The ditch was most likely not visible or known to the builders. On the surface, the ditch and the ruined fortification wall essentially represented a relatively leveled daytime surface with dense loam (73, 86), suitable for the construction of a

pakhsa structure. This was done, and only over time did the pakhsa masonry settle in the area of the ditch.

All the pakhsa blocks are located above (on) a sandy loam layer of ash color with charcoal (70, 18). It is traced throughout the entire southern and eastern profile of the trench. And it, in turn, lies on an absolutely identical layer to the pakhsa one (69), that is, on an identical to the pakhsa layer dense brown loam, which, possibly, the builders created as some kind of leveling horizon, or which is the level of the ground surface that formed during the construction activities for the erection of the structure from pakhsa blocks. One way or another, this is a dense loamy layer of bright brown or dark brown color, on which lies a layer of ash-colored material, on top of which are placed pakhsa blocks.

The eastern profile made it possible to trace the arrangement of layers to the north of the pakhsa structure and the arrangement of layers located below the pakhsa structure, filling the ditch. The filling of the ditch with garbage and soil already belongs to the fourth horizon.

The fourth horizon. The phase of the fortification system's desolation.

Dating: according to the results of the sample analysis taken from layer (37), the cumulative calibrated time interval with a probability of 95.4% spans a period exceeding a century – from 661 AD to 774 AD (7th – second half of the 8th centuries). With a probability of 35.1%, the dating interval is 741-772 AD. This is quite similar to the dating of the third construction horizon mentioned above, where the cumulative calibrated time interval with a probability of 95.4% spans a period exceeding a century – from 657 AD to 775 AD (mid-7th – second half of the 8th centuries). With a probability of 39.4%, the date range is 742–772 AD.

Additionally, a sample from layer (64), located clearly below the layer of 'pakhsa blocks' (the third construction horizon), gave a combined calibrated time interval with a probability of 95.4%, spanning over a century – from 661 AD to 774 AD (7th – second half of the 8th centuries). With a probability of 35.1%, the date range is 741–772 AD. (Appendix B, Figures B.27-29)

Given the similarity of all three dates and the same level of sample extraction (from three different profiles of the trench), it can be concluded that the fourth construction horizon, preceding the level of construction of the pakhsa block structure, has a very clear chronological attribution to the 8th century AD.

The trench in the southern and eastern profiles of the trench is read as numerous alternating layers and interlayers (layers - 85, 99, 148, 149, 100, 101, 150, etc. in the eastern profile: 101, 104, 119, 122-131), very loose, sandy loam, with a high content of organic matter and carbonates. All the numerous layers mark a pit, some kind of depression, and a significant one at that, in this section. It extends all the way to the lower layers. Everywhere, the bending of the layers towards

the deepest part of the ditch is traced. In the profile of the ditch (pit), two powerful (3-5 cm) layers of reed filling (121, 123) are visually distinguished. It is traced everywhere, including the southern profile of the trench, and descends to just a few millimeters only in the center of the dense loamy elevation (56), which is a continuation of the wall (94), located above it. Of course, scattered reed patches are also found higher up, but a dense homogeneous reed layer was discovered only in the filling of the ditch, in its upper part, that is, conditionally, at the final stage of the ditch's filling. The reed layer is also recorded lower, practically at the level that covers the entire pit (100). This layer also transitions to the upper part of the elevation (56), but unlike the upper reed layer, which reaches practically to the center of this elevation, the second reed layer ends on the eastern slope of the elevation. It is evident that the reeds were 'thrown off' from the surface of the citadel wall into the moat already filled with soil and organic matter. The purpose of such an artificial covering of the filled moat with a dense layer of reeds is unclear, but it may be related to the constant presence of moisture, organic matter, and the need to create an isolation (insulating) layer. (Appendix B, Figures B.8-17)

Below the layers of reed decay, there are numerous organic and sandy-loamy loose deposits. In this section, there is another layer of reeds (100). It belongs to one of the phases of wall construction (94), quite possibly to the phase that is later defined as phase 3, and is associated with yellow sandy adobe blocks (size 30x30x7cm) – the wall masonry (?) (element in plan 103), discovered in this section. The continuation of the ditch (pit) in the eastern part, outside the wall (104) with its numerous stratifications, also has a distinctly pronounced reed decay, which is located above the wall masonry of yellow sandy adobe (element in plan 103), which is currently the earliest of the excavated structures and is referred to by us as the so-called 'seventh construction horizon.' Of particular interest within this significant suite of cultural layers is the process of using reed mats. The purpose of using reeds is not clear at the moment, but, as mentioned above, it may be related to certain insulating properties of the material (moisture, organic matter, odors (?)).

The fifth, sixth, and seventh construction horizons (identified solely based on the recorded reconstructions of the outer wall (94) of the citadel (?).

Part of the fortification system, uncovered during the stratigraphic study in trench No. 1, consists of two main elements: the wall and the surrounding ditch. The wall in the northeastern part of the trench turns eastward at an angle of 70 degrees and has a smooth rounded curve in the northeastern direction, which may suggest the presence of a tower in this part, as mentioned above.

The width of the wall is conditionally determined to be 140 cm at the open base and 160 cm at the top. It is not possible to determine the width of the moat. At the moment, the preserved height of the wall and the depth of the moat are also indeterminable due to the incomplete work

on the trench. The exposed section of the wall and moat, located on its outer eastern side, is aligned along the north-south axis. It is possible that the perimeter wall had rounded towers, as indirectly evidenced by the beginning of the wall's curvature towards the outer eastern side, recorded in the northeastern corner of the trench. At the same time, such a small uncovered area does not allow us to confirm or refute the functional purpose of the three elements: the citadel wall (?), the tower (?), and the moat (?).

The wall, apparently, was rebuilt several times. This is evidenced by the different materials used in the construction of different levels of the wall, which are clearly distinguishable from one another. In total, three major reconstructions of the outer wall can be identified, which, accordingly, allow us to distinguish three construction horizons: the fifth, sixth, and seventh. Whether this wall can be identified as the outer wall of the citadel with complete certainty is impossible to say, but the very location of the wall suggests that such an interpretation is quite possible until new facts are revealed. If such judgments are confirmed, the dimensions of the 8th-century citadel can be determined as 70–75 x 70–75 m. (Appendix B, Figures B.2-4)

The fifth construction horizon

Dating: see the fourth and seventh construction horizons – in all likelihood and logic, it can be attributed to the period from the 7th to the 8th centuries AD.

The upper masonry of the wall (phase 1) made of adobe blocks measuring 30×12×10 cm, and reddish-brown loam, lumpy, dense, has been preserved to a height of 80 cm.

It should be noted that below the 'construction period number 3,' several layers and interlayers associated with the filling of the ditch (pit) are further recorded, as detailed above. All these layers, which conditionally 'fall' into the pit, as clearly seen in the eastern part of the southern profile, in its central part - lie on a certain very dense clayey block, a kind of elevation (73, 93). This 'elevation' is associated with the existence of a wall (94), naturally of dense structure. We do not know the width of the wall in the western direction. But, it is obvious that the width at the lower part can reach 2 or more meters, possibly even 3 meters. The wall was recorded only in the part where it expanded by 1.7 meters. Above the mark of the fifth construction horizon, the wall was destroyed. People lived at this level. Here, a hearth was discovered, numerous pits, remnants of a burnt layer (95, 138), which was located across the entire surface of the excavation. All these numerous layers (73, 87, 88, 93, 96, 141) most likely belong to another stage in the city's life. Only one construction horizon (reconstruction) has been recorded, in which a hearth-altar (element 96) was built. The hearth is quite primitive, but nevertheless it is either floor-level or was embedded into the floor by those people who lived 'on this wall,' used it as some kind of platform, and left the aforementioned layers (73, 87, 88, 93, 96, 141).

Later, when these layers appeared, it is possible that this part of the medieval city was abandoned, left behind, and then these conditionally garbage and burnt layers (119, 132, 133) emerged. It is precisely on these layers, as mentioned above, that another 'pakhsa construction horizon' (62) is formed. Below, in the western part of the southern profile, only the accumulations of various layers (93, 144, 145, 146, 147, 106, 107, 111) were identified, which, logically, adjoin the wall (94) – layers that are chronologically synchronous with the wall. Adobe bricks are visible, and it is also evident that all these layers are intersected by a later garbage pit (91, 134, 135, 136, 118). It is important to note how the garbage pit is formed in relation to this elevation (73, 87, 88, 93, 96, 141), located above the wall. The mouth of the pit is actually at the same, upper level, in relation to the elevation above the wall. The pit intersects all the strata that are chronologically synchronous with the wall. However, it is completely overlain by layers (119). In the upper part of the pit, a depression is traced, the layers of which (so-called layers of abandonment) overlap the pit, while also falling into it from the so-called 'elevation' above the wall (132, 133). Therefore, they slope downward in a westerly direction – from the wall to the pit. The pit has straight edges, and during its excavation, a mass of various finds was discovered: ceramics, bones, organic material, stones. At the bottom of the pit, there is a powerful burnt layer (139) – traces of burning. At the top, there is an orange-colored sandy loam, all of which are sandy loam layers at the top of the pit. Above the pit, again numerous layers (30-38), which are well visible in the western profile, they reach up to the plow structure, sandy loam, loamy. They were mostly described last year. Among the layers, this very dense layer of loam stands out, possibly a floor, such a ringing, dense, brown color (34). Again, there are various sandy loam layers that reach somewhere to the level of the pakhsa, pakhsa blocks, and then they break off. In the lower part of the western profile, which differs from the others by a mass of horizontal layers of a greenish tint (ferrous oxide) (90, 161–167, 172-174, 106-111). Here, the continuity of habitation levels is evident. These layers are chronologically synchronous with the 5th, 6th, and 7th phases of wall construction (94). (Appendix B, Figures B.2-4)

The sixth construction horizon

Dating: see the fourth and seventh construction horizons – in all likelihood and logic, this wall repair period can be attributed to the period from the 7th to the 8th centuries AD.

Below, at the 100 cm level, there is a wall masonry (phase 2) made of very dense loess bricks, but of a brown color (148, 128). During the reconstruction, the width of the wall changes, the wall possibly expands significantly during the period of the 'sixth construction horizon' in the form of a peculiar platform (continuation of the wall masonry (148, 128)), laid out in an eastern direction. In the eastern profile, a pit (126 -?), which cuts through the platform or wall (148, 128),

is visible. This pit begins in the so-called 'pakhsa horizon' (the third construction horizon). (Appendix B, Figures B.2-4)

Seventh construction horizon

Dating: The cumulative calibrated time interval with a probability of 93.7% spans a century – from 536 AD to 642 AD (mid-6th to mid-7th centuries). At the same time, with a probability of 68.3%, the date range is 551-559 AD. (Appendix B, Figures B.27-29)

In the deepest part of the trench, at the level of 68.932 cm, blocks of sandy yellowish adobe (size 30×30×6 cm) were discovered, laid in a single row (103) (possibly a wall foundation – between which and the sandy blocks, there is a filling of adobe blocks and their fragments of indeterminate shape).

Between the sixth and seventh construction horizons (or the second and third phases of wall reconstruction), a layer of reed decay is traced, which not only divides these two wall layers but, as is clearly visible, overlaps the 3rd phase. Thus, the second phase of the wall masonry (the sixth construction horizon) rests on a reed layer (100), which is an earlier element in relation to it, possibly intentionally placed by the builders to separate the earlier wall masonry from the subsequent rows of bricks. These structural elements of the wall existed during the formation of numerous alternating dark brown horizontal layers (104), located in the lower, deepest part of the moat at the time of the research.

That is, all this, apparently, was some kind of single chronological period in the life of the city, when the wall was built, when the layers described above began to form in the filling of the moat (pit?). Apparently, all this was a single construction horizon in the life of the medieval city. Earlier layers may be considered in the next season. (Appendix B, Figures B.2-4)

3.2 Conclusions: 'history of the city'

Three consecutive construction horizons: 'dispersed horizon', related to the latest period of the city's life, the period of the 10th-11th centuries, with possible partial habitation of the city in the 12th-13th (?) centuries. and with traces of economic activity from a later period, up to the 20th century, but no longer related to the life of the city itself, rather associated with the use of the elevation dominating the surrounding area in terms of height; the so-called 'first construction horizon,' dated to a period of very active economic activity, with continued construction (or very active repair) of the walls of the 'second construction horizon' using adobe bricks of similar size, the presence of economic pits breaking through the floors of the second construction horizon; as well as the 'second construction horizon,' dating back to the 8th-9th centuries. and represented by raw constructions of various purposes, as evidenced by the excavations laid out in the territory of the shahristan, have a unified planigraphy, possibly with minor changes (repairs and partial

reconstructions), but generally repeating the configuration and location of the walls, without major structural reconstructions. Thus, in the period from the 8th (?) to the 9th-10th centuries. the internal structure of the quarters, the main buildings of the city, has topological continuity – the city lives within unchanged topological frameworks for 3-4 centuries, with no major changes in the urban layout being recorded. With a high degree of probability, it can be said that the layout of the city in the 11th-12th centuries is characterized by the same features as the layout of the city in the 9th-10th centuries.

Apparently, at the end of the second construction period, the city was abandoned for a short period of time, during which there may have been a fire and possibly even the physical destruction of the urban structures. The city was rebuilt (repaired) using the abandoned and partially destroyed structures.

During the period of the 'second construction horizon,' dated to the 8th-9th centuries, a 'construction boom' is occurring in the city. There is widespread active use of adobe bricks; the territory of the shahristan is being intensively built up; it is possible that the area of the shahristan is also expanding. For some reason, probably during this period, the clear boundary between the citadel and the shahristan becomes blurred – the citadel, as can be clearly seen on the detailed aerial orthophoto plan of the city's planigraphy, loses traces of fortification (as, for example, is clearly traceable in other medieval settlements of the Eastern Aral Sea region), but at the same time remains the dominant area in terms of height within the city walls (approximately 1 meter higher than the surrounding territory). The city is divided into 10–14 quarters of varying sizes.

During the VIII-IX centuries, known as the 'third construction period,' fundamental changes occurred in this part of the city – the construction of a powerful structure made of pakhsa blocks began. The structure itself is located above a fortification system that was abandoned for unknown reasons, but apparently due to the organic progressive development of the city. This fortification system possibly belonged to the citadel and consisted of an outer wall, extended in the part of the trench laid along the north-south line, and a surrounding moat on the outside. The builders of the pakhsa structure, given that the outer wall of the citadel had already been destroyed by the time of construction and the moat was completely filled with household waste, mostly of organic origin and soil, apparently no longer knew the location of the wall and moat and built over them on a leveled platform. As it turned out later, part of the pakhsa structure located on the site of the moat began to significantly subside, which led to the partial destruction of this massive structure. It can be concluded that during this period the city expands, buildings are erected on the territory of the shahristan, and the technique of pakhsa filling is used; at the same time, the clear boundary between the shahristan and the citadel disappears – the fortification of the citadel during this period

completely loses its former functionality. The walls of the citadel and its moats are no longer visible on the surface.

The fourth period of Kesken-Kuyuk Kala's life, dated to the 8th century, is characterized by the use of the outer defensive moat not for its intended purpose – organic waste is initially dumped into it, and the surface of the moat is covered twice with a thick layer of reeds, apparently in an attempt to get rid of moisture and/or odors. The outer wall ultimately does not stand out on the surface – it is practically level with the filled moat. The area of the wall and moat in the subsequent period begins to be used as a construction site for erecting structures from pakhsa blocks. It is not possible to determine the reasons for the loss of the fortification functions, but considering the high construction activity in the subsequent 'third construction period,' it can be assumed that the main reason was the expansion of the urban fabric of the shahristan and the deliberate use of the territory occupied by the defensive structures as a building site for the shahristan. However, as noted above, the builders of the structure made of pakhsa likely did not see or know about the existence of the wall and moat, and therefore did not spend time laying the foundation within the loose, subsiding layers that filled the moat. This is an interesting and unexplored feature of the change in urban layout: the change in the functional purpose of one of the central structures of the medieval city – the appearance and disappearance of the citadel. It is evident that Kesken-Kuyuk Kala of the 8th–9th centuries did not have a clearly defined citadel, separated from the rest of the urban fabric (shakhristan), as follows from a detailed analysis based on microtopographic and aerial photographic surveys. Further study of this issue will help clarify the genesis of urban development and the possible reasons for such changes.

The fifth, sixth, and seventh construction horizons are identified based on the study of the wall, a possible flanking tower, and the outer moat.

The construction of the wall, possibly the outer eastern wall of the citadel, with towers around the perimeter (an estimated diameter of more than 6 m (?)) and a deep and very wide moat, can be attributed to the period before the mid-6th–7th centuries. The wall is repeatedly rebuilt. At present, research identifies at least three stages of substantial repair work, each of which is distinguished as a separate construction horizon. In each of the construction periods, adobe bricks are used, but the material for molding the bricks differs. During reconstructions/repairs, the width of the wall changes; the wall possibly expands significantly during the period of the 'sixth construction horizon' in the form of a peculiar platform in the eastern direction. The height of the wall masonry increases by several rows of bricks (approximately up to 1 meter). Inside the wall, to the west, the space is inhabited by simple, modest rooms with hearths and other structures. The insignificant width of the wall, 160–170 cm, does not suggest the presence of shooting galleries or other elements such as merlons, embrasures, etc., which were also not recorded. Subsequent

excavations may reveal a different wall width, reaching 2 or even 3 meters, but at the moment these assumptions are purely hypothetical. If the judgment that this system (wall, tower, moat) is interpreted correctly, then the area of the citadel at this time could have reached 6400 square meters. The reconstructions/repairs of the wall may indicate a very long-term maintenance and preservation of the structures' purpose.

The earliest date of the wall's existence, in its earliest seventh phase (the horizon of using sanded yellow brick), obtained based on radiocarbon analysis, is the mid-6th century AD. (Appendix B, Figures B.24-26, 30, 31)

3.3 List of stratigraphic layers

EASTERN PROFILE
01 - Gray sandy loam
02 - Yellow-gray dense cloddy loam
03 - Layer of dense grayish loam
04 - Dark gray loose sandy loam
05 - Very dense bright brown loam
06 - Very dense bright brown loam (C14 - 550-600 AD)
07 - Layered dense bright brown loam
08 - Layers of black sandy loam (C14 - 650-800 AD)
09 - Dense loam
10 - Black sandy loam layer
11 - Grayish-brown sandy loam layer
12 - Bright yellow-brown, dense cloddy loam
13 - Bright brown, dense plastic loam
14 - Layer of dense bright brown loam
15 - Loose gray-black sandy loam layer
16 - Layers of loose sandy loam of organic origin
17 - Bright orange-red burnt layer
18 - Dark gray loose sandy loam
19 - Gray-white very loose sandy loam
20 - Layer of gray color
21 - Black layer - coal, ash (C14 - 650-800 AD)
22 - Loose gray sandy loam
85 – Dense bright brown clay loam (also see southern profile)

101 – Layer of dense gray-brown sandy loam
104 – Layer of dense dark gray-brown sandy loam
120 – Layer of ash overlaying a layer of reeds (see southern profile)
121 – Layer of reeds (see southern profile)
122 – Layer of fairly loose yellowish-brown clay loam, identical to 126
123 – Layer of reeds (see southern profile)
124 – Gray-yellow layer of sandy loam, with significant presence of ash, loose
125 - Gray-yellow layer of sandy loam, with significant presence of ash, loose
126 – Layer of clumpy, fairly loose yellowish-brown loam, identical to 122
127 – Layer of loose sandy loam of ashy color, possibly ash
128 – Layer of very dense sandy loam of gray-brown color
129 – Interlayers of medium-density loam of grayish-brown color
130 – Layers of medium-density loam of light grayish-brown color
131 – Layer of dense sandy loam of gray-brown color

SOUTHERN PROFILE
39 - Dense dark brown loam
40 - Gray-brown loose sandy loam
41 - Brown-gray sandy loam
42 - Loose bright gray layer of ash
43 - Gray-brown, greenish, loose sandy loam
44 - Layer of black ash and coal
45 - Dense bright brown loam
46 - Wall body (adobe brick)
47 - Layer of dense loam
48 - Layer of very dense homogeneous bright brown loam
49 - Lens of black-brown dense sandy loam
50 - Dense layer (surface), carbonates and ceramics
51 - Gray-yellow-brown, very dense loam
52 - Bright brown, very dense clumpy loam
53 - Pit filled with homogeneous sandy loam
54 - Very dense loam
55 - Layered, very dense bright brown loam
56 - Several layers of black color (ash, coal)
57 - Dense green-colored loam
58 - Brown-black sandy loam layer
59 - Grayish-brown sandy loam mass
60 - Very dense gray-brown loam
61 - Pit, loose gray-brown sandy loam
62 - Bright brown dense plastic loam
63 - Bright orange-colored burnt layer
64 - Dark gray loose sandy loam (C14 - 600-650 AD)
65 - Gray-white seepage layer
66 - Very loose greenish-brown sandy loam
67 - Burnt reed (grass)
68 - Light gray very dense loam
69 - Bright brown dense plastic loam
70 - Layers of very loose loam
71 - Layer of gray ash

72 - Black-gray layer of ash and coal
73 - Dense greenish-tinted loam
74 - Dense yellow-green loam
75 - Black loose sandy loam
76 – Dense sandy loam of grayish-brown color
77 – Very dense loam of brownish-yellowish color
78 – Gray-brown dense sandy loam
79 – Loose sandy loam of gray-brown color
85 – Dense loam of bright brown color (also see on the eastern profile)
86 – Dense loamy mass of gray-yellow shade
87 – Dense loam of yellow-gray color
88 – Sandy loam, loose, gray color
90 – see western profile
91 – Layer of loose sandy loam with a gray-brown tint (see western profile)
93 – Dense gray-yellow clumpy loam
94 – Raw brick wall masonry
95 – Layer of ash, loose
96 – Gray-brown-yellow dense loam
99 – Grayish-yellow very dense loam
100 – Layer of reeds
101 – see eastern profile
102 – see western profile
103 – Masonry made of sandy raw bricks of bright yellow color (see western profile)
104 – see eastern profile
106 – Loamy sand layer, very dense with numerous carbonate inclusions. The layer shows division into separate sub-layers, visually distinguishable by shades: from gray-brown to gray-beige (see western profile)
107 - Loose loamy sand, brown in color, presumably of organic origin (see western profile)
110 – see western profile
111 – Very dense gray-brown loam with a significant amount of carbonate inclusions, but less than in layer 110 (see western profile)
118 – Layer of light gray-white loose sandy loam
119 - Layer of ash and carbonates
120 – Layer of ash overlaying a layer of reed (see eastern profile)

121 – Layer of reed (see eastern profile)
122 – see eastern profile
123 – Layer of reed (see eastern profile)
132 – Layer of loose sandy loam, whitish in color
133 – Layer of loose sandy loam, whitish-yellowish in color
134 – Bright yellow-brown clay loam, fairly dense
135 – Gray-brown clay loam, fairly dense
136 – Yellow-brown clay loam, fairly dense
137 – Gray-brown clay loam, fairly dense
138 - Layer of ash
139 – Layer of bright orange-reddish burnt soil, sandy loam, loose
140 – Thin layer of black ash
141 – Dense loam of a grayish-white hue
142 – Gray-brown-yellow dense loam
143 – Layer of gray-white loose sandy loam
144 – Layer of gray-white dense loam
145 – Layer of dark brown loam with numerous carbonates
146 – Layer of whitish-brown dense loam
147 – Layer of whitish-gray dense loam
148 – A layer of very dense gray-brown sandy loam (continuation in the eastern profile – 128).
151 – Grayish-brown loam, very dense, resembling a pit, with raw bricks and lumpy loose gray-brown sandy loam in the lower part of the fill.

WESTERN PROFILE
23 - Loose clumpy layered dark gray sandy loam
24 - Dense bright brown loam
25 - Traces of burnt soil of black color
26 - Gray-brown sandy loam
27 - Masonry of raw brick
28 - Gray-black layer of sandy loam (C14 - 550-650 AD)
29 - Dense bright brown homogeneous loam
30 - Dense loamy gray-black layer
31 - Dense dark brown homogeneous loam
32 - Layer of coal, carbonates, and ceramics
33 - Green-gray dense loam
34 - Dense bright brown homogeneous loam
35 - Gray loamy interlayer
36 - Bright yellow-green dense sandy loam layer
37 - Loose sandy loam gray-black interlayer (C14 - 650-800 AD)
38 - Layer of dense green-colored loam
90 – Layer of dense light-gray loam
91- Layer of loose sandy loam mass of gray-brown shade (see also southern profile)
102 – Layer of loose sandy loam of gray-black color
106 – Loamy sand layer, very dense with numerous carbonate inclusions. The layer shows division into separate sub-layers, visually distinguishable by shades: from gray-brown to gray-beige (see southern profile)
107 - Loose sandy loam, brown in color, presumably of organic origin (see southern profile)
110 – Very dense dark brown loam with a significant amount of carbonate inclusions (C14 - 550-600 AD)
111 – Very dense gray-brown loam with a significant amount of carbonate inclusions, but less than in layer 110 (see southern profile)
155 – Light gray-beige-yellowish loam, layered, with numerous carbonate inclusions
156 – Yellowish-gray loam, somewhat loose, with numerous carbonate inclusions
157 – Gray-brown sandy loam, loose, denser than 110
158 – Gray-brown sandy loam, loose, denser than 157
159 – Loose sandy loam of a whitish-grayish-brown hue, bordered by gray-black sandy loam in the upper part, with a significant amount of carbonates

160 – Layered gray-brown fairly dense sandy loam
161 – Layered gray-brown fairly dense sandy loam
162 – Layered gray-brown fairly dense sandy loam
163 – Layered gray-brown with a yellowish tint, fairly dense sandy loam
164 – Gray-brown, fairly dense sandy loam
165 – Gray-ashy, loose sandy loam
166 – Grayish-yellowish tint, dense sandy loam
167 – Yellowish-gray loam, fairly dense
168 – Coal-ash, loose sandy loam
169 – Bright orange color, loose sandy loam
170 – Brown-gray sandy loam, slightly loose
171 – Gray-brown sandy loam, loose but denser than 170
172 – Yellowish-gray loam, fairly dense
173 – Yellowish-gray-brown loam, fairly dense
174 – Yellowish-gray-whitish loam, fairly dense
175 – Yellowish-gray-brownish loam, fairly dense
103 – Masonry of sanded raw bricks of bright yellow color (see southern profile)

4 Description of Scientific Research Works

Before the start of scientific research works on the study of construction horizons and structures of the cultural layer content of the stratigraphic trench, preparatory measures were taken to document this site, including a description of its appearance, aerial photography, and photo documentation of the area of upcoming research.

Scientific research works on the study of earlier layers and construction elements, and stratifications of the trench, began with the stage of cleaning previously excavated surfaces and removing deposited soil in the trench. (Appendix A, Figures A.1-4).

Excavation work was carried out simultaneously across the entire area of the trench, using the method of layer-by-layer cleaning of each identified stratum, with the gradual removal of soil fill.

Throughout the designated trench area, photo documentation and recording of identified elements were conducted: moat, walls, hearth, garbage pits, ash spots, etc.

During the excavation work within the trench area, seven construction horizons with structural elements were identified, consisting of four walls at different horizons, a moat with fill from different periods (85, 104), two garbage pits (91, 100), a fire pit (80), and a floor hearth (96) with a post hole (97) (Appendix B, Figures B.24-26).

In addition to the identified elements, during the clearing of the soil filling, materials from ceramic, osteological, and metal complexes were discovered (Appendix B).

The materials of the ceramic complex are represented by fragments of handmade and wheel-thrown vessels: rims, handles, ornamented and non-ornamented walls of red clay and gray clay ceramic vessels (Appendix G, Figures G.1-30).

The materials of the osteological complex are represented by fragments of bones of large and small ruminants, as well as fish bones. All materials were found in layers of different construction horizons: in soil fillings, as well as in refuse pits of various periods.

The materials of the metal complex are represented by two bronze items. The stone item is represented by fragments of stone millstones.

During the excavation work, four construction horizons were identified, as well as three stages of wall construction - walls from different construction horizons were identified, a ditch located on the outside of the wall (94) turned into a garbage pit (104, 85), filled with household and construction waste from human activity. In the center of the excavation, a floor hearth and a post hole were identified, as well as 3 garbage pits from different construction horizons.

On the final day, a wall and a sufa of the fourth horizon, belonging to an earlier period, were identified.

4.1 Description of construction horizons

Construction horizon No.1

The upper layer of the first horizon is completely destroyed, represented by loose sandy loam about 10 cm thick (el. No.39). Below is a dense light brown clay loam, very bright. Possibly, the remains of structures, which also belong to the first construction horizon, the layer thickness is 20-25 cm (fig. №40).

Further, the horizon is represented by very loose sandy loam, this is also visible in the eastern profile. This layer also overlays a layer of coal and ash (fig. №44).

This horizon is observed in all three profiles of the trench – southern, western, and eastern.

Construction horizon №2

Construction horizon №2 is located below horizon №1 and is represented by raw bricks, a collapse of raw materials, and also transitions into raw brick masonry (fig. №46), this is also clearly visible in the eastern profile. Apparently, this construction period belongs to the active construction phase at the settlement. This horizon was later destroyed and became the basis for the first construction horizon. In turn, the inhabitants of the second horizon took as a basis the earlier third horizon, the upper part of which is represented by a layer of ash and cinders (el. No. 56).

Construction Horizon No. 3

Construction Horizon No. 3 is a horizon of pakhsa blocks (el. No. 62). There are several blocks, and they extend into the eastern profile, but here they are interrupted by a pit (el. No. 14) with numerous various sandy loam layers, carbonate interlayers. This entire pakhsa horizon rests on a very stable foundation. In the central part of the southern profile, this masonry of pakhsa blocks is at a higher level as it rests on the wall of the underlying construction horizon. To the east and west, this masonry gradually lowers, sinking due to the garbage layer located deeper. The garbage layers were most likely unknown to the builders and represented a single level at the time of construction.

Construction Horizon No. 4

This layer is characterized by a large amount of organic material, numerous carbonates, and burnt layers. In the western part of the southern profile, as well as in the southern part of the western profile, there is a large pit (el. No. 91), the mouth of which is located on the surface of the fourth construction horizon. The pit has straight edges and contains a mass of finds, ceramics, bones, organic material, and stones. A powerful layer of calcination is located at the bottom. At the top, there is an orangish sandy loam. Above the pit, there are numerous sandy loam and loamy layers, which are well visible in the western profile, extending up to the pakhsa structure. They were mostly described last year. Among them, this very dense loam layer stands out, possibly a

floor, dense and brown in color. Various sandy loam deposits, which reach up to the level of the pakhsa, pakhsa blocks, and then terminate.

In the eastern profile, two main horizons are recorded. The main one, to which we are referring, is the reed layer, carbonate inclusions, all of this is associated with the pit (el. No. 85). The pit in this part has a significant narrowing. All this narrowing is associated with organic matter, the presence of moisture, water. The layer also contains carbonate interlayers, which are found everywhere.

4.2 Stratigraphic Excavation No. 1

The excavation is located in the southern part of the Kesken Kuyuk Kala settlement. This excavation is a continuation of a previously established stratigraphic excavation.

The purpose of this excavation is to identify the stratigraphic situation of the settlement and determine the chronological range of its existence.

During the work, 33 layers were identified, associated both with constructions (floors, walls) and with traces of settlement activities (garbage pits, seepage layers) (Appendix B, Figures B.5-23).

List of elements (plan)

1. Element 78. Layer of brown loam
2. Element 79. Layer of bright brown loam
3. Element 80. Garbage pit
4. Element 81. Central rounded part of the 'hearth' (pit)
5. Element 82. Layer of black color (charcoal)
6. Element 83. Layer of white-gray ash
7. Element 84. Bright gray-orange loam (iron oxide) very dense
8. Element 85. Garbage pit with loose brown sandy loam with a large amount of organic matter
9. Element 86. Archaeological trench of the 21st century
10. Element 87. Gray-black layer of organic material
11. Element 88. Very dense yellow-brown clay loam
12. Element 89. Dark brown clay loam
13. Element 90. Very dense gray-green clay loam
14. Element 91. Garbage pit in the southwestern corner of the stratigraphic trench

15. Element 92. Dense bright brown clay loam with charcoal inclusions
16. Element 93. Small trench (ditch) in the northwestern part of the trench
17. Element 94. Adobe masonry (outer part of the wall
18. Element 95. Greenish-brown sandy loam fill
19. Element 96. Floor hearth in a layer of ash and cinder fill
20. Element 97. Round posthole
21. Element 98. Burnt layer
22. Element 99. Dense cloddy brown-yellow loam (part of the wall
23. Element 100. Rectangular pit in the southwestern corner of the stratigraphic excavation
24. Element 101. Layer of reed and cattail laid in the pit
25. Element 102. Layer of greenish-brown clumpy, loose loam
26. Element 103. Early masonry of raw bricks made from sandy clay near the raw wall
27. Element 104. Early period garbage pit. Continuation of the pit (ditch) layer
28. Element 105. Dense light-brown loam
29. Element 106. Layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions
30. Element 107. Layer of reed and cattail and loam
31. Element 108. Adobe brick by the adobe wall
32. Element 109. Masonry of fine-grained sandy yellow adobe bricks by the northern wall of the trench
33. Element 110. Layer of broken adobe bricks
34. Element 111. Sufa

Description of elements (plan)

Element 78. Layer of brown loam

Layer of medium-density brown loam is located in the eastern part of the stratigraphic trench.

After removing the layer and after cleaning (Appendix A, Figures A.96, 97), the following elements were identified on the surface: el. 80 – garbage pit; el. 81 – central round part of the 'hearth' (pit) (80); el. 82 – central round part of the 'hearth' (pit); el. 83 – layer of white-gray ash; el. 84 – bright gray-orange loam (iron oxide) very dense; el. 85 – loose brown sandy loam with a large amount of organic matter; el. 87 – gray-black layer of organic matter; el. 88 – very dense yellow-brown loam; el. 89 – dark brown loam; el. 90 – very dense gray-green loam; el. 91 – garbage pit in the southwestern corner of the stratigraphic excavation; el. 92 – dense bright brown loam with charcoal inclusions.

A gaming asyk was discovered during the clearing of the brown-colored loam fill. The asyk is painted with reddish-brown paint, with incisions made by a sharp tool, creating a specific ornament. Size 3.4x2.2x1.9 cm. Weight – 8.4 g. The find was assigned the field number Ks-23-01-78-01. (Appendix A, Figure A.1-4)

Element 79. Layer of bright brown loam

The layer of bright brown loam is located south of the so-called 'fire pit' (pit) (80), and is one of the layers of pit (85).

Element 80. Garbage pit

The 'garbage pit' was read as a rounded contour and represented loose sandy loam. The outer contour of the pit was a bright black layer of coal (82), up to 1.5 cm thick. The main filling of the pit, also forming the circumference – (83), was bright gray clumpy sandy loam with a yellowish tint. (Appendix A, Figure A.4)

In the center of the 'pit' – bright brown sandy loam, very loose, fine-grained (possibly of organic origin).

The bottom of the pit is flat, heavily fired, yellow-brown in color, covered with an even layer of black charcoal, 1 cm thick (Appendix A, Figure A.5-16).

Soil from the pit, field number Ks-23-01-80-01, was taken for carpology, as well as

Element 81. The central round part of the 'hearth' (pit) (80)

The central round part of the 'hearth' (pit) (80) consists of a layer of black wood ash and a layer of brightly colored brown loam.

A layer of black color, consisting of charcoal, outlines the circular shape of the hearth. The width of the layer is 2-2.5 cm, with a thickness of 0.5 cm. The described layer of charcoal is also traced across the entire surface of the bottom of the 'hearth' (pit) (80) (Appendix A, Figure A.5-19).

Element 82. A layer of black color (charcoal)

A layer of black color, consisting of charcoal, outlines the circular shape of the hearth. The width of the layer is 2-2.5 cm, with a thickness of 0.5 cm. The described layer of charcoal is also traced across the entire surface of the bottom of the 'hearth' (pit) (80) (Appendix A, Figure A.5-8).

Element 83. Layer of white-gray ash

Layer of white-gray ash of organic origin. Adjacent to layer (82) – black in color, filled with charcoal and ash, and bounded in the central part of the 'fire pit' (pit) (80) by a layer of blackish-bright-brown sandy loam.

At the same time, layer (83), as seen from the profile of pit (80), which was excavated in half, it is visible that, like layer (82), it is located across the entire surface of the bottom of the 'fire pit' (pit) (80), unlike layer (81), which is concentrated in the center of the fire pit (Appendix A, Figure A.5-8).

Element 84. Bright gray-orange loam (iron oxide) is quite dense

At the level of 33.169, a layer of bright gray-orange loam (iron oxide) appeared, very dense, very loose. Possibly of natural origin. The layer clearly marks the boundaries of the pit (85) on the western and northern sides. This loam may be the pakhsa masonry of a wall, on the southern side of which a pit (ditch) was dug in an earlier period (Appendix A, Figures A.19-21).

Element 85. Garbage pit with loose brown sandy loam containing a large amount of organic material

Garbage pit from different construction periods, oval-shaped, measuring 2.80x2.50 m, located in the eastern part of the trench and identified during excavations at level 33.510 (Appendix A, Figures A.19-21, 25-30, 38-40).

At level 33.152, there is a layer of brown sandy loam, quite loose. The layer contains a large number of organic fragments: stems and leaves of reeds and cattails, manure, coal, and ash (Appendix A, Figures A.23-24).

The layer contains fragments of animal bones, a small number of ceramic fragments of molded vessels, and chips of quartzite and quartzite-sandstone (Figures 36-37).

During the clearing (Appendix A, Figures A.25-27) of the filling, a saiga knucklebone was found, marked with incisions made by a sharp tool, creating a rhomboid pattern. Size 3x1.9x1.7 cm. Weight – 7.74 g. The find was assigned the field number Ks-23-01-85-01.

During the clearing of the fill at level 31.722, a possible gaming asyk was found. Size 3.5x2.2x2 cm. Weight – 12.5 g. The find was assigned the field number Ks-23-01-85-02.

While clearing the fill layer at a depth of 31.160, coordinates x – 5041622.971 and y – 379598.010, fragments of a red clay vessel were discovered – a bottom consisting of two fragments and a side (Appendix A, Figures A.30-33). The fragments were lying in a lens of fine-grained light yellow sand (Appendix A, Figures A.34-35).

In the layer among the loam and decayed accumulation of cattail, a ceramic spindle whorl blank was discovered. The spindle whorl is of a rounded shape, measuring 4.2x3.6 cm, with a thickness of 0.7 cm. Weight – 14.86 g. The find was assigned the field number Ks-23-01-85-03.

While clearing the soil filling the pit (Appendix A, Figures A.41-44), bones and fish scales were encountered. The bones and scales were selected for analysis to determine the species. The selected material for analysis was assigned the field number Ks-23-01-85-04.

We also note a fragment of a stone millstone (deyirmen) found among the stones. Size 27.5x9-12.5x5.4 cm. Weight 3125 g assigned field number Ks-23-01-85-05.

On the northern side of the pit, at the presumed wall, adobe brick masonry of the wall (94) was discovered in the section (Appendix A, Figures A.45,46).

Element 86. Archaeological trench of the 21st century

The rectangular archaeological trench is noted at the upper mark of 33.431 and at the lower marks of 32.950-32.330. Traces of the 'early trench' are observed at these marks.

Element 87. Gray-black layer of organic material

Layer of black (charcoal) and gray (ash) colors, delineating the boundaries of dense loam (88).

In the profile (cross-section) from the northern side, it is noticeable that this layer is located in element (89) – a greenish-colored dense loam with a dip towards the north (i.e., in the southern part, the layer is situated higher and then it levels out but descends towards the north).

At the same time, both layer (87) and element (89) are cut by element (93), which disrupts the chronological sequence, wherein elements (87) and (89) are earlier relative to element (93) (Appendix A, Figures A.62, 63, 66, 68).

Element 88. Very dense loam of yellow-brown color

Very dense loam of yellow-brown color, sub-rectangular in plan, delineated on the eastern and western sides by layers of coal and ash (87).

During the clearing of this layer, no ceramics or osteological material were found (Appendix A, Figures A.62-66, 68).

Element 89. Dark brown loam

Dark brown loam with greenish shades, with occasional inclusions of raw brick fragments or bright yellow loamy concretions, located in the central part of the southern stratigraphic wall (Appendix A, Figures A.62, 63, 66-68).

A small amount of handmade pottery and small fragments of animal bones were found during the clearing.

A gaming asyk was discovered during the clearing of the dark brown loam fill. The asyk is painted with a reddish-brown paint, with incisions made by a sharp tool creating a specific ornament. Size 5x3.7x2.9 cm. Weight – 8.4 cm. The find was assigned the field number Ks-23-01-89-01.

Element 90. Very dense gray-green loam

A very dense gray-green loam is located in the center of the excavation at level 32. 944. In the layer, there is a decayed layer of reed and cattail lying at the same level.

While clearing the dense gray-green loam, fragments of handmade pottery and small fragments of sheep bones were discovered (Appendix A, Figure A.66-73).

During the excavation, a fragment of mother-of-pearl from a shell was found in the layer. Size 1.2x0.9x0.2 cm. Weight – 0.04 g. This find was assigned the field number Ks-23-01-90-1 (Appendix A, Figure A.22).

Upon further deepening at the level of 32.843, a fragment of a bone plate with traces of processing was found. The size of the bone overlay: 3.7x3.1x0.2-0.8 cm. Weight – 10.75 g.

This find was assigned the field number Ks-23-01-90-2.

The bronze artifact was discovered during the clearing of dense gray-green loam near the western wall of the stratigraphic excavation. A bronze conical-shaped artifact, made by casting and molding. The bronze artifact is covered with green oxide. Dimensions of the bronze artifact: height 2.5 cm; diameter from bottom to top 0.5-0.9x1.6-1.3 cm. Weight – 13.25 g. This find has been assigned the field number Ks-23-01-90-3.

Subsequently, during the cleaning of the layer and the northern stratigraphic wall at level 32.856, a bronze plaque covered with green oxide was found. On the reverse side of the plaque,

there is a pin, round in cross-section, with a height of 0.6 cm and a diameter of 0.4 cm. The size of the plaque is 2.7x1.8x0.6 cm. This find has been assigned the field number Ks-23-01-90-4.

Element 91. Garbage pit in the southwest corner of the stratigraphic trench.

The described element – the garbage pit is located in the southwest corner of the stratigraphic trench. The garbage pit is bounded to the east and north by a layer of greenish-hued dense loam (90).

It represents a multi-layered filling of diverse layers. At the level of 33.146, a filling of dark brown sandy loam is traced.

While clearing the pit filling, inside, along with the dark brown sandy loam, osteological material is traced: bones of a ram, bird, as well as individual fragments belonging to cattle.

In the filling of the pit at different levels, stones of various sizes are traced, with signs of chipping and wear. The purpose of these stones is unknown (Appendix A, Figures A.66, 68, 74-79).

Among the cluster of stones, organic material, and ceramics, a fragment of fired, brown-colored clay roof plaster was found, measuring 13.7x11.5x5.3 cm. Imprints of reed stems and leaves (cane) were preserved on the inner surface. Weight 457 g. This find was assigned the field number Ks-23-01-91-1.

The ceramic complex in this fill is represented by various fragments of hand-molded pottery, mainly belonging to water jugs, pots, braziers, and cauldrons. Many bear the impact of fire.

From the osteological material, we note a vertebra of a large river fish, apparently belonging to a large catfish. In the same layer, ribs of large specimens of river fish were found.

At the level of 32.362, a layer of ash filling is traced, under which at the mark of 32.167 a round bottom of a pit appeared.

Element 92. Dense bright brown loam with charcoal inclusions

Dense bright brown loam with charcoal inclusions is traced at the level of 33.289.

The layer contains fragments of coarse thick-walled red clay handmade pottery and animal bones.

To the south, the layer is bounded by very dense yellow-brown loam (88), which apparently formed chronologically in an earlier period (Appendix A, Figure A.66, 80-84, 98-102).

The 'garbage' pit (85), which originated later in time, delineates the eastern boundary of element (92).

Element 93. Trench (small trench) in the northwestern part of the excavation pit

Layer of greenish-gray loam, very dense, but not as much as element (89), which cuts through this layer, identified at level 33.108.

The layer has clear contours and represents an elongated narrow 'trench,' approximately 21-22 cm wide, from east to west. The depth of the 'trench' is unknown.

The 'trench' cuts through element (89), dividing it into two parts.

Element (87) (layer of coal and ash), located in layer (89), is also cut by element (93) (Appendix A, Figure A.85-95).

The filling of the 'trench' is a loose, light gray sandy loam, sharply contrasting with the surrounding clay loam ('walls' of the trench).

Depth from the fixation level is 13-18 cm.

Another 'branch' was discovered on the western part of the 'ditch', cutting into the main 'ditch' from the south and heading north.

Element 94. Adobe masonry (outer part of the wall (84)

Masonry of adobe bricks made of dense clay loam of bright gray-red-orange color, identical to the masonry (84), was recorded at the mark of 32.811.

Only one row of bricks was identified on the exposed surface, but there is a hypothesis that the masonry continues westward, which was discovered during the excavation of elements (95) (Appendix A, Figures A.103-109).

The brick dimensions of 33x20x10-15 cm are identical to the masonry (84).

The brickwork (94) is bonded with the masonry (84), representing, respectively, architectural elements of a single structure.

It is possible that this is the outer row of brickwork of the massive outer wall (84), bordered on the eastern side by a 'ditch' (85) due to the presence of numerous layers, referred to as a 'pit'.

Element 95. Greenish-brown sandy loam fill

A layer (fill) of greenish-brown hue, very loose and clumpy, was identified at the level of 32.768 in the central part of the trench near the brick wall (94), on its inner side (Appendix A, Figures A.111-114).

In the fill, continuing down to a level of 10-15 cm, and ending with a layer of carbonate inclusions, which in turn lie on very dense gray-orange clay loam, similar to elements (94) and (84), virtually no bones or ceramics were found.

After sampling all the fill at the level of 32.605, an uneven surface of dense loam was revealed, possibly a continuation of the masonry (94).

It is possible that layer (95) is the fill of a 'depression' in the masonry (94), which was quite wide.

Element 96. A floor hearth in the layer of ash and soot fill

The described element is located in the center of the excavation in dense bright brown loam (92). Initially traced as a sub-rectangular spot of gray-black color, consisting of silver-colored ash, with inclusions of black charcoal and soot. When clearing the gray-black spot, at the level of 32.725, a rectangular silhouette emerged. At the same level lay a fragment of a molded lid, showing traces of firing and soot.

While clearing the ash and cinder fill, a concentration of fish scales and bones was observed in the layer.

This fill inside the spot was collected for carpological analysis – Ks-23-01-96-1.

Charcoal found in the fill was collected for radiocarbon analysis C_{14} inv. № Ks-23-01-96-2.

Subsequently, after clearing the fill of ash and soot, a floor hearth was uncovered.

The floor hearth, rectangular in shape, measuring 78x58 cm, is located in the center of the excavation in dense bright-brown loam (92) at marks 32.653, 32710, 32.740, 32.759. On the western side of the hearth, there is a rectangular depression measuring 12x19 cm.

The interior space of the hearth, also rectangular in shape with marks 32.591, 32.631, 32.676, 32.684, is calcined due to constant exposure to high temperatures. In the central part of the hearth, on the dense bottom of the hearth, a burnt spot measuring 42x59 cm appeared (Appendix A, Figures A.115-126).

Element 97. The post hole is of a round shape

Clearing the layer of dense bright brown loam with inclusions of small charcoal pieces (92) at the level of 32.748, the contours of a round-shaped post hole with a diameter of 12 cm appeared. Inside, the hole is filled with loose fine-grained gray sand at the base. At a depth of 10-11 cm, gray ash is observed.

The outer perimeter of the circle is marked by a black layer, up to 0.5 cm thick.

From the top, the wide pit gradually narrows downward, where at the level of 32.666, the bottom part of the pit is observed (Appendix A, Figure A.127-132).

Element 98. Burnt layer

Clearing the layer of dense bright brown loam with inclusions of small charcoal pieces (92) at the level of 32.725, a black layer – ash – appeared under the aforementioned layer, covering almost the entire excavation area, with a decline towards the west. A layer of ash lies on a denser yellow-brown loam. During the clearing of the surface layer, small fragments of red clay

handmade pottery are traced, lying, obviously, above the floor level (Appendix A, Figures A.133-148).

Element 99. Dense clumpy brown-yellow loam (part of the wall (84), (94)

The boundaries of the dense clumpy brown-yellow loam layer are traced at the level of 32.770 and clearly marked the layer of loose greenish-brown sandy loam.

It is possible that the layer was formed during the destruction of the wall (94)-(84), and therefore it is attributed to a later chronological period.

In all likelihood, layer (99) is contemporaneous with layer (95) in terms of formation time, or it is a continuation of the wall (94) masonry (Appendix A, Figures A.135-146).

Element 100. Rectangular pit in the southwestern corner of the stratigraphic excavation

The rectangular pit is located in the southwestern corner of the stratigraphic excavation (Appendix A, Figures A.147-150). The pit, measuring 92x57 cm, was dug in a northeast-southwest direction. It adjoins the southwestern part of the pit from the late period (91). On this side, it is lined on top with raw bricks, which thereby delineate the area of the rectangular pit from the late period pit (91) (Appendix A, Figures A.155-157).

The filling of the pit consists of loose greenish-brown fine clumpy sandy loam with the inclusion of organic remains, consisting of fish bones and scales, small bones of sheep or goat. The filling contains compressed decayed cattail (Appendix A, Figures A.151-154, 158).

The ceramic complex is represented by small fragments of handmade pottery. Many bear the impact of fire.

At the level of 32.261, an oval bottom of a pit emerged (Appendix A, Figures A.143-146).

Element 101. Layer of reed and cattail in the pit (85)

The layer of reed and cattail in the pit is observed at the level of 31.316. This layer of cattail and reed was covered by loose brown sandy loam with a large amount of organic material.

It represents a compacted filling in the form of bundles of reed and cattail, lying closely together over an area of 2.80x2.50 m, with a thickness of up to 15 cm. By the time of the excavations, the reed and cattail had decayed, acquiring a silvery-brownish hue.

No artifacts or osteological material were found in this layer.

A similar layer of reed and cattail (107) at the same level was recorded on the western side of the trench.

Element 102. Layer of greenish-brown clumpy, loose loam

The layer of greenish-brown clumpy, loose loam was excavated in the western part of the trench. The layer extended from the western wall of the trench to the center. The layer appears as a rectangular spot measuring 1.50 m from west to east and 1.30 m from south to north. On the southwest side, the layer borders a garbage pit (91). In the center, there is dense loam and ash from a floor hearth.

During the clearing of the greenish-brown clumpy, loose loam layer, small fragments of handmade pottery are encountered. A ceramic spindle whorl blank was also found here.

The osteological material is represented by sheep bones. Alongside the sheep bones, vertebrae and ribs of fish are found.

In the removed layer, a gill cover belonging to a sturgeon species was found. Size 5.5x4.7x0.2-1.1 cm. Weight – 9.5 cm. The find was assigned the field number: Ks-23-01-102-1

This layer ends at levels 31.603, 31.598.

Element 103. Early masonry made of raw bricks with sandy clay near the raw wall (94)

Masonry made of raw bricks with sandy clay is located near the raw wall (94) and was found at levels 31.034, 31.026, 31.036, 31.038 during the clearing of the brownish loam layer of the pit (ditch) (104).

It represents a layout of square bricks, measuring 32x32x8 cm. The bricks are tightly fitted to each other and bonded with a similar mortar from which the bricks are made. On the outside, the brickwork is covered with a thick layer of plaster up to 5 cm thick. Behind the brick wall is wall (94) (Appendix A, Figures A.160-164).

The space between the brickwork and wall (94) is filled with fragments of broken raw bricks and blocks ranging in size from 10 to 45 cm. The space between the fragments is filled with liquid clay and compacted.

Element 104. Early period garbage pit. Continuation of the pit (ditch) layer (85)

An oval-shaped garbage pit measuring 2.80x2.50 m is located on the eastern side of the eastern part of the trench, starting at level 31.015. It was identified after clearing the fill of pit (85). After the fill of the pit was removed at level 31.329, a layer of cattail and reed (101) appeared, completely covering the contours of the pit. In turn, pit (104) of the early period was the fill of a ditch located on the outer side of wall (94) (Appendix A, Figures A.160-164).

The fill of the pit (ditch) consists of moist brownish loam with the presence of organic material. In the middle of the fill, reed and bulrush decay continues to be encountered.

During the clearing of the brownish loam, at levels 31.034, 31.026, 31.036, 31.038, a masonry of five raw sanded square bricks was discovered, each measuring 32x32x8 cm. See above.

In the fill layer of the pit (ditch), fragments of small ruminant and cow bones are traced. Fish bones belonging to sturgeon species (sturgeon, beluga?) are also found – ribs, gill cover, and vertebrae.

In addition, it is worth noting fragments of molded vessels, either for water-bearing purposes or for tableware. We note a fragment of a molded vessel with a burnished surface, the surface of which is decorated with intersecting stripes forming a grid (cell).

Blank for a ceramic spindle whorl. The blank for a ceramic spindle whorl was found in the filling of a garbage pit. The surface is uneven, rough, covered with brown iron oxides. Size 6.2x5.8x1 cm. The fragment of the stone millstone is in satisfactory condition. The item has been assigned a unique code number: Ks_23_1_104_1.

Charcoal found in the filling was collected for radiocarbon analysis C_{14} inv. No. Ks-23-01-104-2.

Soil found in the filling was collected for carpological analysis inv. No. Ks-23-01-104-3.

At the level of 30.221, the garbage pit ends. Here, moist brown loam has appeared.

Element 105. Dense light brown loam

The described layer is traced in the central and western parts of the stratigraphic trench. It represents dense light brown loam. In the excavated upper layer on the southern and southwestern sides, a thin layer, 3 cm thick, of charcoal is traced.

On the western side of the trench, in the removed layer at a spade's depth – 25 cm, a greenish-clumpy loose loam is traced, ending after the removal of the upper layer. In the central part of the trench, clumps of burnt loam with a reddish-brown tint are observed (Appendix A, Figures A.165-173).

In the layer being removed, small sandy lenses of yellow fine-grained sand are observed.

Continuing to excavate this layer and deepening by a spade's depth in the southern and southwestern parts of the trench, the layer of ash and cinders ends (abruptly). With the removal of this layer, the greenish-brown clumpy, loose loam (102) is also not observed in the western part of the trench.

While clearing the light brown loam in the fill, among animal bones and ceramics, a fragment of a turtle shell was discovered. Part of the shell plates had delaminated and was lost. The upper front part of the shell, measuring 5.6x7x0.3 cm, has been preserved. Weight – 17.6 g.

The fragment of the turtle shell is in partially satisfactory condition. This find was assigned the field number Ks-23-01-91-1.

In the excavated layer, the osteological material is represented by fragments of MRS bones – jaws, tubular bones, hoof phalanges, ribs, and thighs. A spatula with traces of notches and chips was also found.

The ceramics are represented by fragments of handmade pottery, as well as stones of unknown purpose, with traces of chipping. No metal or metal products were found in this studied layer.

At the level of 31.907, a layer of dense brown loam with fine-grained gray sandy loam (106) and carbonate inclusions appeared. In this layer, gypsum crystals are encountered during cleaning.

Element 106. A layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions

After removing the dense light brown loam at level 31.907, a layer of dense brown loam with fine-grained gray sandy loam (106) and carbonate inclusions appeared. In this layer, gypsum crystals are encountered during cleaning (Appendix A, Figures A.174-177).

In the central part along the inner side of wall (94), a gray-green loamy platform measuring 82x65 cm was discovered. In the middle of the platform, in the gray-green loamy mass, lay a rectangular brick made of gray-green loam, measuring 36x23 cm (Appendix A, Figures A.178-181).

The layer contains small fragments of handmade pottery and fragments of bones belonging to a ram.

Element 107. A layer of reed and cattail and loam

The accumulation of the reed and cattail layer in the pit is traced at the level of 31.329 in the western and central part of the stratigraphic area measuring 2.70x1.20 m. It represents a compacted filling in the form of bundles of reed and cattail, lying tightly together, up to 30 cm thick, as well as gray loam between the bundles. By the time of the excavations, the reed and cattail had decayed, acquiring a silvery-brownish hue.

No artifacts or osteological material were found in this layer.

After clearing the layer of reeds and cattails, a layer of broken adobe bricks was discovered.

The layer of reeds and cattails found in the fill was collected for radiocarbon analysis C_{14} inv. № Ks-23-01-107-1.

Element 108. Adobe brick near the adobe wall (94)

While excavating the layer of gray-brown loam on the western side of the adobe masonry (94) wall, a gray-green loamy platform measuring 82x65 cm was discovered. In the middle of the site, in a gray-green loamy mass, lay a rectangular brick made of gray-green loam, measuring 36x23 cm. On the western side, the brick was partially damaged by a garbage pit, from which a small arc-shaped edge 8 cm wide and 25 cm long was preserved. The size of the garbage pit at the time of description is 34x38 cm (Appendix A, Figure A.182-192).

Element 109. The masonry of the wall made of fine-grained raw yellow sand bricks at the northern wall of the trench

Excavating a layer of gray-brown loam on the western side of the trench, a wall 2.70 m long and 32 cm wide was discovered on the northern side of the trench wall. The wall is laid in the direction east-northeast – west-southwest in a single row of square bricks made of loam and fine sand. The bricks are tightly fitted to each other and bonded with clay mortar. Between the trench and the wall, there was a small passage (Appendix A, Figure A.195-203).

Element 110. Layer of broken raw bricks

After clearing the layer of reeds and cattails in the western part of the stratigraphic trench, a layer of broken rectangular and square raw bricks was discovered. The broken bricks were not lying chaotically but were apparently laid out (Appendix A, Figure A.200-209). This is indicated by the fact that they were all lying flat. No bricks standing on edge were identified. The space between the bricks was filled with gray loam. The masonry layer was traced over an area of 2.70x1.20 m. During the clearing of this layer, a sufa (111) was identified beneath it.

A sample was taken from this layer for carbon-14 analysis, and the results dated it to 550-600 AD (Figure 5.1).

Element 111. Sufa

The rectangular sufa, measuring 2.56x0.58 m, was laid out in an east-west direction from fragments of raw bricks, with the gaps between them filled with liquid clay. On the northern and western sides, the edge of the sufa is lined with adobe bricks, placed on edge, tightly together, and bonded with liquid clay. The sufa was covered with a layer of compacted fragments of rectangular and square adobe bricks, 20-30 cm thick (Appendix A, Figures A.200-203, 210-212).

5 Results of radiocarbon dating

List of samples taken for carbon analysis 14

Number	Name/Description	Status
Sample #1	**Layer #6 (KS_22_01_06_01)** Very dense bright brown loam (rubble of raw blocks with dimensions 32x10x16x? cm).	An analysis was made for carbon 14 (550-600 AD). (2022 y.)
Sample #2	**Layer #8 (KS_22_01_08_01)** Black sandy loam layers (ashes, charcoal), fragments of charcoal, ceramics, carbonate white interlayers, alternating with sandy loam layers with inclusions of charcoal and ceramics	An analysis was made for carbon 14 (AD. 650-800). (2022 y.)
Sample #3	**Layer #21 (KS_22_01_21_01)** Black layer - coal, ash	An analysis was made for carbon 14 (AD. 650-800). (2022 y.)
Sample #4	Layer #20 Gray layer - ashes, embers	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #5	Fish scale	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #6	Layer #15 Loose sandy gray-black layer with lots of embers	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #7	Layer #10. Black sandy loam - ashes, ashes, embers	The material is stored in the laboratory of RUTRUM LLC
Sample #8	Layer #22 Loose gray sandy loam with large amounts of charcoal	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #9	**Layer #27 (KS_22_01_27_01)** Masonry of raw bricks of bright brown color, brick dimensions 32x8x10x? cm, interlaying mortar of dark brown color - 1-3 cm	An analysis was made for carbon 14 (1850-1600 BC). Incorrect result (2022 y.)
Sample #10	**Layer #28 (KS_22_01_28_01)** Gray-black sandy loam layer with large amounts of charcoal, lime, ceramics, carbonates	An analysis was made for carbon 14 (550-650 AD). (2022 y.)
Sample #11	**Layer #37 (KS_22_01_37_01)** Loose sandy gray-black layer with large amounts of charcoal and carbonates	An analysis was made for carbon 14 (AD 650-800). (2022 y.)

Sample #12	Layer #44 Black ash and coal layer, gray ash layer in the upper part of the layer	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #13	**Layer #64 (KS_22_01_64_01)** Dark gray friable sandy loam with large amounts of charcoal and carbonates, identical to layer #18 of the eastern profile	An analysis was made for carbon 14 (600-650 AD). (2022 y.)
Sample #14	Layer #67. Burned reeds (grass), ashes, black and white ashes	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #15	Layer 61 (fish scales). Pit, loose gray-brown loam, fragments of fish bones, coals	The material is stored in the laboratory of RUTRUM LLC
Sample #16	Layer #61 (bone). Pit, loose gray-brown loam, fragments of fish bones, coals	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #17	Layer #61 (charcoal). Pit, loose gray-brown loam, fragments of fish bones, coals	The material is stored in the laboratory of RUTRUM LLC (2022 y.)
Sample #18	Layer #110 (charcoal). Very dense dark brown loam with a significant amount of carbonate inclusions	An analysis was made for carbon 14 (AD 550-600). (2023 y.)

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Vilnius Radiocarbon
Performed by

DATING CERTIFICATE

No. 2022-11-16-FTMC-PR78

13th December 2022

1. Applicant for analysis: Mr Nurbol Baimukhanov, International Institute for Central Asian Studies, 19, University boulevard street, Samarkand, Uzbekistan, 140129
2. Material of sample: Sediments
3. Date of sample receiving: 2022-11-23
4. Analysis date: 2022-12-13
5. Equipment used for analysis: Single stage accelerator mass spectrometer (SSAMS, NEC, USA), Automated Graphitization Equipment AGE-3 (IonPlus AG).
6. Method of analysis: Samples were prepared using HCl pretreatment. IAEA C3, NIST-OXII and IAEA C9 were used as reference materials.
7. Results of analysis:

Sample designation	Lab. code	Radiocarbon age, BP	pMC
KS_22_01_06_01	FTMC-PR78-1	1511±27	82.85±0.28
KS_22_01_08_01	FTMC-PR78-2	1293±27	85.13±0.29
KS_22_01_21_01	FTMC-PR78-3	1309±27	84.96±0.29
KS_22_01_27_01	FTMC-PR78-4	3397±29	65.51±0.24
KS_22_01_28_01	FTMC-PR78-5	1482±27	83.15±0.28
KS_22_01_37_01	FTMC-PR78-6	1301±28	85.05±0.30
KS_22_01_64_01	FTMC-PR78-7	1409±28	83.91±0.29

The results are given in years before 1950 (radiocarbon age BP). The uncertainty in the age determination is given +/- one standard deviation. All radiocarbon ages are corrected for isotopic fractionation using the measured 13/12-ratio. The radiocarbon ages must be translated to calibrated radiocarbon years.

8. Calibrated radiocarbon dates:

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001

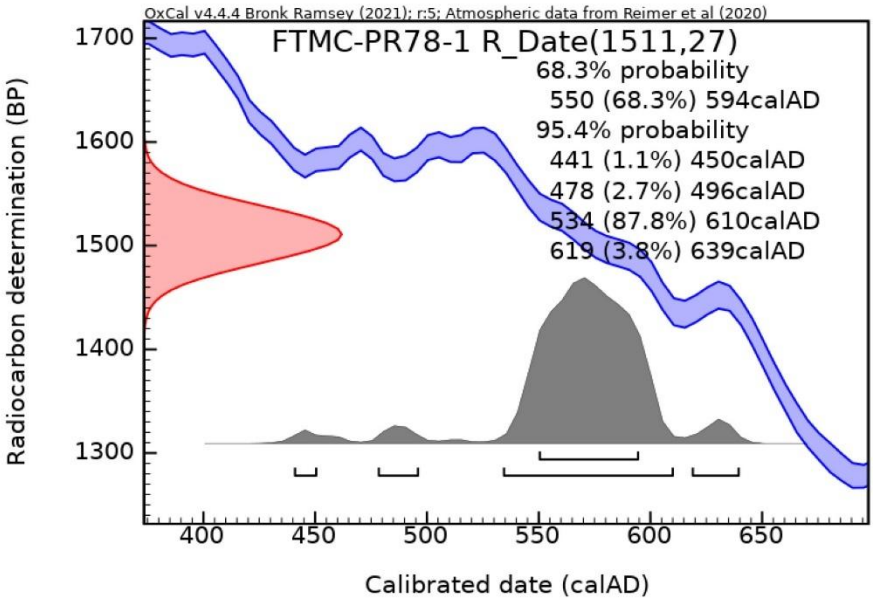

Fig. 1. Radiocarbon date 1511±27BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

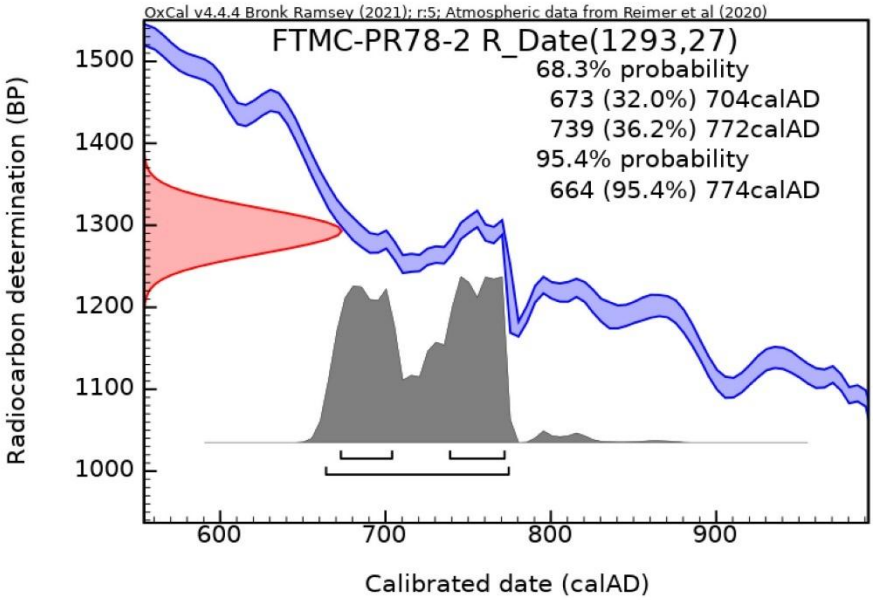

Fig. 2. Radiocarbon date 1293±27BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

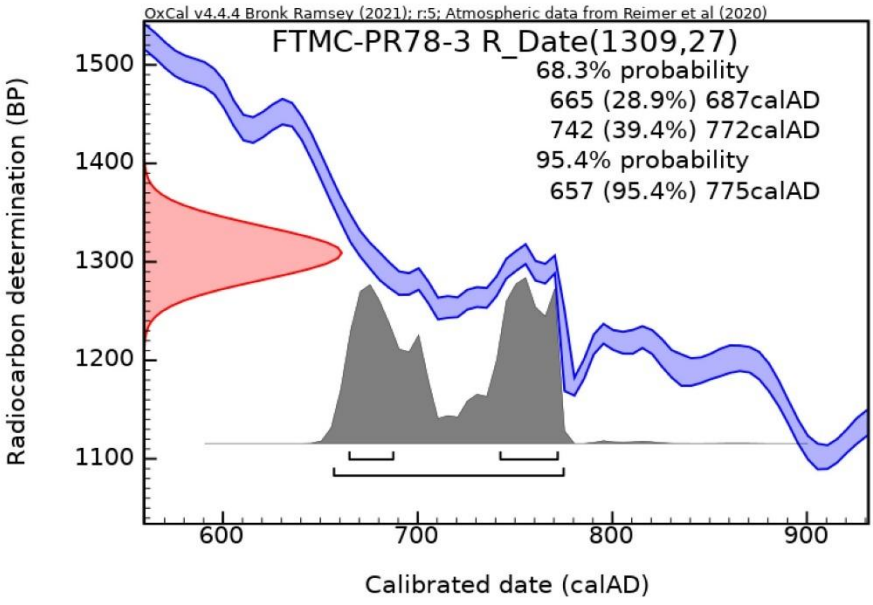

Fig. 3. Radiocarbon date 1309±27BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

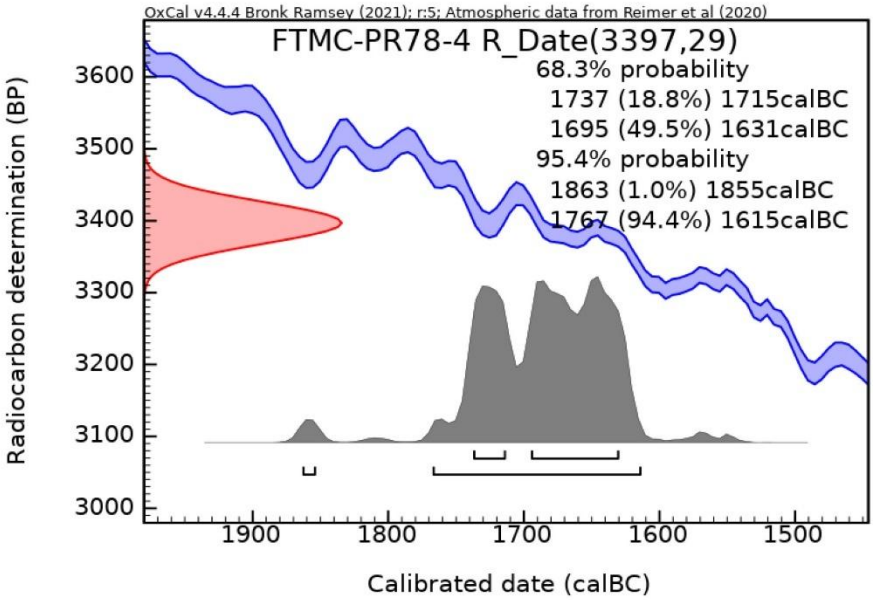

Fig. 4. Radiocarbon date 3397±29BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

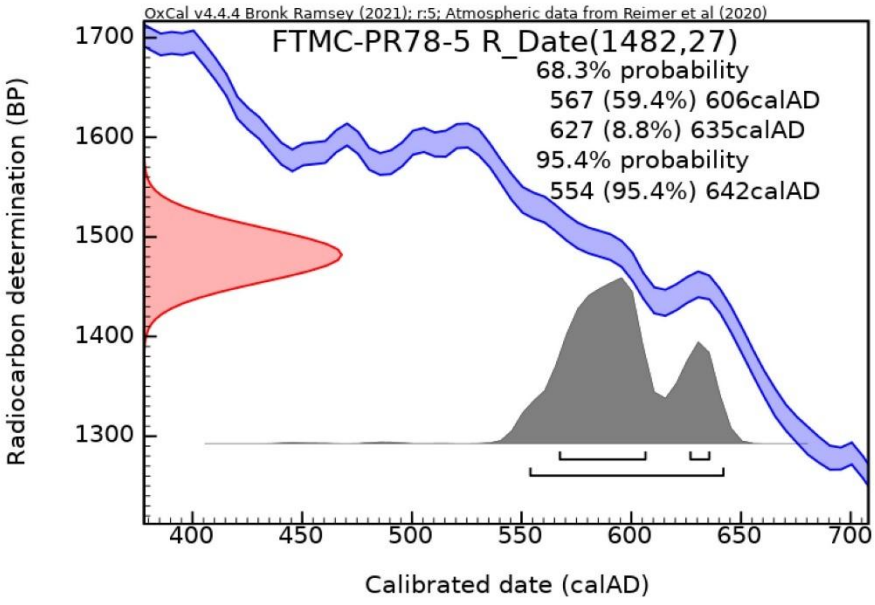

Fig. 5. Radiocarbon date 1482±27BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

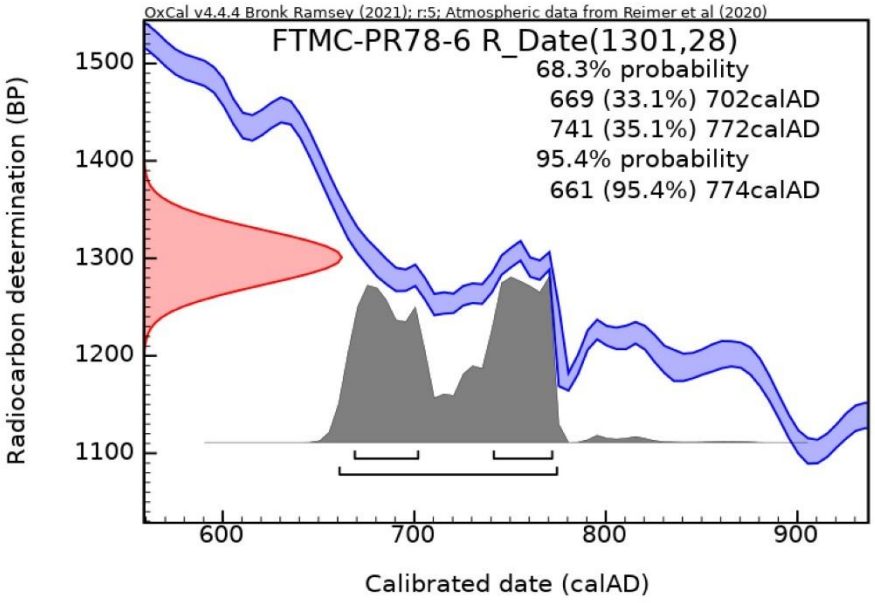

Fig. 6. Radiocarbon date 1301±28BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

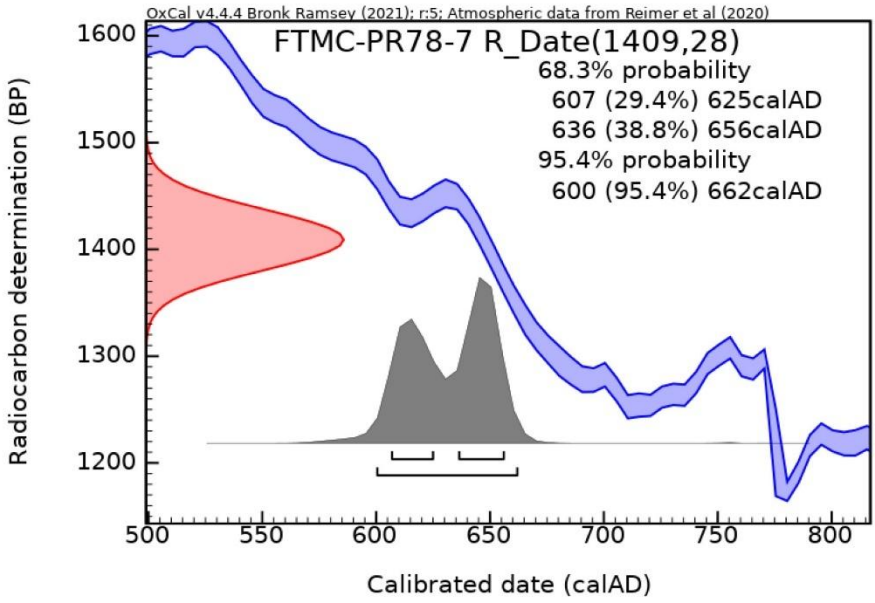

Fig. 7. Radiocarbon date 1409±28BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

Responsible person: dr. Žilvinas Ežerinskis

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Vilnius Radiocarbon
Performed by

DATING CERTIFICATE

No. 2023-12-24-FTMC-SC64

23rd January 2024

1. Applicant for analysis: Mr Nurbol Baimukhanov, International Institute for Central Asian Studies, 19, University boulevard street, Samarkand, Uzbekistan, 140129
2. Material of sample: Charcoal
3. Date of sample receiving: 2023-12-29
4. Analysis date: 2024-01-23
5. Equipment used for analysis: Single stage accelerator mass spectrometer (SSAMS, NEC, USA), Automated Graphitization Equipment AGE-3 (Ionplus AG, Zürich).
6. Method of analysis: Samples were pretreated with a standard acid-base-acid protocol. IAEA C3, IAEA C9, and NIST-OXII were used as reference materials.
7. Results of analysis:

Sample designation	Lab. code	Radiocarbon age, BP	pMC
KS_23_1_104_2	FTMC-SC64-1	-	-
KS_23_1_110_1	FTMC-SC64-2	1505±29	82.91±0.30

The results are given in years before 1950 (radiocarbon age BP). The uncertainty in the age determination is given +/- one standard deviation. All radiocarbon ages are corrected for isotopic fractionation using the measured 13/12C-ratio. The radiocarbon ages must be translated to calibrated radiocarbon years.

8. Calibrated radiocarbon dates:

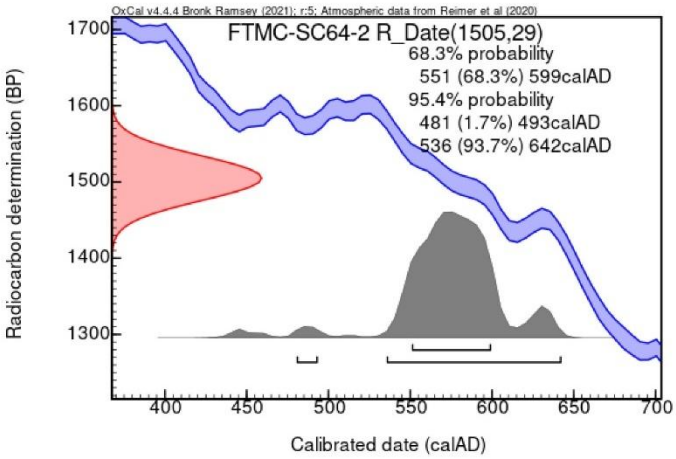


Fig. 1. Radiocarbon date 1505±29BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

Responsible person: dr. Žilvinas Ežerinskis

Game asyk. The game asyk was discovered during the clearing of the fill. The asyk is painted with reddish-brown paint, with incisions made by a sharp tool, creating a specific ornament. Size 3.4x2.2x1.9 cm. Weight – 8.4 g. The find was assigned the field number Ks-23-01-78-01.

Game asyk. During the clearing of the fill, a saiga knucklebone was discovered, marked with incisions made by a sharp tool, creating a rhomboid pattern. Size 3x1.9x1.7 cm. Weight – 7.74 g. The find was assigned the field number Ks-23-01-85-01.

During the clearing of the fill at level 31.722, a possible gaming knucklebone was found. Size 3.5x2.2x2 cm. Weight – 12.5 g. The find was assigned the field number Ks-23-01-85-02.

Ceramic spindle whorl blank. In the layer among the loam and decayed accumulation of cattail, a ceramic spindle whorl blank was discovered. The spindle whorl is of a rounded shape, measuring 4.2x3.6 cm, with a thickness of 0.7 cm. Weight – 14.86 g. The find was assigned the field number Ks-23-01-85-03.

Fragment of a stone millstone. A fragment of a stone millstone was found in the fill of a garbage pit. Part of the millstone is chipped. A drilled hole is observed in the central part. Wide in the form of a depression on the surface, the hole narrows in the center and then widens on the opposite side. The surface is uneven, rough, covered with brown iron oxides. Size 27.5x9-12.5x5.4 cm. The diameter of the drilled hole is 1-2.7 cm. Weight – 3125 grams.

The fragment of the stone millstone is in satisfactory condition. The item has been assigned a unique code number: Ks_23_1_85_5.

Fragment of a bone overlay. The fragment of the bone overlay is elongated rectangular in shape, made from the tubular bone of an animal, by sawing and grinding. The fragment was found in dense gray-green clay loam near the western wall of the stratigraphic excavation.

The size of the bone overlay: 3.7x3.1x0.2-0.8 cm. Weight – 10.75 g.

The bone overlay is in satisfactory condition. The item has been assigned a unique code number: Ks_23_1_90_2.

Bronze item. A bronze conical-shaped artifact, made by casting and molding. The bronze artifact is covered with green oxide. The artifact was discovered during the excavation of dense gray-green clay loam near the western wall of the stratigraphic excavation. Dimensions of the bronze item: height 2.5 cm; diameter from bottom to top 0.5-0.9x1.6-1.3 cm. Weight – 13.25 g.

The bronze artifact is in satisfactory condition. The artifact has been assigned a unique identification code: Ks_23_1_90_3.

Bronze plaque. Subsequently, during the cleaning of the layer and the northern stratigraphic wall at level 32.856, a bronze plaque covered with green oxide was found. On the reverse side of

the plaque, there is a pin, round in cross-section, with a height of 0.6 cm and a diameter of 0.4 cm. The dimensions of the plaque are 2.7x1.8x0.6 cm. Weight – 3.8 g. This find has been assigned the field number Ks-23-01-90-4.

Fragment of clay roof coating, measuring 13.7x11.5x5.3 cm. Imprints of reed stems and leaves (cane) were preserved on the inner surface. Weight 457 g. This find was assigned the field number Ks-23-01-91-1.

In the excavated layer, a gill cover belonging to a sturgeon fish was found. Size 5.5x4.7x0.2-1.1 cm. Weight – 9.5 cm. The find was assigned the field number: Ks-23-01-102-1

Ceramic spindle whorl blank. The blank for a ceramic spindle whorl was found in the filling of a garbage pit. The surface is uneven, rough, covered with brown iron oxides. Size 6.2x5.8x1 cm. Weight – 45 g. The fragment of the stone millstone is in satisfactory condition. The item has been assigned a unique code number: Ks_23_1_104_1.

Fragment of a turtle shell. The fragment of the turtle shell was discovered during the clearing of light brown loam in the fill, among animal bones and ceramics. Part of the shell plates had delaminated and was lost. The upper front part of the shell, measuring 5.6x7x0.3 cm, has been preserved. Weight – 17.6 g.

The fragment of the turtle shell is in partially satisfactory condition. This find has been assigned the field number Ks-23-01-105-1.

Cultural material (description)

Copper coin. The copper coin was found during the survey of the settlement on the surface of the rabat. The coin is partially covered with green oxide. On one side of the coin, a tamga in the form of a trident stand can be traced, with an inscription in the Khorezmian alphabet visible along the edges. On the reverse side, an image of the ruler's head is visible. The coin was minted by the local ruler of the Kerder region, Khosro. The coin dates back to the early 8th century AD. Diameter 2.6 cm. Weight – 2 g. The artifact has been assigned a unique code number: Ks-23_1_0_1.

A fragment of molded ceramics was found near the stratigraphic trench on the western side. The surface of the ceramics is burnished both inside and outside and covered with a red slip. The exterior side was exposed to fire, causing the slipped surface to turn black. The outer side of the vessel wall is decorated with an incised circle, inside which an X-shaped tamga is inscribed. A repair hole with a diameter of 0.4 cm is drilled next to the tamga. The fragment size is 10.6x8.5x1.2 cm. Weight – 122 g.

The item is assigned a unique code number: Ks-23_1_0_2.

Onyx bead. The bead was found during the survey of the settlement on the surface in the northwestern part of the shahristan. The bead is made of a multi-layered semi-precious stone – onyx (chalcedony). The surface of the bead is polished. Onyx bead of cylindrical octagonal shape, black-brown-gray in color. The width of the bead's facets varies from 0.4 to 0.8 cm. Height 3.3 cm, width 1.3-1.5 cm. A through hole with a diameter of 0.2 cm is drilled along the entire length of the bead. Weight – 13.6 g. The item is assigned a unique identification code: Ks-23_1_0_3.

CONCLUSION

During the excavation work, four construction horizons were identified, as well as three stages of the wall's existence.

The upper, later construction horizon includes the garbage pit el. 91, located in the southwestern corner of the stratigraphic trench, and penetrating the layers and structures of the second construction horizon.

The second layer represents a powerful loamy cover, consisting of very dense bright gray-orange loam (iron oxide) el. 84, gray-black organic layer – el. 87; very dense yellow-brown loam – el. 88; dark brown loam – el. 89; very dense gray-green loam – el. 90.

This level also includes the garbage pit el. 80 with loose sandy loam, on the surface of which in the center is a cleared hearth el. 81. In turn, the garbage pit (80) was a continuation of the garbage pit (85) of the upper construction horizon, located in the ditch of the early construction period, and was a continuation of the garbage pit (104), formed as a result of waste accumulation. This is indicated by the reed and cattail lining, which divided the filling layers of the mentioned pits during the redevelopment in the third construction horizon. Garbage pits themselves are the filling of the early construction horizon ditch, located on the outside of the walls (94), which is a later construction of the early wall (103).

In the garbage pits, along with loam, fragments of sheep, goat, and cow bones are found. In the filling layer, fish scales and bones of river fish, as well as reed and cattail decay with burnt manure in the upper horizon, and also charcoal fragments found at different levels, are encountered.

The ceramic complex is represented by fragments of handmade and wheel-thrown pottery belonging to water vessels, pots, ceramic cauldrons, and braziers. Also found were blanks for ceramic spindle whorls and gaming astragali made from sheep and gazelle bones. On one of them, an ornament in the form of a grid was applied to the surface using the incision method.

In addition, fragments of a stone millstone (deirmen) and stones with traces of chipping were found in the filling of the moat pit.

The third layer represents a mudbrick wall (93) (the outer part of the wall (84), recorded at the mark 32.811 and laid with only one row of mudbricks measuring 33x20x10-15 cm on the wall of the early construction horizon el (103). The masonry continues in the western direction and was covered by greenish-brown sandy loam fill. (95).

On the inner side of the wall el 93, a floor hearth el was cleared. (96) and a posthole el. (97) as well as a rectangular trench and a square pit in the southwestern corner, apparently serving as garbage pits. In turn, both the hearth and the posthole were elements of the third construction

horizon. This layer also includes a garbage pit (85), located at the site of the moat, outside the outer wall of element 93.

In turn, these elements rested on a dense light brown raw brick layer with inclusions of fine sand, charcoal, and fired loam in the western and central parts.

We also note the layer of reed and cattail (101) in pit (85) (level 31.316) and the layer of reed and cattail (107) (level 31.329), which are practically at the same level. The layer of reed and cattail (107) covered the structures and rooms of an earlier construction horizon, being on the inner side of the wall of the earlier construction horizon (103). At the same time, the layer of reed and cattail (101) covers the filling of pit (104) of the earlier horizon from the filling of pit (85) of a later period, as if delineating their fillings and levels. Apparently, this layout was carried out during the replanning or reconstruction at the same time.

The fourth construction horizon can be attributed to the ditch, which is also a pit (104), as well as the wall (103) and the sufa and wall (109) located behind the inner side of the wall, the masonry of the wall made of fine-grained raw sandy yellow bricks at the northern wall of the trench. These elements were uncovered on the final day of the excavations.

In addition to the identified elements, materials from ceramic, osteological, and metal complexes were discovered during the clearing of the soil fill.

The materials of the ceramic complex are represented by fragments of handmade and wheel-thrown vessels: rims, handles, ornamented and unornamented walls of red clay and gray clay vessels.

The materials of the osteological complex are represented by fragments of bones of large and small ruminants, as well as fish bones. All materials were found in layers of different construction horizons: in soil fillings, as well as in refuse pits of various periods.

The materials of the metal complex are represented by two bronze items. The stone item is represented by fragments of stone millstones.

Modern documentation methods were used in the work process with the application of high-precision geodetic equipment; material processing was conducted in AutoCAD, ArcGIS, Agisoft Metashape.

APPENDIX A
Photo Illustrations

Figure A.1 - Process of clearing the surface of the stratigraphic trench. View to the west.

Figure A.2 - Process of clearing the surface of the stratigraphic trench. View to the west.

Figure A.3 - Process of clearing the surface of the stratigraphic trench. View to the west.

Figure A.4 - Process of clearing the surface of the stratigraphic trench. View to the east.

Figure A.5 - Element 80, 81, 82, 83. Garbage pit, central round part of the 'fireplace' (pit) (81), black layer (charcoal) (82), white-gray ash layer (83). View to the east.

Figure A.6 - Element 80, 81, 82, 83. Garbage pit, central circular part of the 'fireplace' (pit) (81), black layer (charcoal) (82), white-gray ash layer (83). View to the south.

Figure A.7 - Element 80, 81, 82, 83. The process of cleaning the garbage pit and 'fireplace' (pit) (81) with a black layer (charcoal), white-gray ash layer (83). View to the north.

Figure A.8 - Element 80, 81, 82, 83. The process of cleaning the garbage pit and the 'fire pit' (pit) (81) with a layer of black color (charcoal), a layer of white-gray ash (83). View to the east.

Figure A.9 - Element 81. Burnt layer of manure during cleaning inside the 'fire pit' (pit) (81) with a layer of black color (charcoal), a layer of white-gray ash (83). View to the east.

Figure A.10 - Element 81. Burnt layer of manure during cleaning inside the 'fire pit' (pit) (81) with a layer of black color (charcoal), a layer of white-gray ash (83). View to the west.

Figure A.11 - Element 80, 81. Sampling of the burnt manure layer for radiocarbon C_{14} analysis. View to the east.

Figure A.12 - Element 80, 81. Sampling of the burnt manure layer for radiocarbon C_{14} analysis. View to the east.

Figure A.13 - Element 80, 81. Section of the pit after removing the ash and coal layer. View to the south.

Figure A.14 - Element 80, 81. Section of the pit after removing the ash and coal layer. View to the south.

Figure A.15 - Element 80, 81. Section of the pit after removing the ash and coal layer. View to the east.

Figure A.16 - Element 80, 81. Pit after removal of the ash and coal layer. View to the south.

Figure A.17 - Element 80, 81. Pit after removal of the ash and coal layer. View to the south.

Figure A.18 - Element 80, 81. Pit after removal of the ash and coal layer. View to the east.

Figure A.19 - Element 85, 81, 84. Garbage pit (ditch) (85) with a 'fireplace' (81), very dense bright gray-orange loam (iron oxide) (84). View to the east.

Figure A.20 - Element 85, 84. Rotten layer of cattail and burnt manure in the dense bright gray-orange loam (iron oxide) layer of the garbage pit (ditch). View to the west.

Figure A.21 - Element 85, 84. Decayed layer of cattail and burnt manure in a dense bright gray-orange loam (iron oxide) layer of the garbage pit (ditch). View to the south.

Figure A.22 - Element 90. Mother-of-pearl in the filling of the garbage pit (ditch). View to the east.

Figure A.23 - Element 85. Decayed layer of cattail and reed in a brown loam layer of the garbage pit (ditch). View to the east.

Figure A.24 - Element 85. Decayed layer of cattail and reed in a brown loam layer of the garbage pit (ditch). View to the east.

Figure A.25 - Element 85. Clearing of the fill layer inside the trash pit (ditch). View to the east.

Figure A.26 - Element 85. Clearing of the fill layer inside the trash pit (ditch). View to the east.

Figure A.27 - Element 85. Clearing of the fill layer inside the trash pit (ditch). View to the east.

Figure A.28 - Element 85. Trash pit (ditch) after clearing inside the fill layer. View to the east.

Figure A.29 - Element 85. Trash pit (ditch) after clearing inside the fill layer. View to the east.

Figure A.30 - Element 85. Trash pit (ditch) after clearing inside the fill layer. View to the south.

Figure A.31 - Element 85. Fragments of a vessel in the trash pit (ditch) after clearing inside the fill layer. View to the south.

Figure A.32 - Element 85. Fragments of a vessel in a garbage pit (ditch) after cleaning within the fill layer. View to the west.

Figure A.33 - Element 85. Fragments of a vessel in the trash pit (ditch) after clearing inside the fill layer. View to the south.

Figure A.34 - Element 85. Sand lens in a garbage pit (ditch) after cleaning within the fill layer. View to the south.

Figure A.35 - Element 85. Sand lens in a garbage pit (ditch) after cleaning within the fill layer. View to the south.

Figure A.36 - Element 85. Tubular bone in a garbage pit (ditch) after cleaning within the fill layer. View to the east.

Figure A.37 - Element 85. Tubular bone in a garbage pit (ditch) after cleaning within the fill layer. View to the east.

Figure A.38 - Element 85. Garbage pit (ditch) after clearing the layer inside the filling. View to the east.

Figure A.39 - Element 85. Garbage pit (ditch). Eastern stratigraphic section. View to the east.

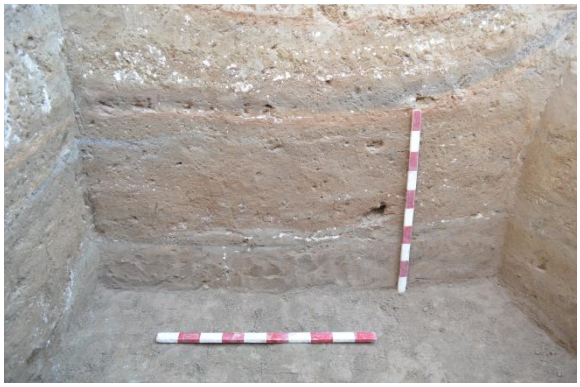


Figure A.40 - Element 85. Garbage pit (ditch). Southern stratigraphic section. View to the south.

Figure A.41 - Element 85. Work moment of excavations of the filling layer inside the garbage pit (ditch). View to the south.

Figure A.42 - Element 85. Work moment of excavations of the filling layer inside the garbage pit (ditch). View to the south.

Figure A.43 - Element 85. Work moment of excavations of the filling layer inside the garbage pit (ditch). View to the south.

Figure A.44 - Element 85. Work moment of excavations of the filling layer inside the garbage pit (ditch). View to the south.

Figure A.45 - Element 85. Brickwork in the cross-section of the wall (94) after excavating the fill layer inside the garbage pit (ditch). View to the north.

Figure A.46 - Element 85. Brickwork in the cross-section of the wall (94) after excavating the fill layer inside the garbage pit (ditch). View to the north.

Figure A.47 - Element 85. Garbage pit (ditch) after excavating the fill layer inside and brickwork of the wall (94) outside. View to the east.

Figure A.48 - Element 85. Garbage pit (ditch) after excavating the fill layer inside. Top view to the east.

Figure A.49 - Element 85. Northern wall of the garbage pit (ditch) after excavations of the filling layer inside and brickwork of the wall (94). Top view to the north.

Figure A.50 - Element 85. Southern wall of the garbage pit (ditch) after excavations of the filling layer. Top view to the south.

Figure A.51 - Element 85. Western wall of the garbage pit (ditch) after excavations of the filling layer. Top view to the west.

Figure A.52 - Element 85. Garbage pit (ditch) and wall (94) after excavations of the filling layer. Top view to the south.

Figure A.53 - Element 85. Garbage pit (ditch) and wall (94) after excavation of the fill layer. Top view to the north.

Figure A.54 - Element 85. Garbage pit (ditch) and wall (94) after excavation of the fill layer. Top view to the west.

Figure A.55 - Element 85. Excavations inside the garbage pit (ditch) after cleaning the previous fill layer. View to the east.

Figure A.56 - Element 85. Excavation process inside and outside the garbage pit (ditch). View to the northeast.

Figure A.57 - Element 85. Excavations inside the garbage pit (ditch) after cleaning the previous fill layer. View to the east.

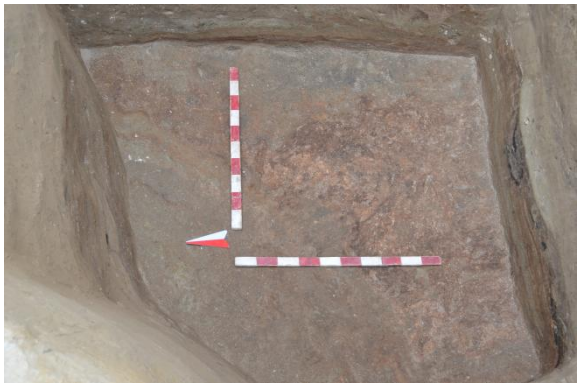


Figure A.58 - Element 85. Excavations inside the garbage pit (ditch) after cleaning the previous fill layer. View to the east.

Figure A.59 - Element 85. Excavations inside the garbage pit (ditch) after cleaning the previous layer of fill. View to the south.

Figure A.60 - Element 85. Excavations inside the garbage pit (ditch) after cleaning the previous layer of fill. View to the south.

Figure A.61 - Element 85. Northern wall of the garbage pit (ditch) after excavations of the filling layer inside and brickwork of the wall (94). Top view to the north.

Figure A.62 - Elements 87, 88, 89. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the west.

Figure A.63 - Elements 87, 88, 89. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the east.

Figure A.64 - Element 88. Dense bright brown loam. View to the south.

Figure A.65 - Element 88. Dense bright brown loam. View to the south.

Figure A.66 - Elements 87, 88, 89, 90, 91, 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the south.

Figure A.67 - Element 89. Dark brown loam. View to the south.

Figure A.68 - Elements 87, 88, 89, 90, 91, 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the south.

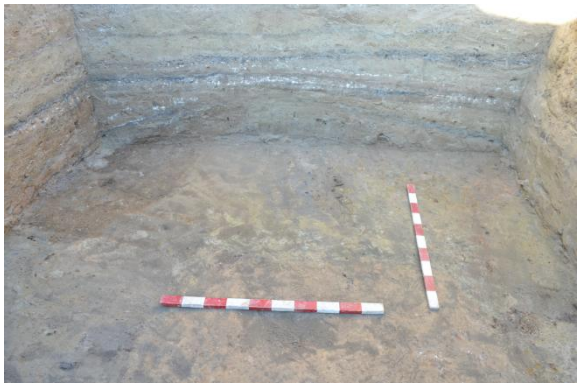


Figure A.69 - Element 90. Very dense gray-green loam. View to the west.

Figure A.70 - Element 90. Decomposed cattail and reed in a layer of dense gray-green loam. Top view to the west.

Figure A.71 - Element 90. Decomposed cattail and reed in a layer of dense gray-green loam. Top view to the north.

Figure A.72 - Element 90. Layer of dense gray-green loam after cleaning. View to the west.

Figure A.73 - Element 90. Layer of dense gray-green loam after cleaning. Top view to the west.

Figure A.74 - Element 91. Garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the south-southwest.

Figure A.75 - Element 91. Continuation of excavations of the garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the west-southwest.

Figure A.76 - Element 91. After removing the layer, a garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the south-southwest.

Figure A.77 - Element 91. After removing the layer, a garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the south-south-

Figure A.78 - Element 91. After removing the layer, a garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the west.

Figure A.79 - Element 91. After removing the layer, a garbage pit from the late construction period in the southwestern corner of the stratigraphic trench. View to the southwest.

Figure A.80 - Element 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the south.

Figure A.81 - Element 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the north.

Figure A.82 - Element 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the east.

Figure A.83 - Element 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the east.

Figure A.84 - Element 92. General view of the trench after removing and cleaning the layer of dense bright-brown loam with charcoal inclusions (92). View to the east.

Figure A.85 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark-brown loam (89). View to the east.

Figure A.86 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark-brown loam (89). View to the east.

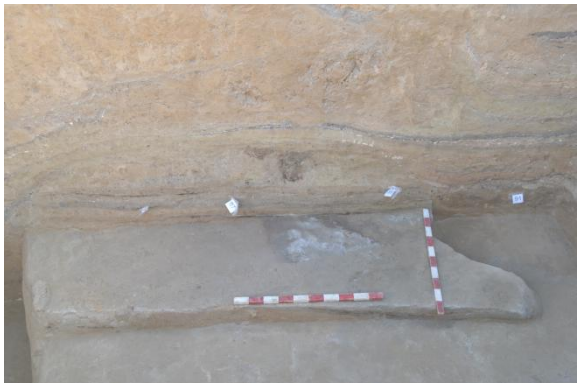


Figure A.87 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark-brown loam (89). View to the south.

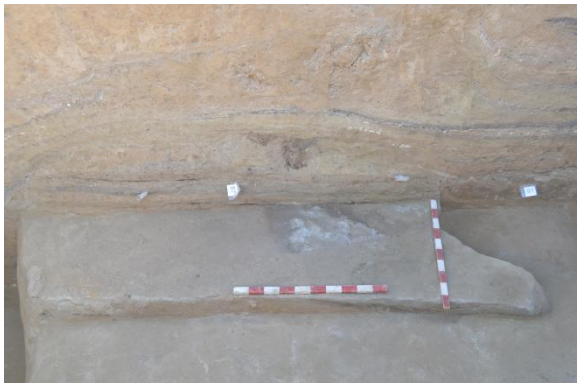


Figure A.88 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark-brown loam (89). View to the south.

Figure A.89 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark-brown loam (89). View to the east.

Figure A.90 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark brown loam (89). View to the southwest.

Figure A.91 - Element 93, 87, 89. The 'trench' that cut through the layer of coal and ash (87), dark brown loam (89). View to the southwest.

Figure A.92 - Element 93, 87, 89. Excavated 'trench' that cut through the layer of coal and ash (87), dark brown loam (89). View to the south.

Figure A.93 - Element 93, 87, 89. Excavated 'trench' penetrating a layer of coal and ash (87), dark brown loam (89). View to the southwest.

Figure A.94 - Element 93, 87, 89. Excavated 'trench' penetrating a layer of coal and ash (87), dark brown loam (89). View to the east.

Figure A.95 - Element 93, 87, 89. Excavated 'trench' penetrating a layer of coal and ash (87), dark brown loam (89). View to the west.

Figure A.96 - Element 78. General view of the trench after removing the layer of brown clay loam. View to the west.

Figure A.97 - Element 78. General view of the trench after removing the layer of brown clay loam. View to the east.

Figure A.98 - Elements 87, 88, 89, 90, 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the west.

Figure A.99 - Elements 87, 88, 89, 90, 91, 92. General view of the trench after removing the layer of dense bright brown loam with charcoal inclusions (92). View to the west.

Figure A.100 - Elements 90, 91, 92. Clearing of dense gray-green clay loam, garbage pit, and dense bright brown clay loam with charcoal inclusions. View to the west.

Figure A.101 - Element 90, 91, 92. Clearing of dense gray-green clay loam, garbage pit, and dense bright brown clay loam with charcoal inclusions. View to the west.

Figure A.102 - Element 90, 91, 92. Clearing of dense gray-green clay loam, a garbage pit, and dense bright brown clay loam with charcoal inclusions. Top view to the east.

Figure A.103 - Element 94. Brick wall masonry. View to the east-southeast.

Figure A.104 - Element 94. Brick wall masonry. View to the east-southeast.

Figure A.105 - Element 94. Brick wall masonry. View to the northwest.

Figure A.106 - Element 94. Brick masonry wall. View to the northwest.

Figure A.107 - Element 94, 84. Facade brick and pakhsa masonry walls from inside the garbage pit (ditch) (85, 104). View to the northwest.

Figure A.108 - Element 94, 84. Facade brick and pakhsa masonry walls from inside the garbage pit (ditch) (85, 104). View to the northwest.

Figure A.109 - Element 94, 84. Inner side of brick and pakhsa masonry walls. View to the northwest.

Figure A.110 - Stratigraphic section of the southern wall of the trench. View to the south.

Figure A.111 - Element 95. Greenish-brown sandy loam fill near the brick wall (94). View to the northeast.

Figure A.112 - Element 95. Greenish-brown sandy loam fill near the brick wall (94). View to the north.

Figure A.113 - Element 95. Layer of greenish-brown sandy loam fill near the brick wall (94) after cleaning. View to the northeast.

Figure A.114 - Element 95. Layer of greenish-brown sandy loam fill near the brick wall (94) after cleaning. View to the northeast.

Figure A.115 - Elements 96, 97. Fragment of a ceramic vessel in a layer of ash above the floor hearth and a posthole. View to the east.

Figure A.116 - Element 96, 97. Fragment of a ceramic vessel in a layer of ash above the floor hearth and a posthole. View to the east.

Figure A.117 - Element 96. Fragment of a ceramic vessel in a layer of ash above the floor hearth. View to the northeast.

Figure A.118 - Element 96. Fragment of a ceramic vessel in a layer of ash above the floor hearth. View to the northeast.

Figure A.119 - Element 96. Clearing of a fragment of a ceramic vessel in a layer of ash and the floor hearth. View to the southeast.

Figure A.120 - Element 96. Clearing of a fragment of a ceramic vessel in a layer of ash and the floor hearth. View to the southeast.

Figure A.121 - Element 96. Floor hearth after cleaning. View to the northeast.

Figure A.122 - Element 96. Floor hearth after cleaning. View to the southeast.

Figure A.123 - Element 96. Floor hearth after cleaning. View to the southwest.

Figure A.124 - Element 96. Fired inner surface of the floor hearth after cleaning. View to the southeast.

Figure A.125 - Element 96. Fired inner surface of the floor hearth after cleaning. View to the northeast.

Figure A.126 - Element 96, 99, 100. Floor hearth, dense clumpy brown-yellow loam, rectangular pit after cleaning. View to the east.

Figure A.127 - Element 97. Post hole of rounded shape in the center of the trench. View to the north.

Figure A.128 - Element 97. Post hole of rounded shape in the center of the trench. View to the east.

Figure A.129 - Element 97. Post hole of rounded shape in the center of the trench after cleaning. View to the west.

Figure A.130 - Element 97. Post hole of rounded shape in the center of the trench after cleaning. View to the west.

Figure A.131 - Element 97. Posthole of a round shape in the center of the trench after cleaning. View to the east.

Figure A.132 - Element 97. Posthole of a round shape in the center of the trench after cleaning. View to the east.

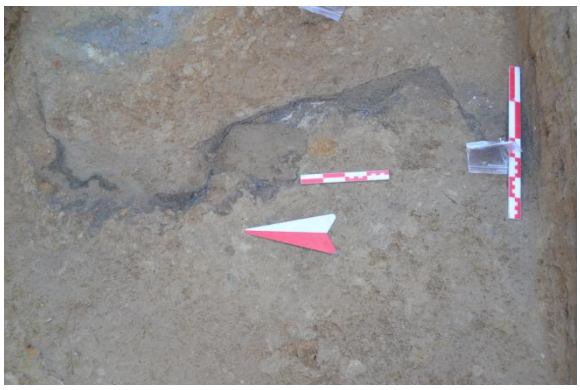


Figure A.133 - Element 98. Burnt layer near the brick wall (94). View to the east. View to the east.

Figure A.134 - Element 98. Burnt layer near the brick wall (94). View to the east. View to the south.

Figure A.135 - Element 99. Lumpy brown-yellow dense loam near the brick wall (94). View to the east.

Figure A.136 - Element 99. Lumpy brown-yellow dense loam near the brick wall (94). View to the north.

Figure A.137 - Element 94, 95, 98, 99. General view of the elements after cleaning. View to the east.

Figure A.138 - Element 94, 95, 98, 99. General view of the elements after cleaning. View to the east.

Figure A.139 - Element 94, 95, 98, 99. General view of the elements after cleaning. View to the north.

Figure A.140 - Element 94, 95, 98, 99. General view of the elements after cleaning. View to the north.

Figure A.141 - Element 94, 95, 96, 98, 99. General view of the elements after cleaning. View to the north.

Figure A.142 - Element 94, 95, 96, 98, 99. General view of the elements after cleaning. View to the south.

Figure A.143 - Element 96, 98, 99, 100. Floor hearth, burnt layer of dense clumpy brown-yellow loam, rectangular pit after cleaning. View to the east.

Figure A.144 - Element 96, 98, 99, 100. General view of the floor hearth, burnt layer, dense clumpy brown-yellow loam, rectangular pit after cleaning. Top view to the east.

Figure A.145 - Element 91, 95, 96, 98, 99, 100. Floor hearth, burnt layer of dense clumpy brown-yellow loam, rectangular pit after cleaning. Top view facing north.

Figure A.146 - Element 91, 95, 96, 98, 99, 100. General view of the floor hearth, burnt layer, dense clumpy brown-yellow loam, rectangular pit after cleaning. View to the southwest.

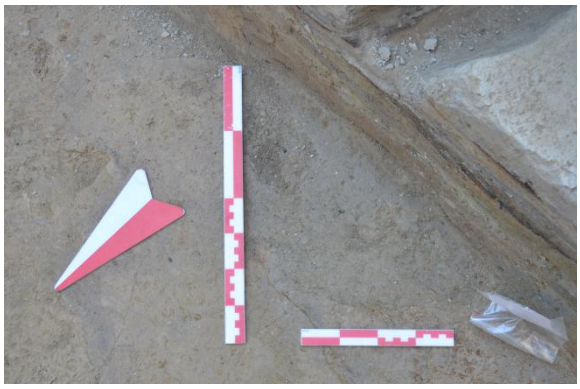


Figure A.147 - Element 100. Silhouettes of a square-shaped pit in the central and southern parts of the trench. View to the southeast.

Figure A.148 - Element 100. Silhouettes of a square-shaped pit in the central and southern parts of the trench. View to the southwest.

Figure A.149 - Element 100. Dark sandy loam filling of a square-shaped pit in the central and southern parts of the trench. View to the south.

Figure A.150 - Element 100. Profile of the dark sandy loam filling of a square-shaped pit in the central and southern parts of the trench. View to the south.

Figure A.151 - Element 100. Work moment of excavations of the dark sandy loam filling of a square-shaped pit in the central and southern part of the trench. View to the southwest.

Figure A.152 - Element 100. Work moment of excavations of the dark sandy loam filling of a square-shaped pit in the central and southern part of the trench. View to the southwest.

Figure A.153 - Element 100. Layer of dark sandy loam filling of a square-shaped pit in the central and southern part of the trench. View to the southwest.

Figure A.154 - Element 100. Work moment of excavations of the dark sandy loam filling of a square-shaped pit in the central and southern part of the trench. View to the southwest.

Figure A.155 - Element 100. Square-shaped pit after removing the top layer of dark sandy loam filling in the central and southern part of the trench. View to the southwest.

Figure A.156 - Element 100. Square-shaped pit after removing the top layer of dark sandy loam filling in the central and southern parts of the trench. View to the northwest.

Figure A.157 - Element 100. Stratigraphic section of the square-shaped pit after removing the top layer of dark sandy loam filling. View to the south.

Figure A.158 - Element 100. Work moment of excavations of the dark sandy loam filling of the square-shaped pit in the central and southern parts of the trench. View to the south.

Figure A.159 - Element 100. Square-shaped pit in the central and southern part of the trench after excavations of the dark sandy loam filling. View to the southwest.

Figure A.160 - Element 103, 104. Wall masonry after excavations of the filling layer inside the garbage pit (ditch) (104). View to the south.

Figure A.161 - Element 103, 104. Wall masonry after excavations of the filling layer inside the garbage pit (ditch) (104). View to the west.

Figure A.162 - Element 103, 104. Joint of bricks in the wall inside the garbage pit (ditch) (104). View to the southwest.

Figure A.163 - Element 103, 104. Wall masonry after excavating the filling layer inside the garbage pit (ditch) (104). View to the southwest.

Figure A.164 - Element 103, 104. Joint of bricks in the wall inside the garbage pit (ditch) (104). View to the west.

Figure A.165 - Element 105. Dense light brown loam on the inner side of the wall (94). Top view to the north.

Figure A.166 - Element 105. Dense light brown loam from the inner side of the wall (94). Top view facing east.

Figure A.167 - Element 105. Dense light brown loam from the inner side of the wall (94). Top view facing east.

Figure A.168 - Element 105. Dense light brown loam from the inner side of the wall (94). Top view facing west.

Figure A.169 - Element 105. Dense light brown loam from the inner side of the wall (94). Top view facing south.

Figure A.170 - Element 105. Western stratigraphic wall after excavations of dense light-brown loam. Top view to the west.

Figure A.171 - Element 105. Dense light-brown loam from the inner side of the wall (94). Top view to the northwest.

Figure A.172 - Element 105. View of the wall (94) from the inner side after excavations of dense light-brown loam. Top view to the east.

Figure A.173 - Element 105. Southern stratigraphic wall after the removal of dense light brown loam. Top view facing south.

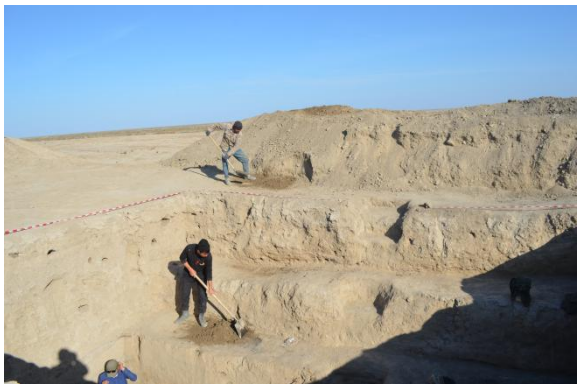


Figure A.174 - Element 106. Work moment of excavating a layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the northwest.

Figure A.175 - Element 106. Work moment of excavating a layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the northwest.

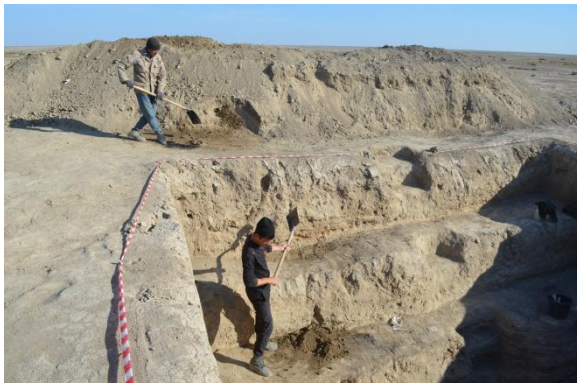


Figure A.176 - Element 106. Work moment of excavating a layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the north.

Figure A.177 - Element 106. Work moment of excavations of a layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the northeast.

Figure A.178 - Element 106. Layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the south.

Figure A.179 - Element 106. Layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the west.

Figure A.180 - Element 106. Layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the east.

Figure A.181 - Element 106. Layer of dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the north.

Figure A.182 - Element 107. Layer of cattail and reed with loam. View to the southeast.

Figure A.183 - Element 107. Layer of cattail and reed with loam. View to the south.

Figure A.184 - Element 107. Layer of cattail and reed with loam. View to the northwest.

Figure A.185 - Element 107. Layer of cattail and reed with loam. View to the west.

Figure A.186 - Element 107. Layer of cattail and reed with loam. View to the northwest.

Figure A.187 - Element 107. Layer of cattail and reed with loam. View to the east.

Figure A.188 - Element 107. Layer of cattail and reed with loam. View to the north.

Figure A.189 - Element 107. Layer of cattail and reed with loam. View to the west.

Figure A.190 - Element 107. Layer of cattail and reed with loam. View to the south.

Figure A.191 - Element 107. Layer of cattail and reed with loam and carbonate deposits. View to the east.

Figure A.192 - Element 107. Layer of cattail and reed with loam and carbonate deposits. View to the north.

Figure A.193 - Element 108. Unfired brick in dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the east.

Figure A.194 - Element 108. Unfired brick in dense brown loam with fine-grained gray sandy loam and carbonate inclusions. View to the northeast.

Figure A.195 - Element 109, 110. Masonry of the wall made of fine-grained raw sanded yellow bricks and a layer of laid broken raw bricks. View to the east.

Figure A.196 - Element 109, 110. Masonry of the wall made of fine-grained raw sanded yellow bricks and a layer of laid broken raw bricks. View to the northwest.

Figure A.197 - Element 109, 110. Masonry of the wall made of fine-grained raw sanded yellow bricks and a layer of laid broken raw bricks. View to the east.

Figure A.198 - Element 109. Masonry of the wall made of fine-grained raw sanded yellow bricks. View to the north.

Figure A.199 - Element 109. Masonry of the wall made of fine-grained raw sanded yellow bricks. View to the northwest.

Figure A.200 - Element 109, 110, 111. Masonry of the wall made of fine-grained raw sanded yellow bricks, brick laying and sufa. View to the northwest.

Figure A.201 - Element 109, 110, 111. Masonry of the wall made of fine-grained raw sanded yellow bricks, brick laying and sufa. View to the north.

Figure A.202 - Element 109, 110, 111. Masonry of the wall made of fine-grained raw sanded yellow bricks, layout of brick fragments and sufa. View to the north.

Figure A.203 - Element 109, 110, 111. Masonry of the wall made of fine-grained raw sanded yellow bricks, brick laying and sufa. View to the north.

Figure A.204 - Element 110. Layout of broken raw bricks. View to the south.

Figure A.205 - Element 110. Layout of broken raw bricks. View to the southeast.

Figure A.206 - Element 110. Layout of broken raw bricks. View to the east.

Figure A.207 - Element 110. Layout of broken raw bricks. View to the north.

Figure A.208 - Element 110. Process of clearing the layout of broken raw bricks. View to the southeast.

Figure A.209 - Element 110. Process of clearing the layout of broken raw bricks. View to the south.

Figure A.210 - Element 111. Sufa and wall masonry made of fine-dispersed raw sandy yellow bricks. View to the east.

Figure A.211 - Element 111. Sufa and wall masonry made of fine-dispersed raw sandy yellow bricks. View to the east.

Figure A.212 - Element 111. Sufa and wall masonry made of fine-grained raw sanded yellow bricks. View to the west.

APPENDIX B
Drawing documentation

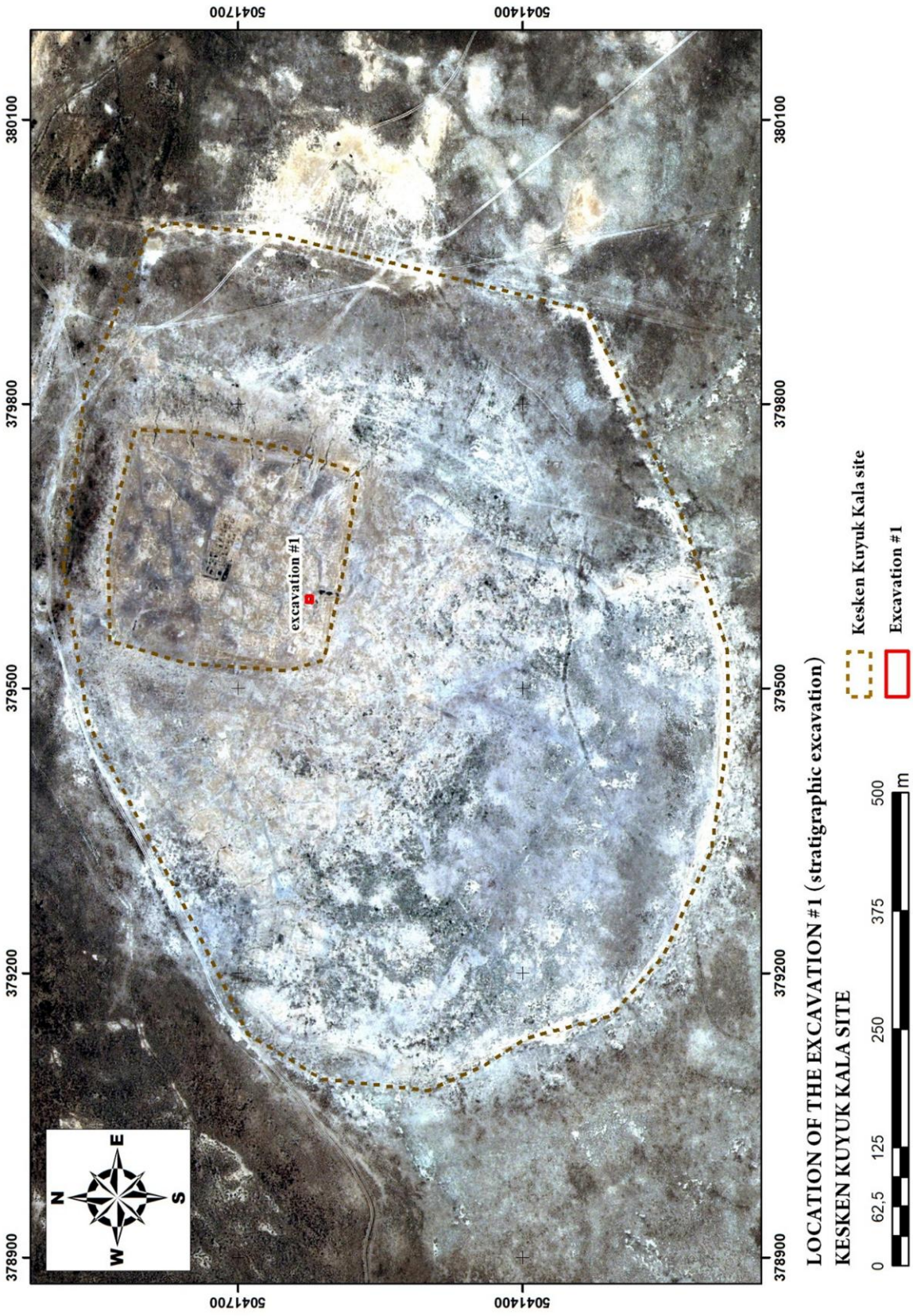


Figure B.1 – Layout of the excavation within the boundaries of the Kesken-Kuyuk Kala settlement

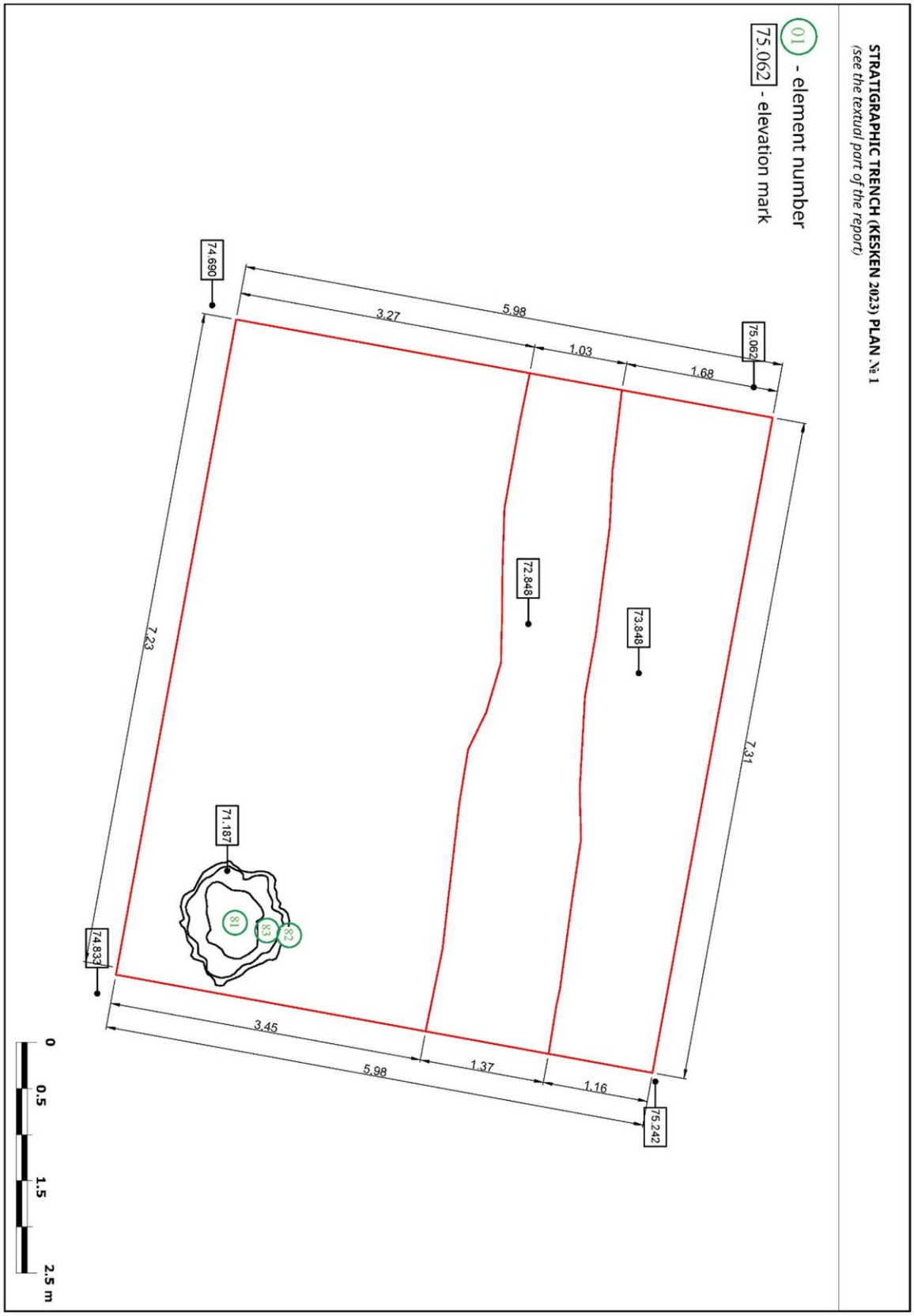


Figure B.2 – Plan of the trench – level No.1

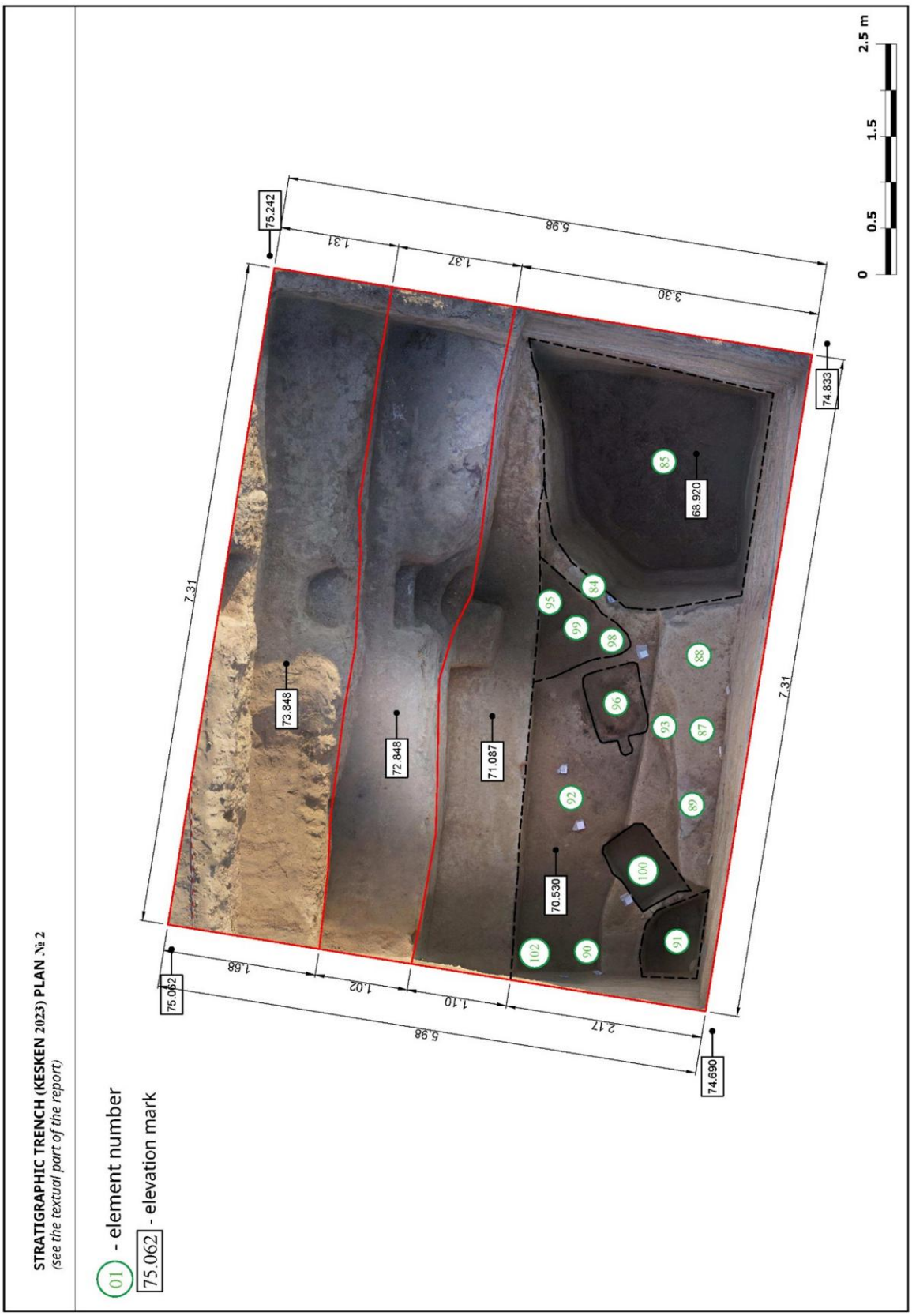


Figure B.3 – Plan of the trench – level No.2

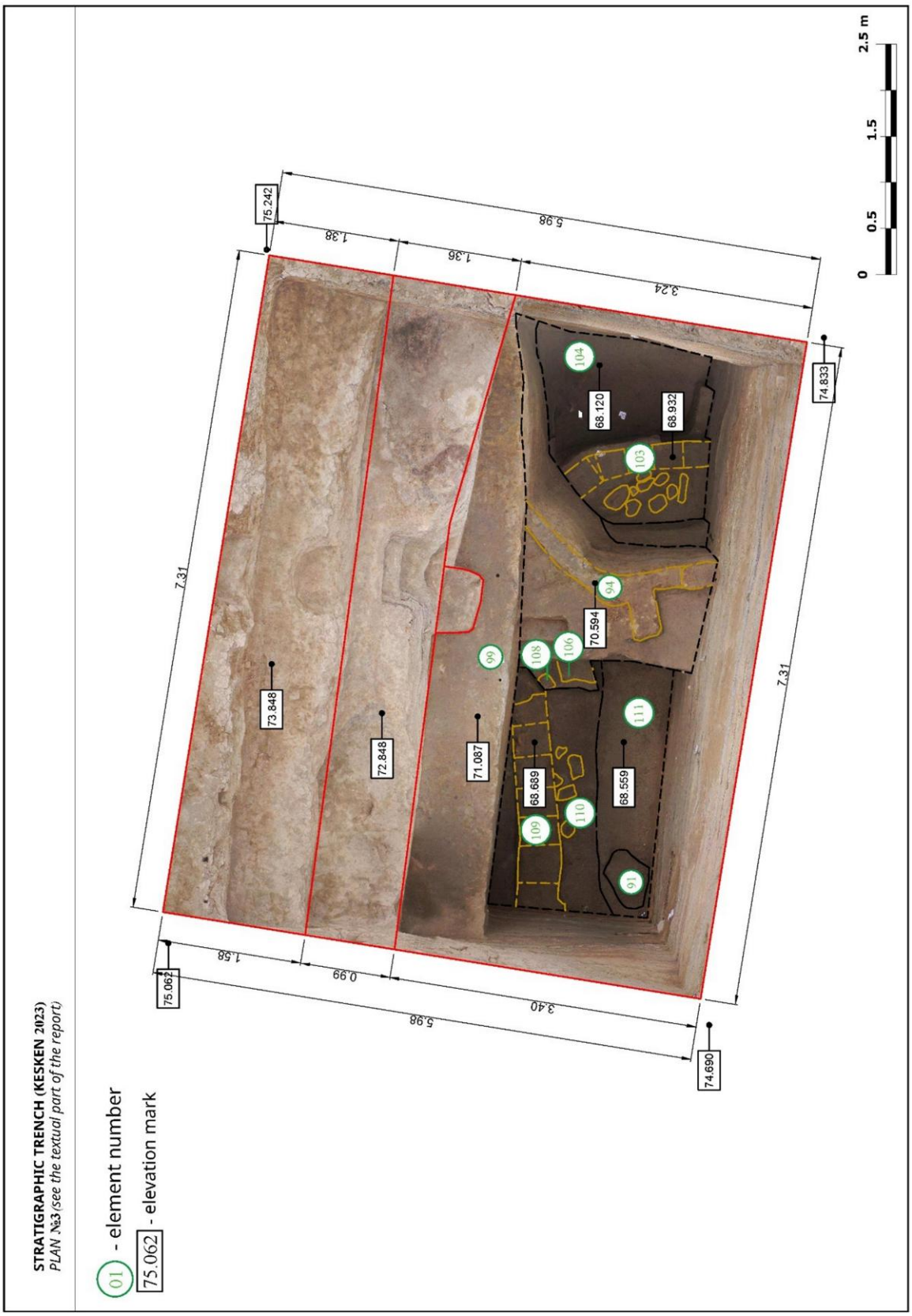


Figure B.4 – Plan of the trench – level No.3

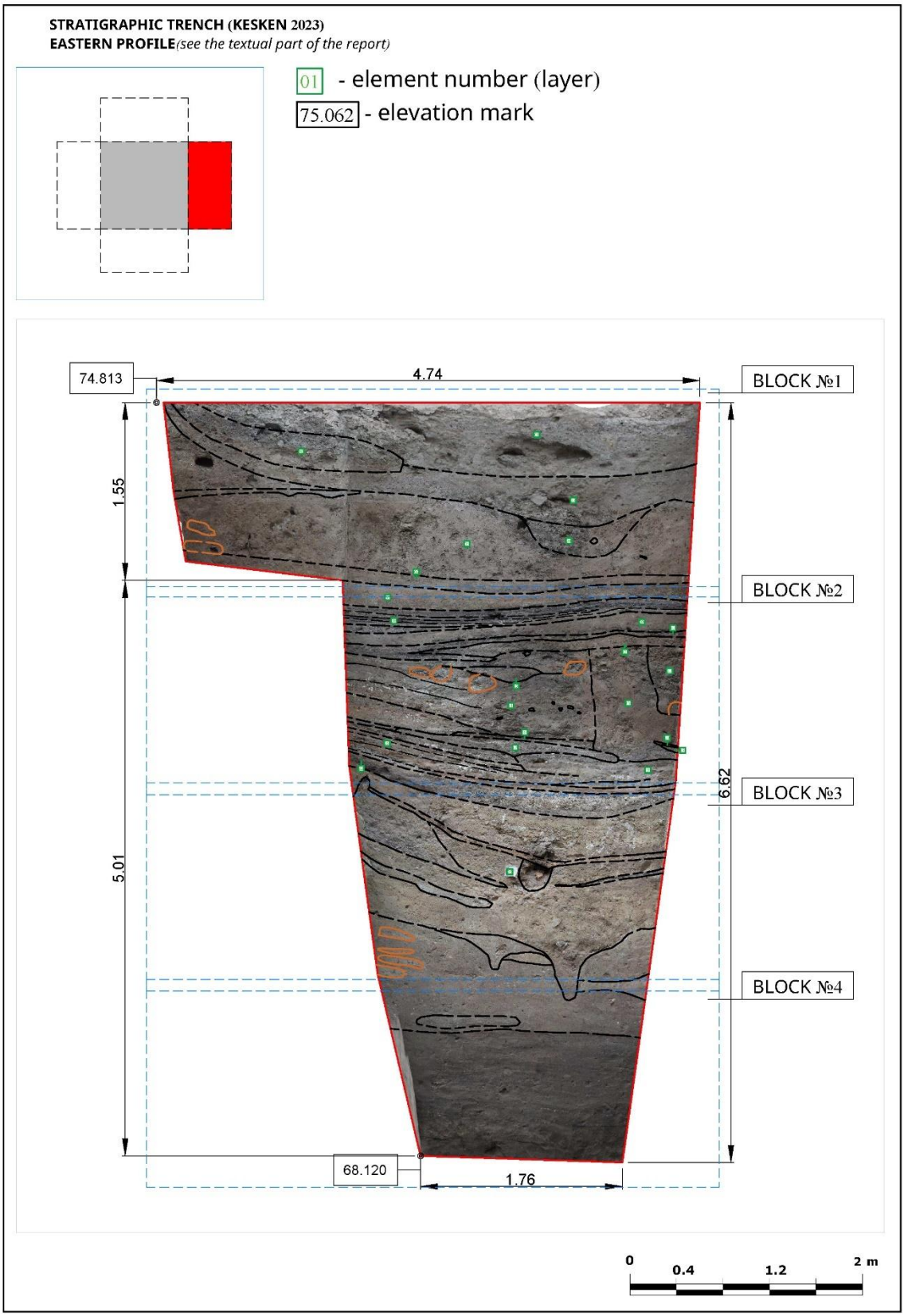


Figure B.5 – Eastern Stratigraphic Profile. General View

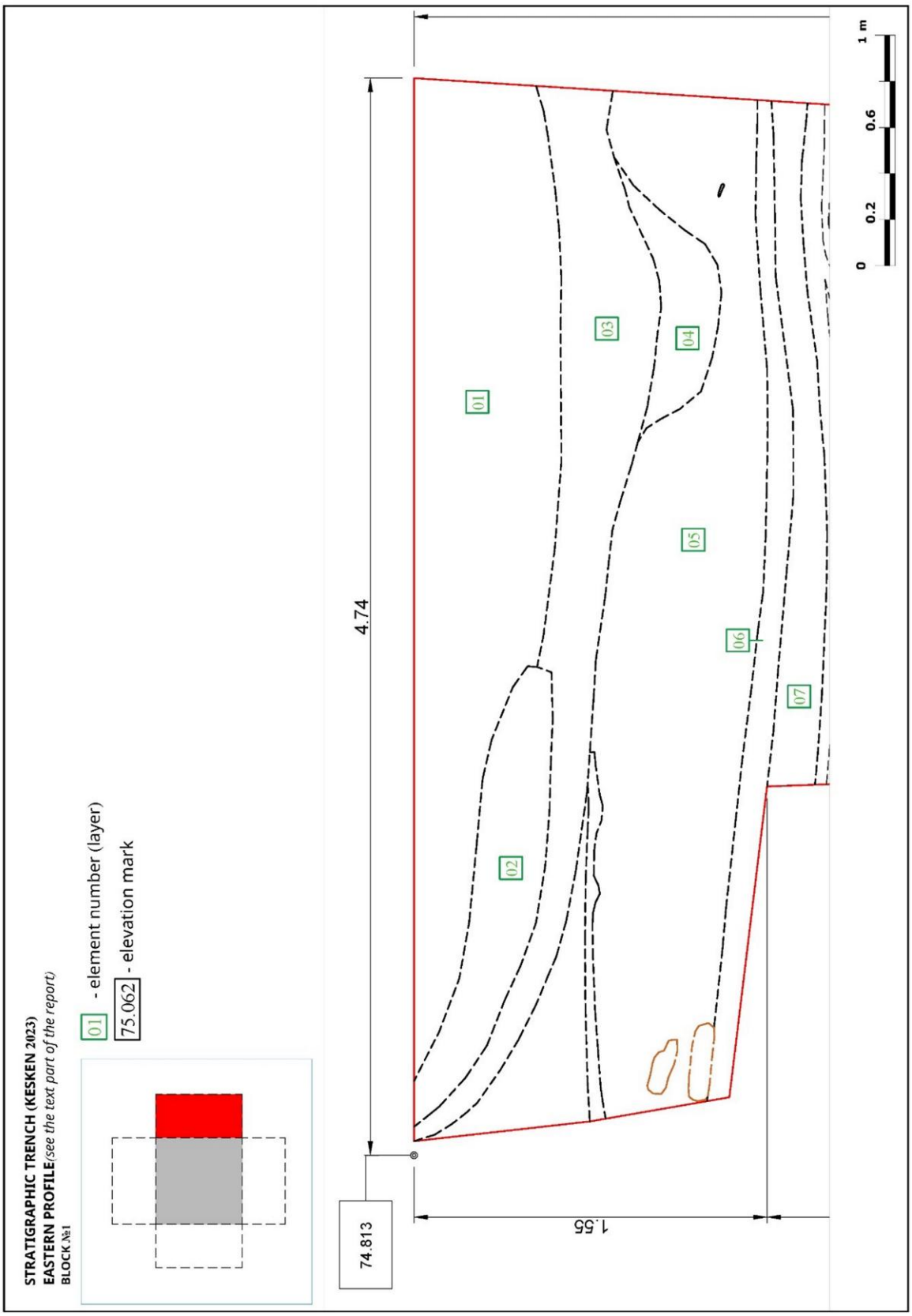


Figure B.6 – Eastern Stratigraphic Profile. Block No.1

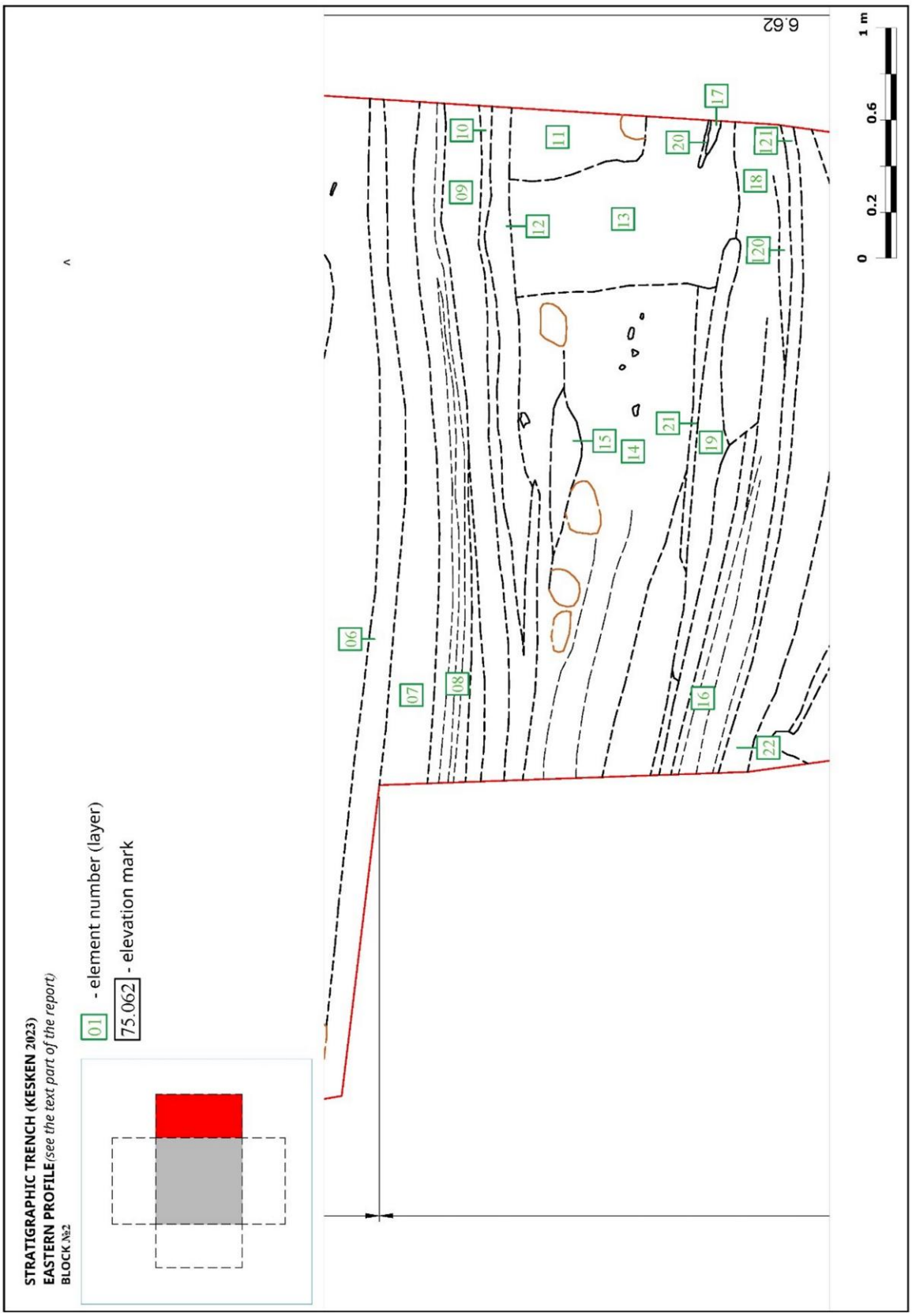


Figure B.7 – Eastern Stratigraphic Profile. Block No.2

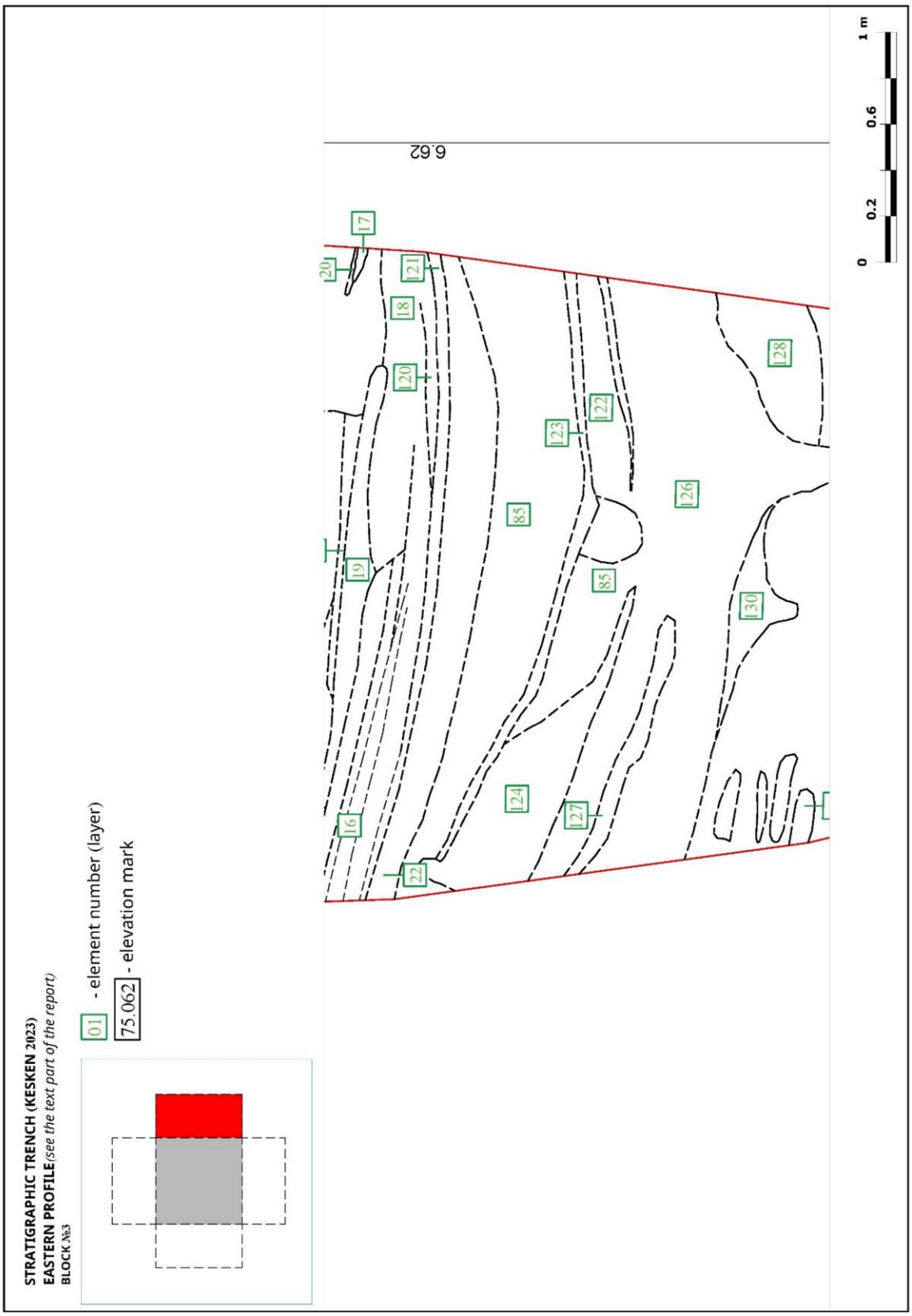


Figure B.8 – Eastern Stratigraphic Profile. Block No.3

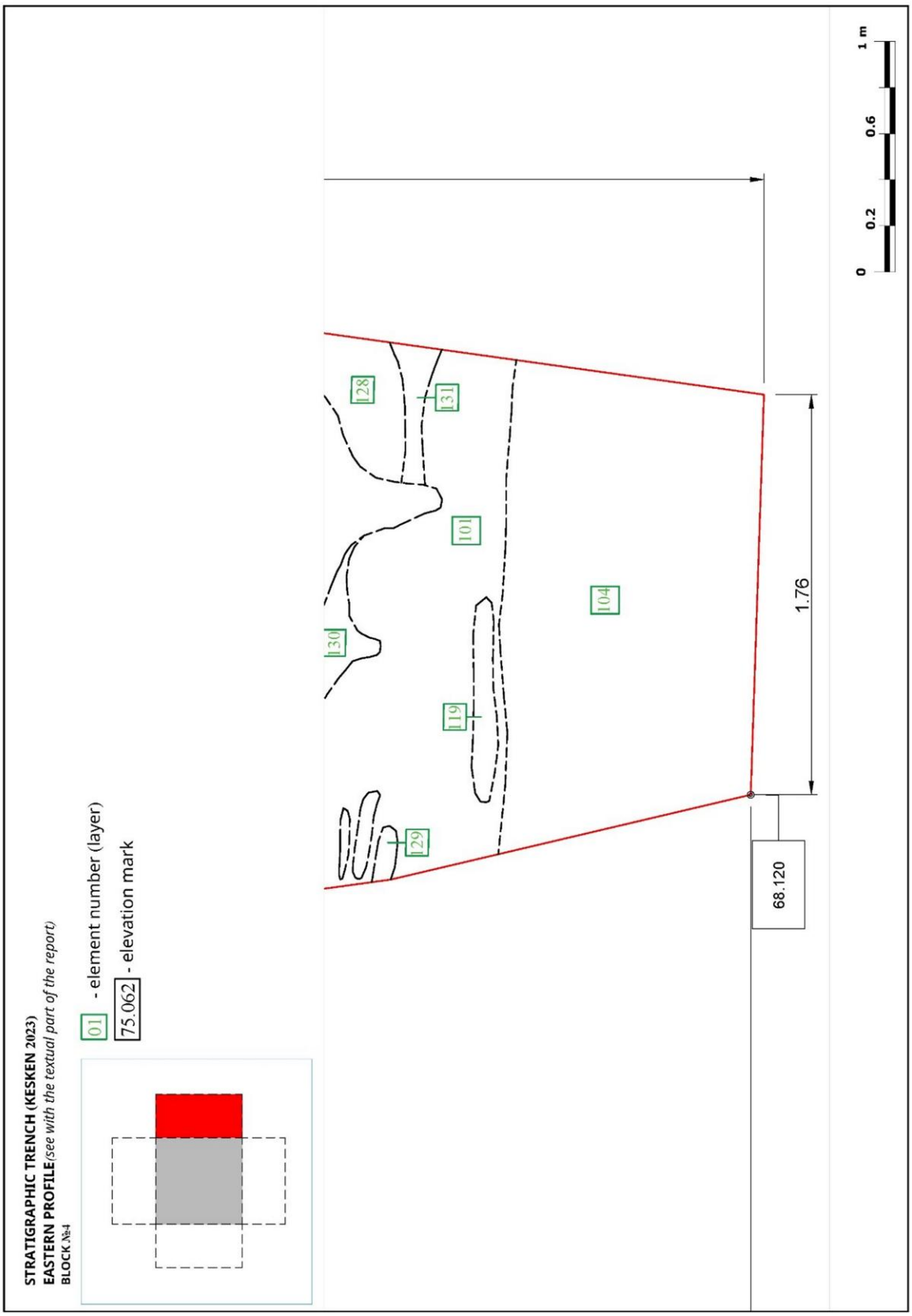


Figure B.9 – Eastern Stratigraphic Profile. Block No.4

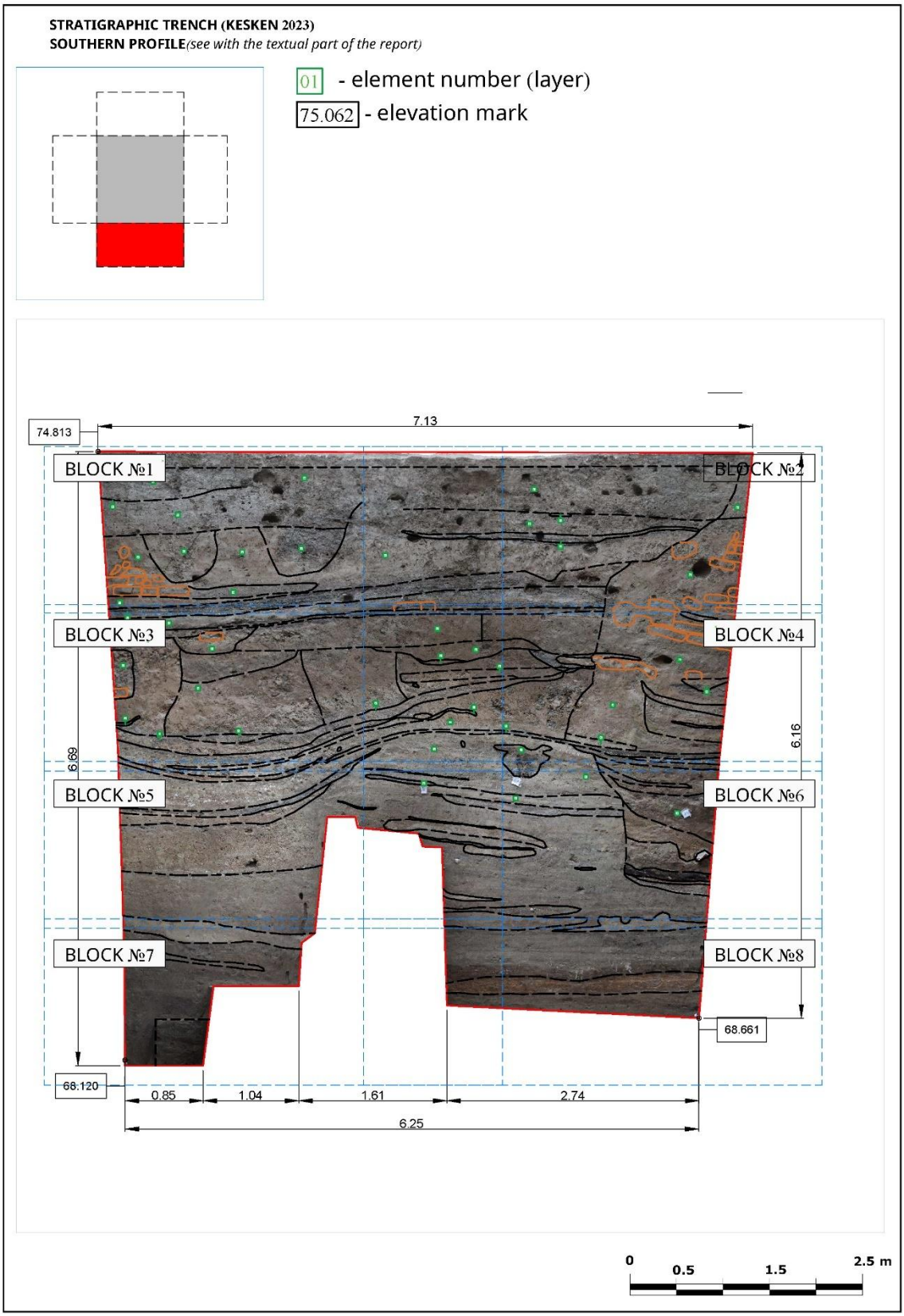


Figure B.10 – Southern Stratigraphic Profile. General View

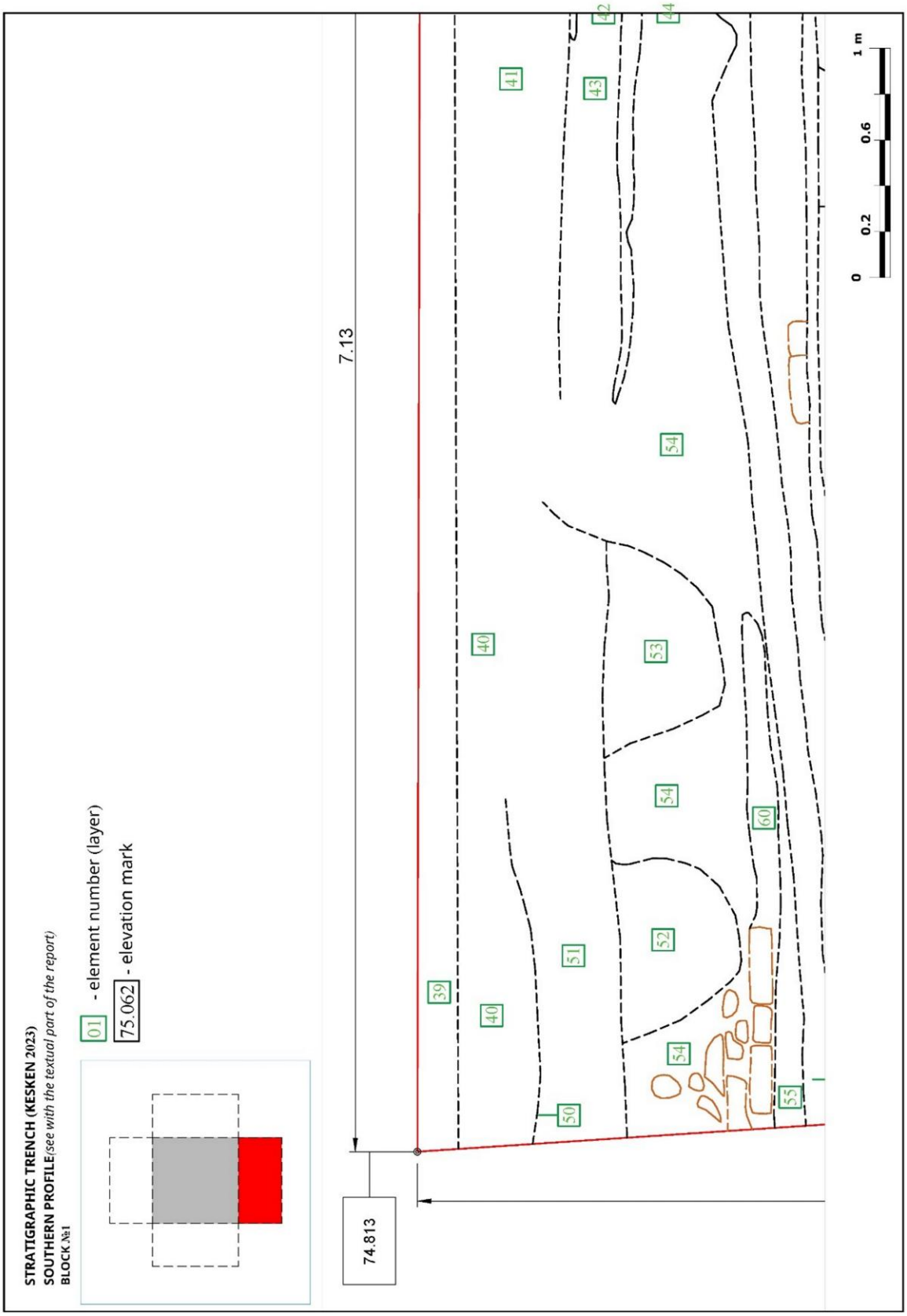


Figure B.11 – Southern Stratigraphic Profile. Block No.1

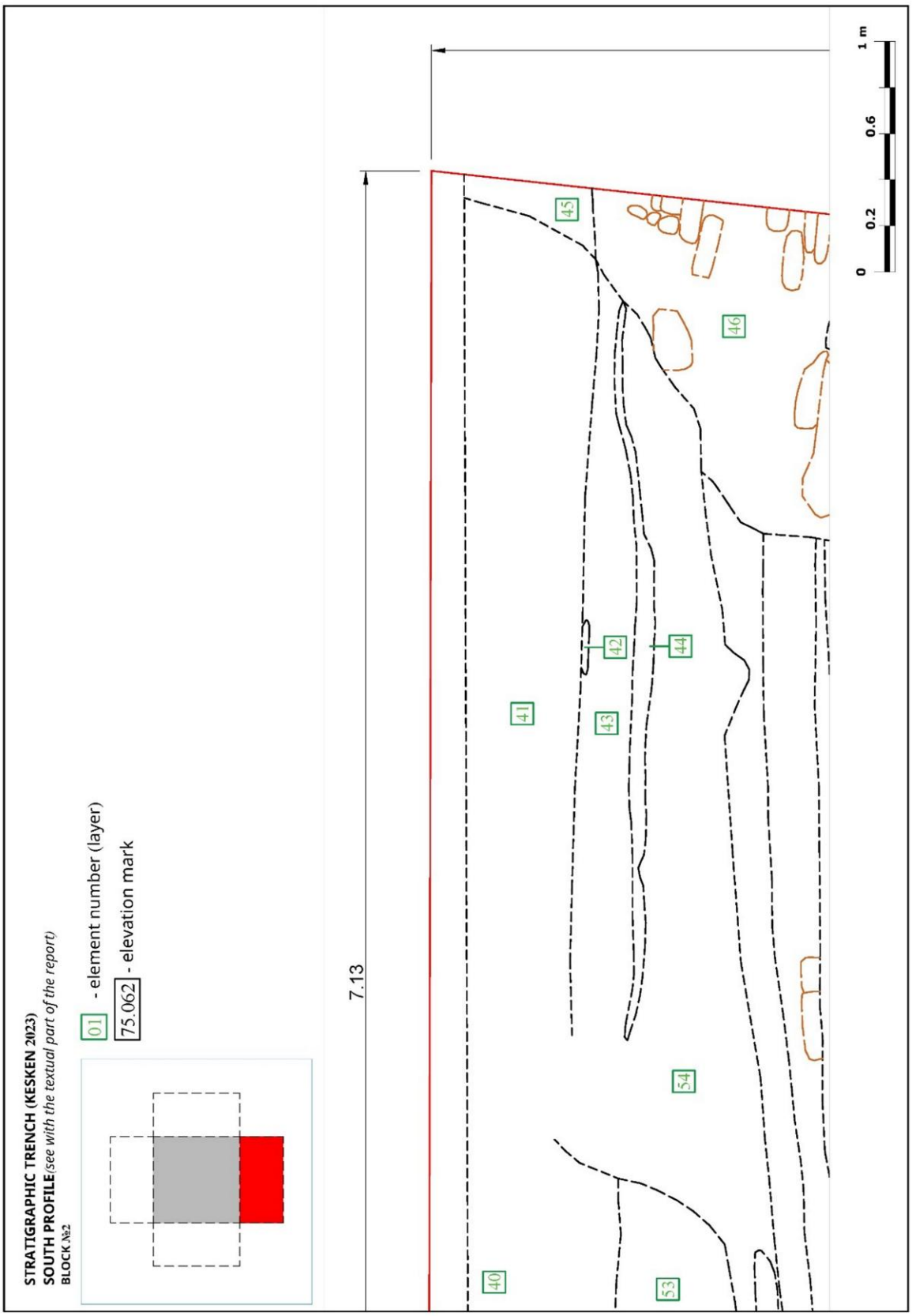


Figure B.12 – Southern Stratigraphic Profile. Block No.2

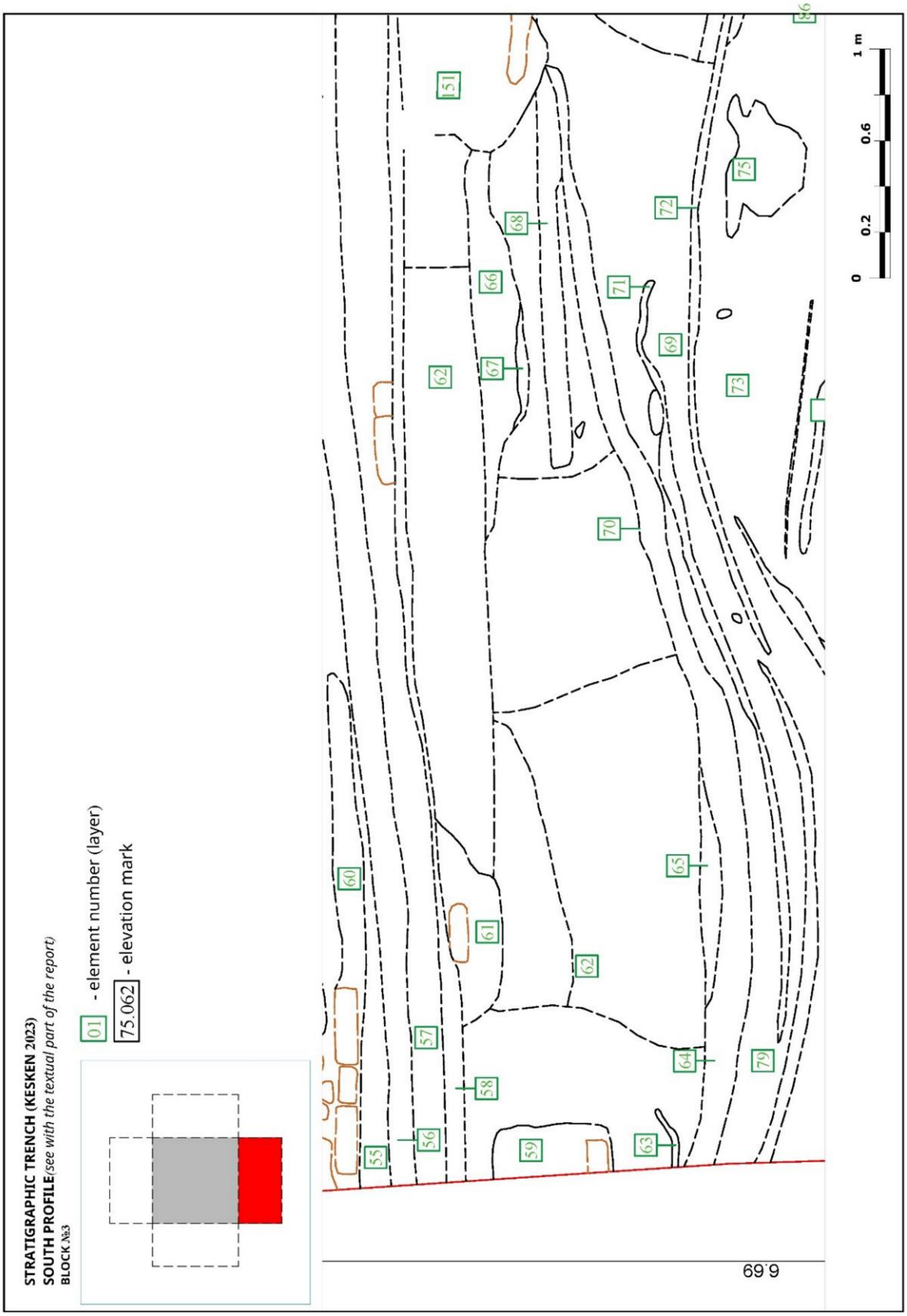


Figure B.13 – Southern Stratigraphic Profile. Block No.3

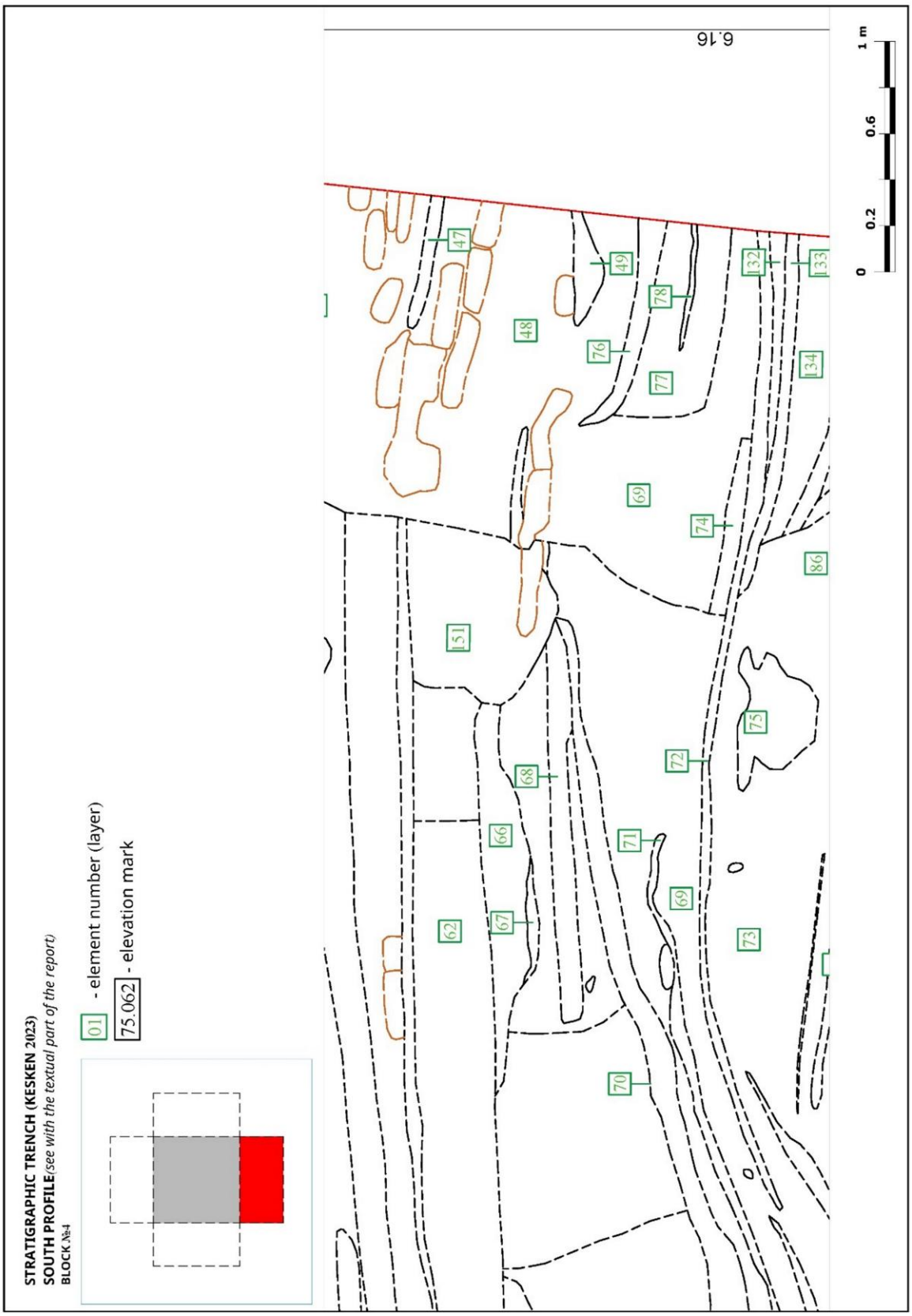


Figure B.14 – Southern Stratigraphic Profile. Block No.4

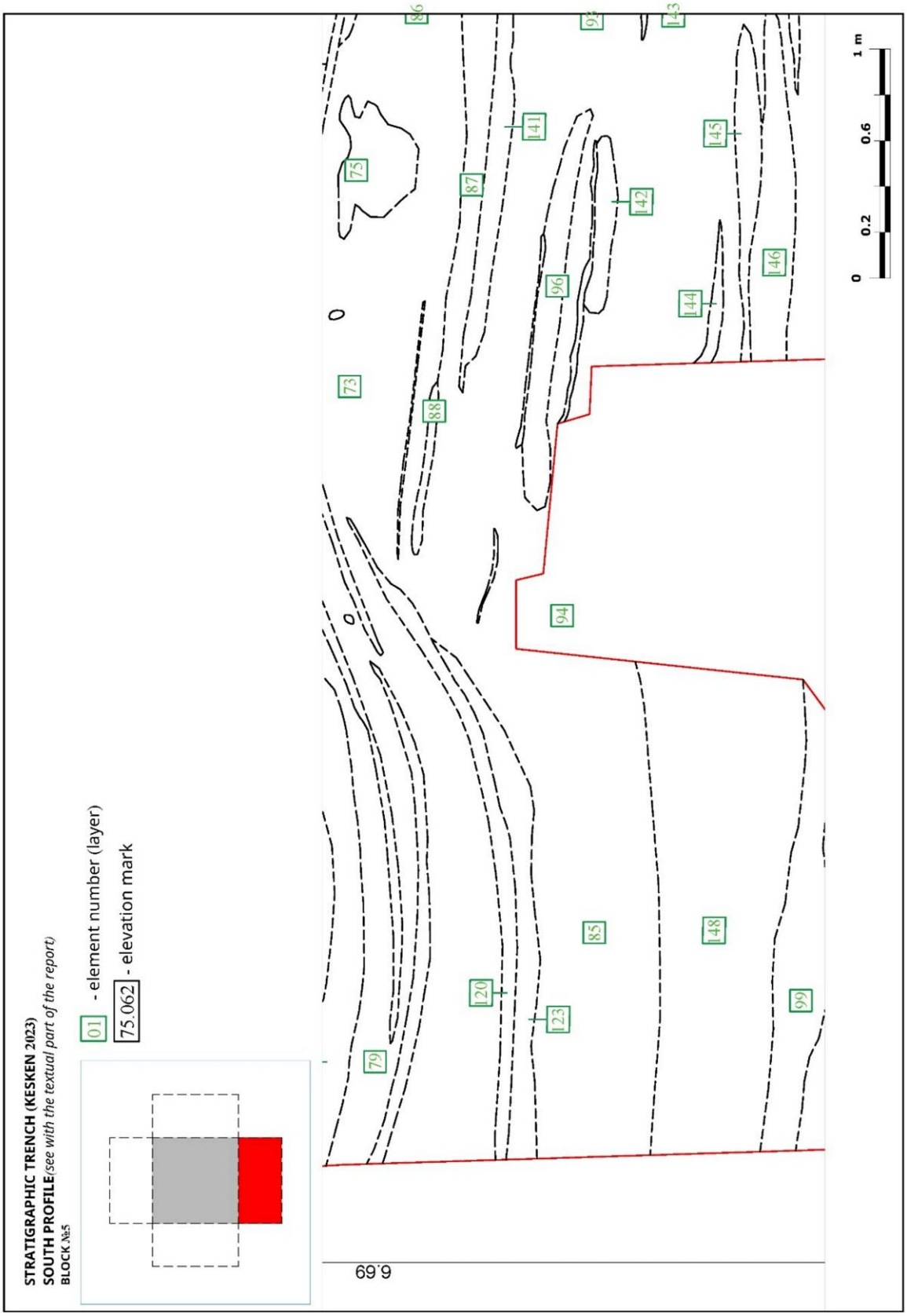


Figure B.15 – Southern Stratigraphic Profile. Block No.5

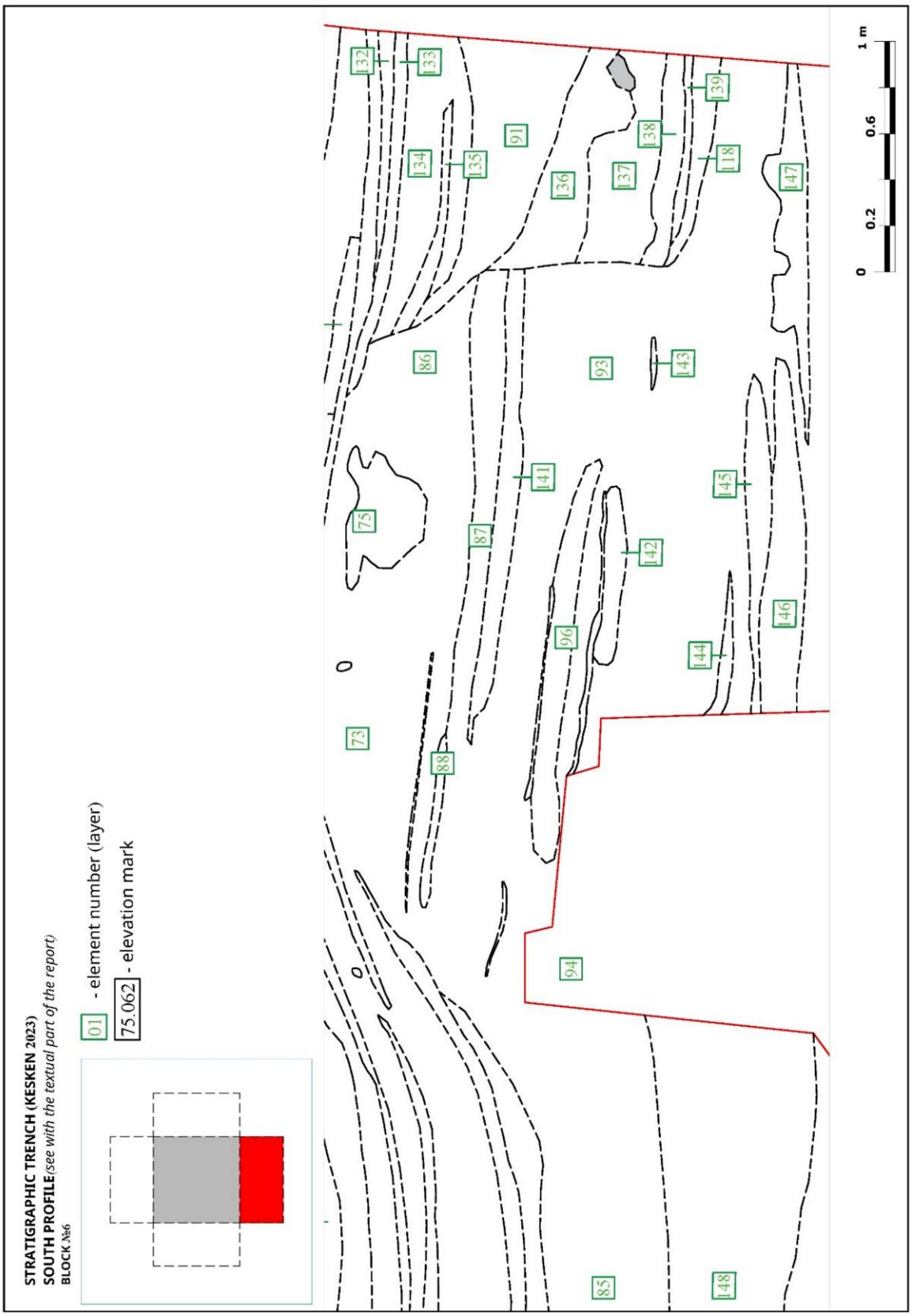


Figure B.16 – Southern Stratigraphic Profile. Block No.6

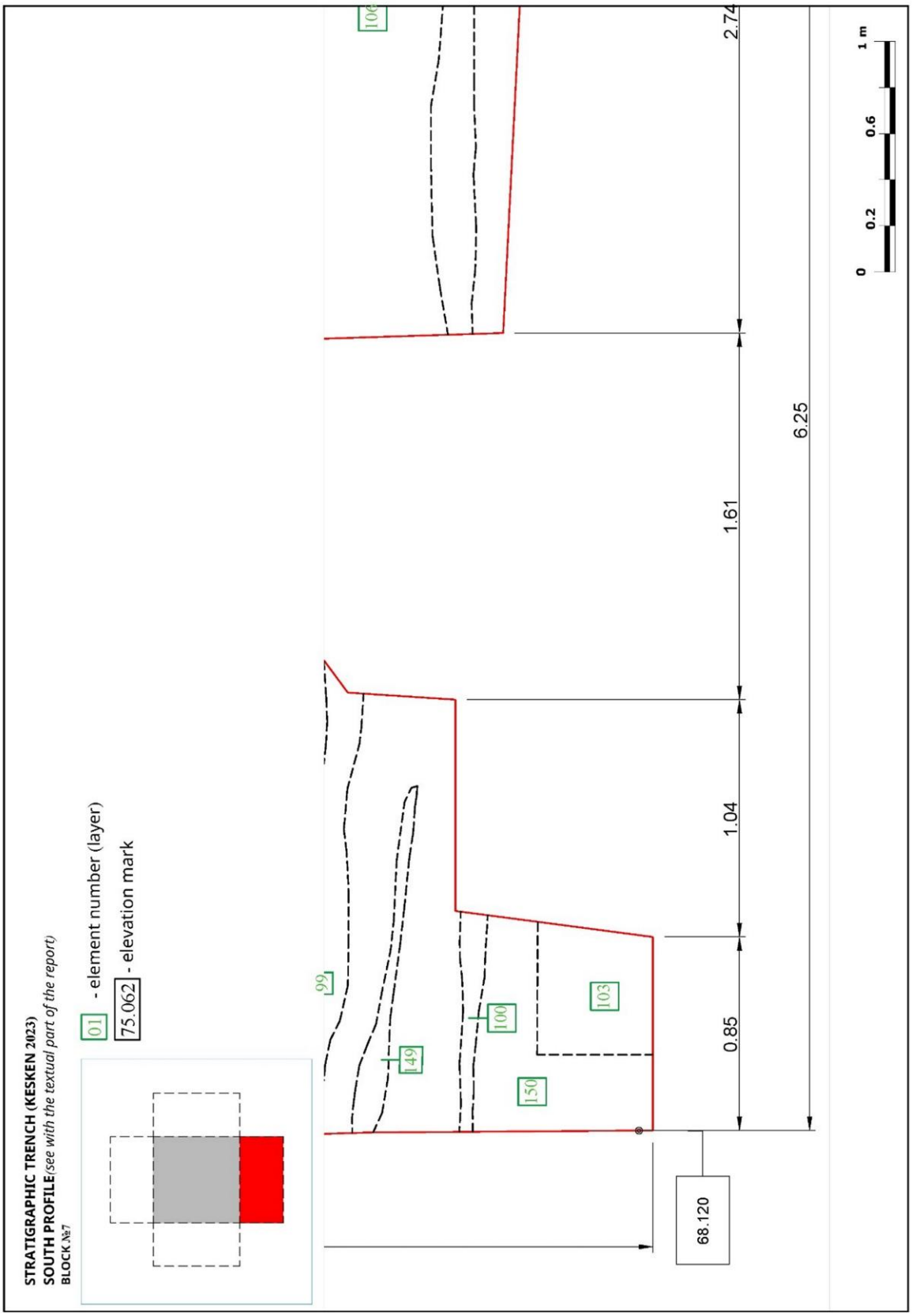


Figure B.17 – Southern Stratigraphic Profile. Block No.7

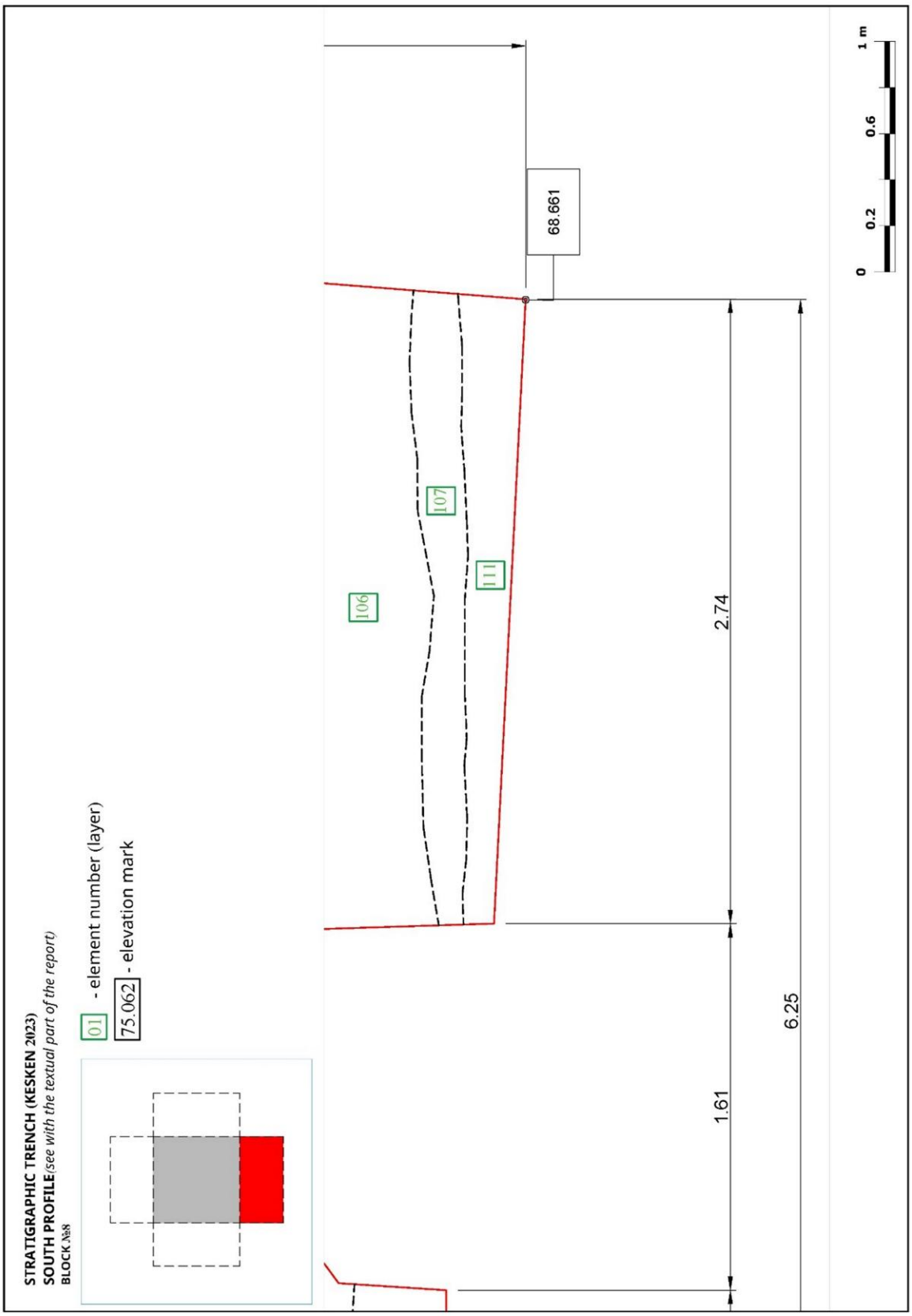


Figure B.18 – Southern Stratigraphic Profile. Block No.8

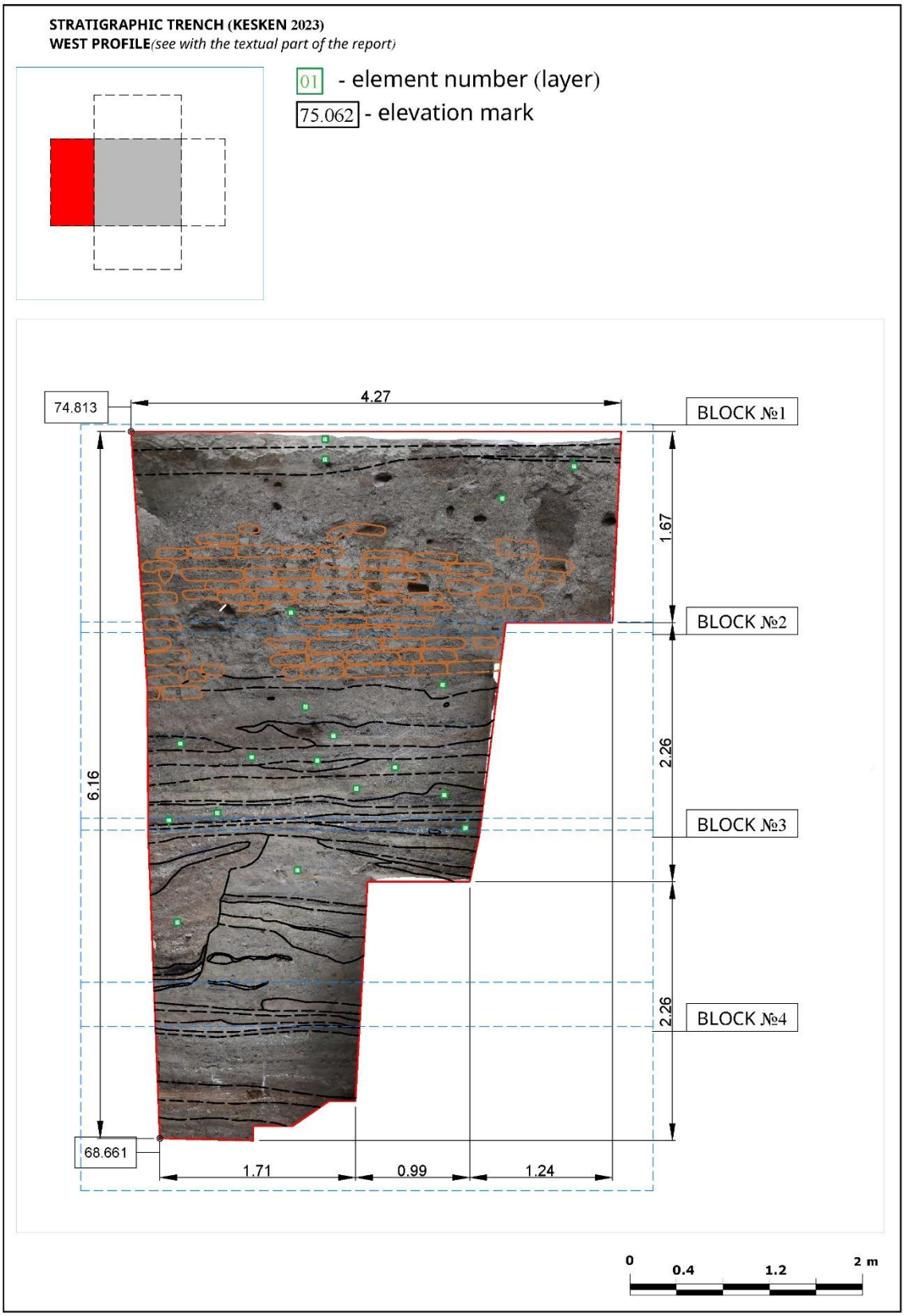


Figure B.19 – Western Stratigraphic Profile. General View

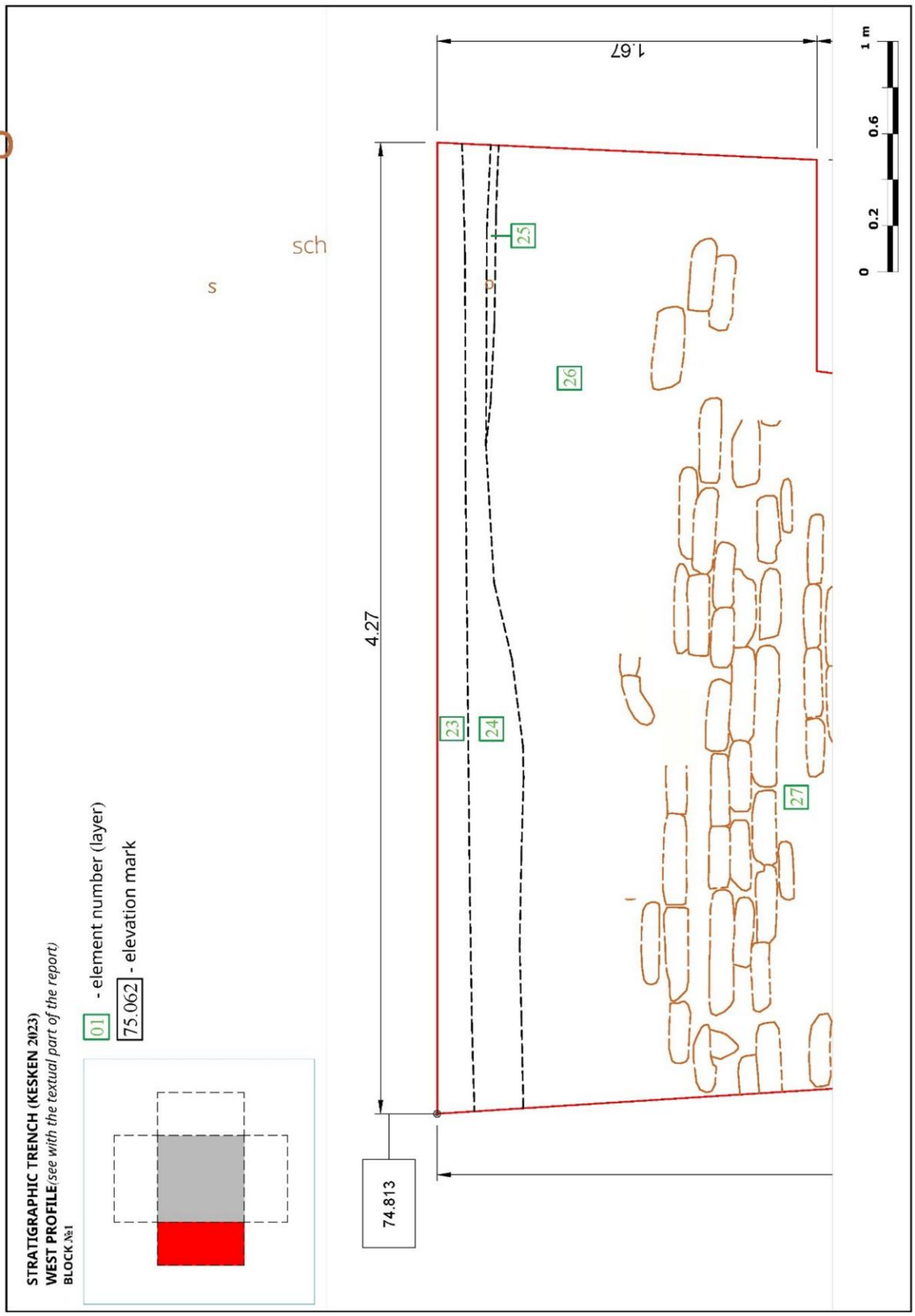


Figure B.20 – Western Stratigraphic Profile. Block No.1

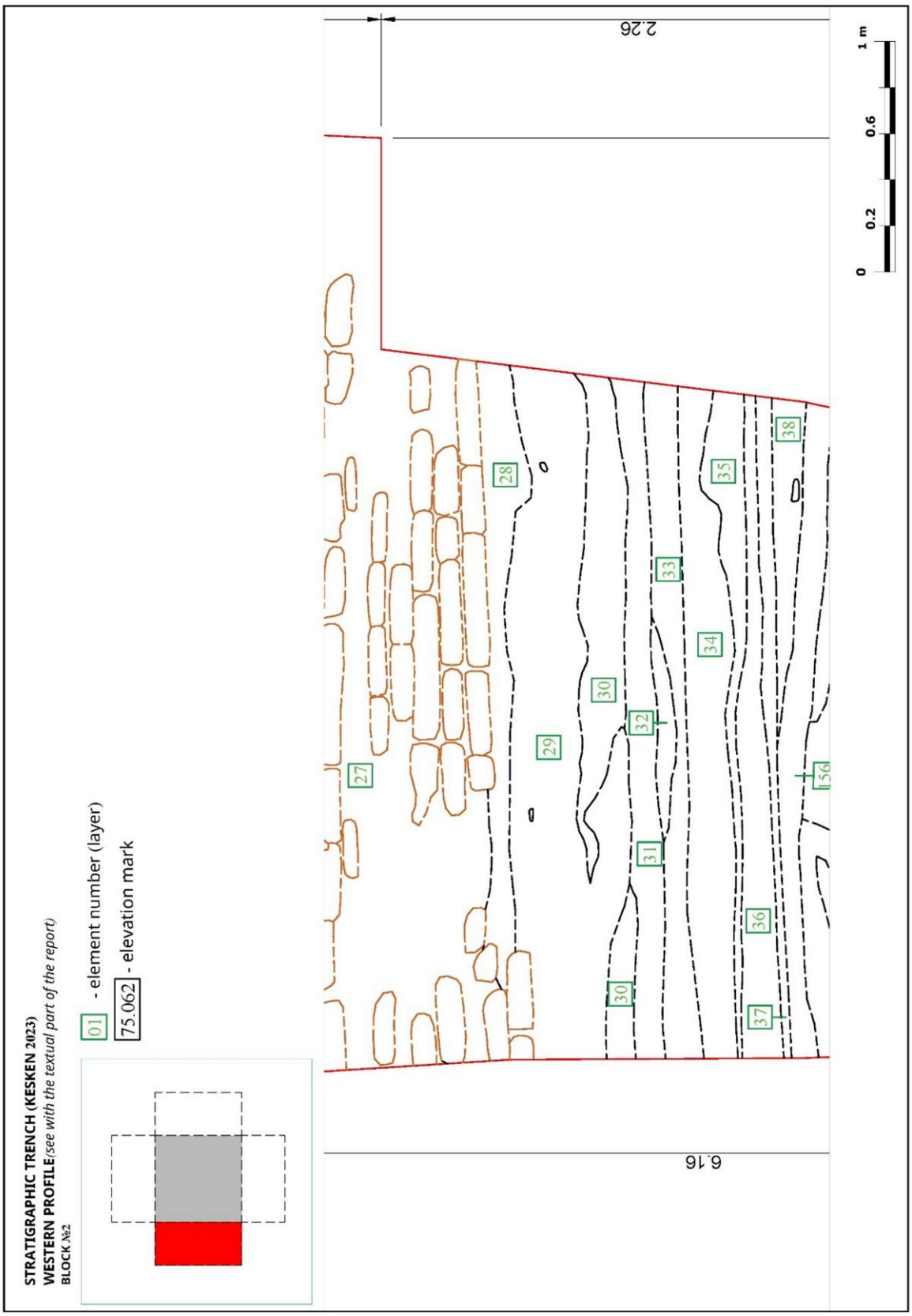


Figure B.21 – Western Stratigraphic Profile. Block No.2

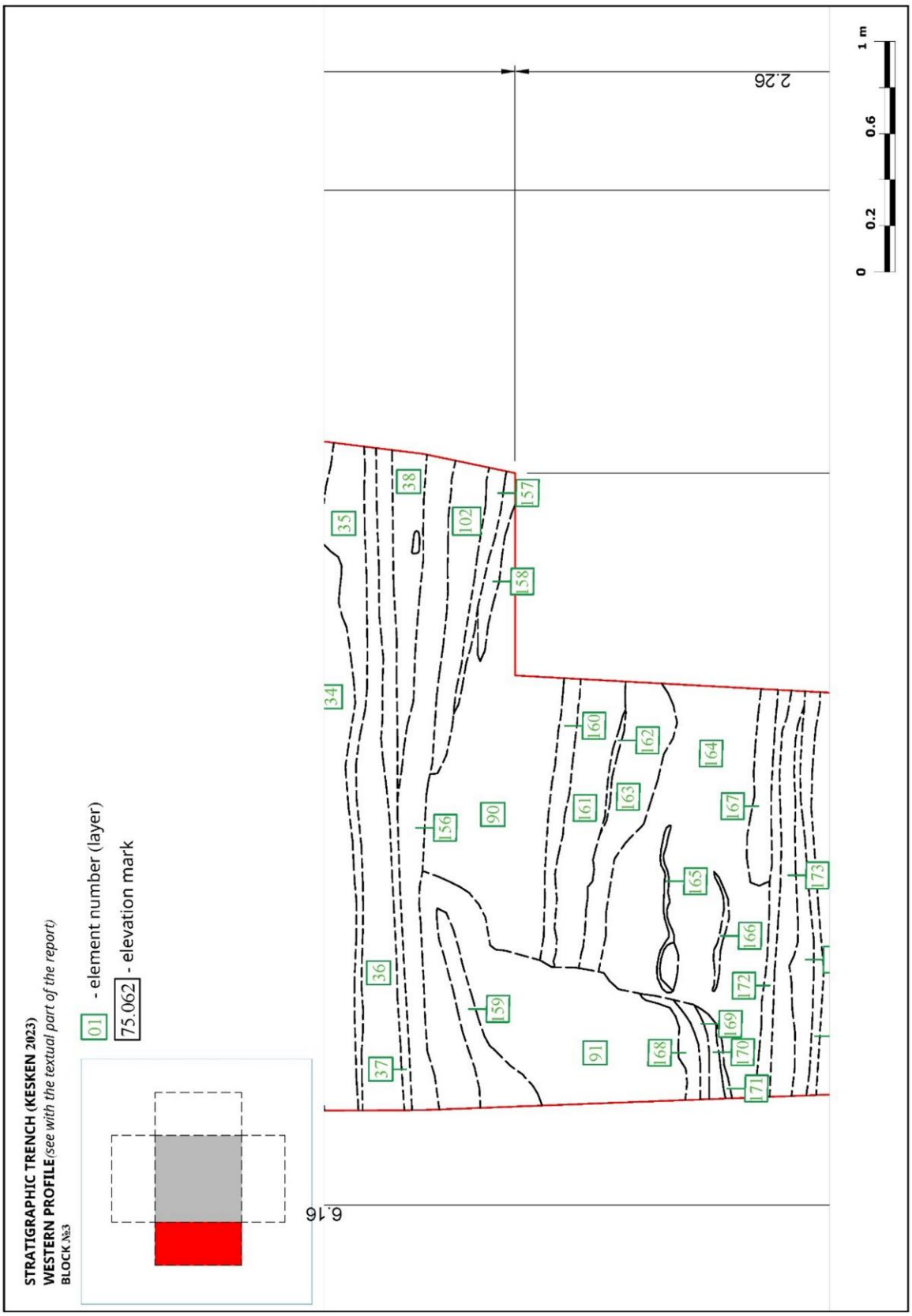


Figure B.22 – Western Stratigraphic Profile. Block No.3

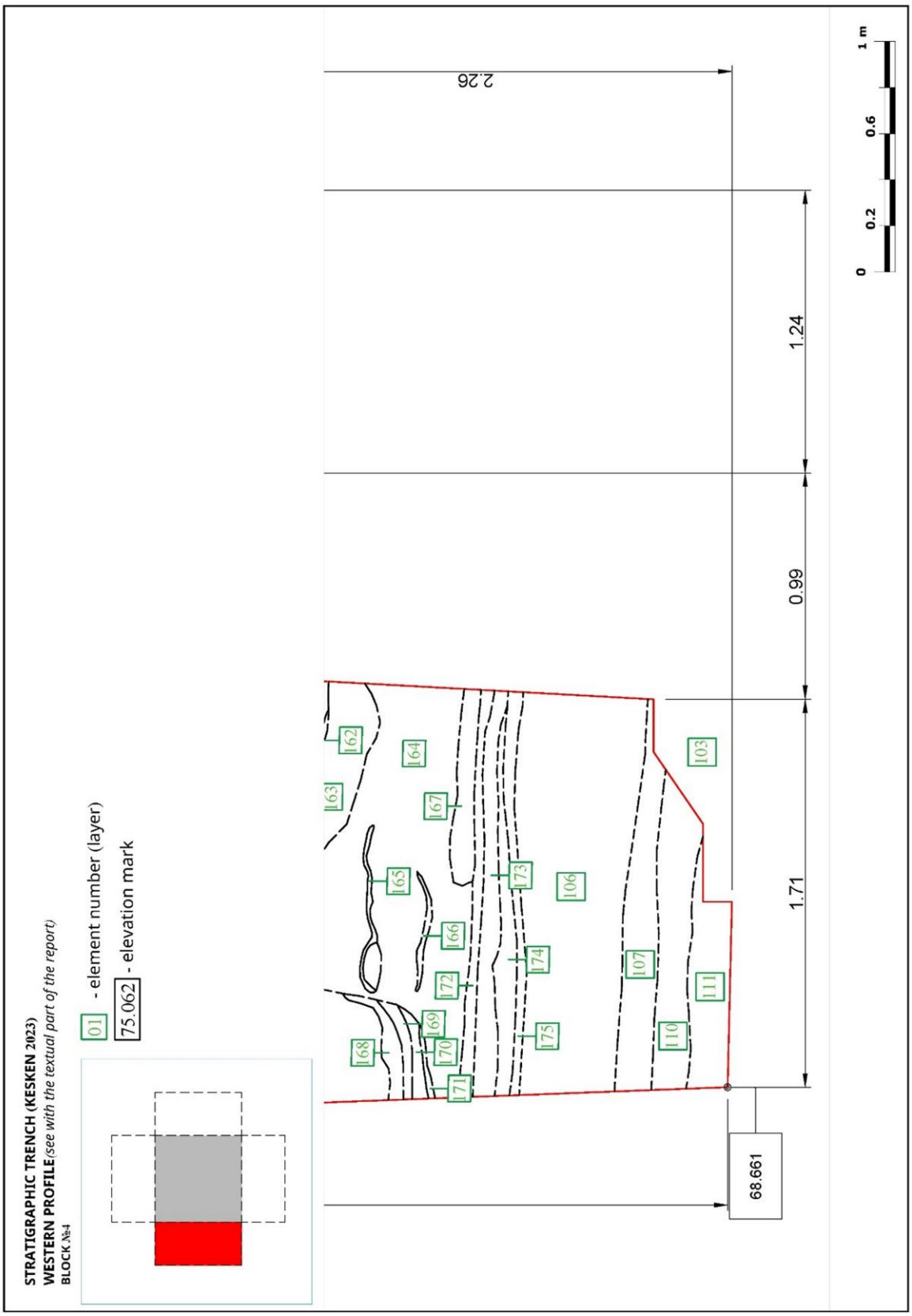


Figure B.23 – Western Stratigraphic Profile. Block No.4

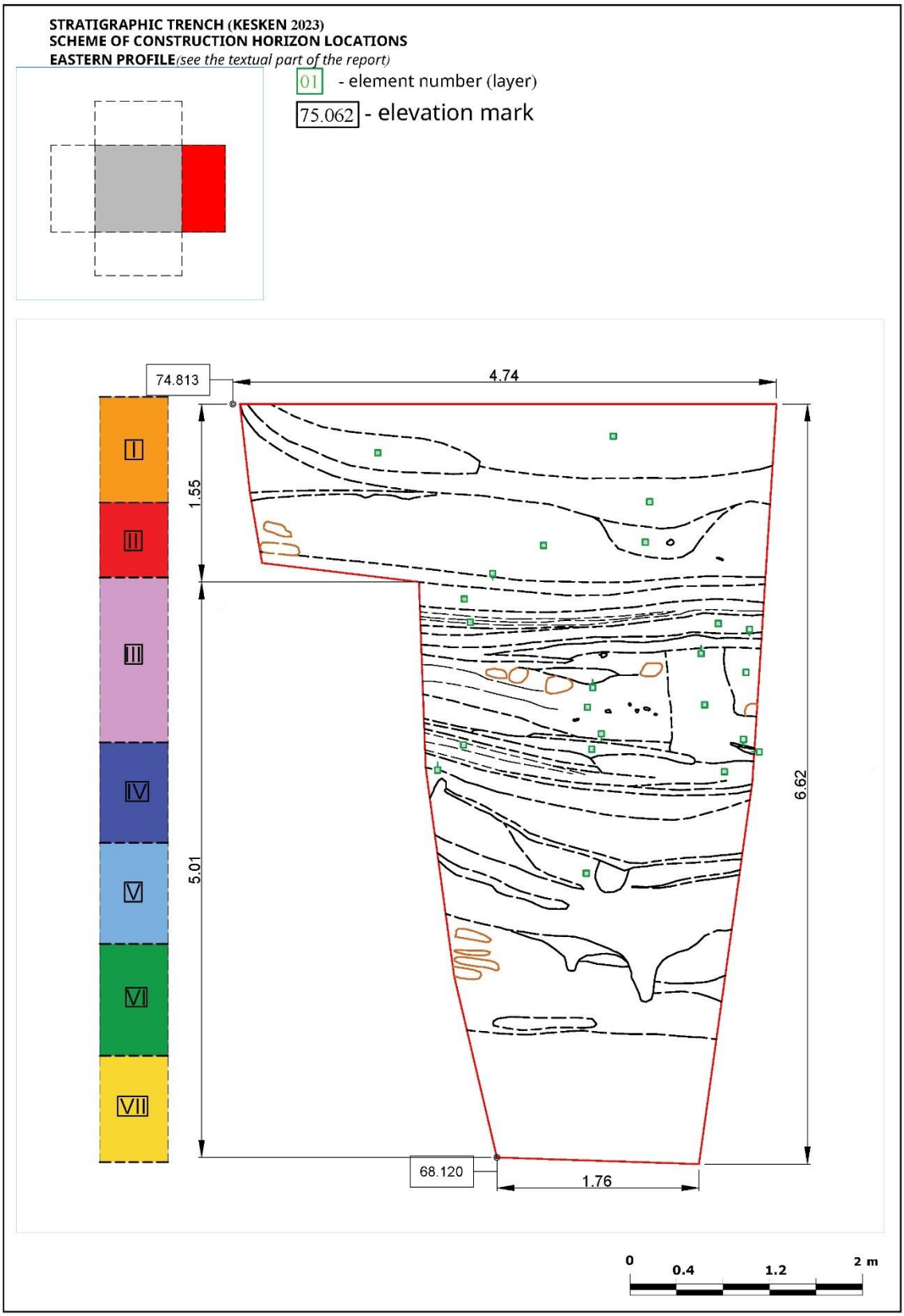


Figure B.24 – Eastern Stratigraphic Profile. Diagram with Horizons

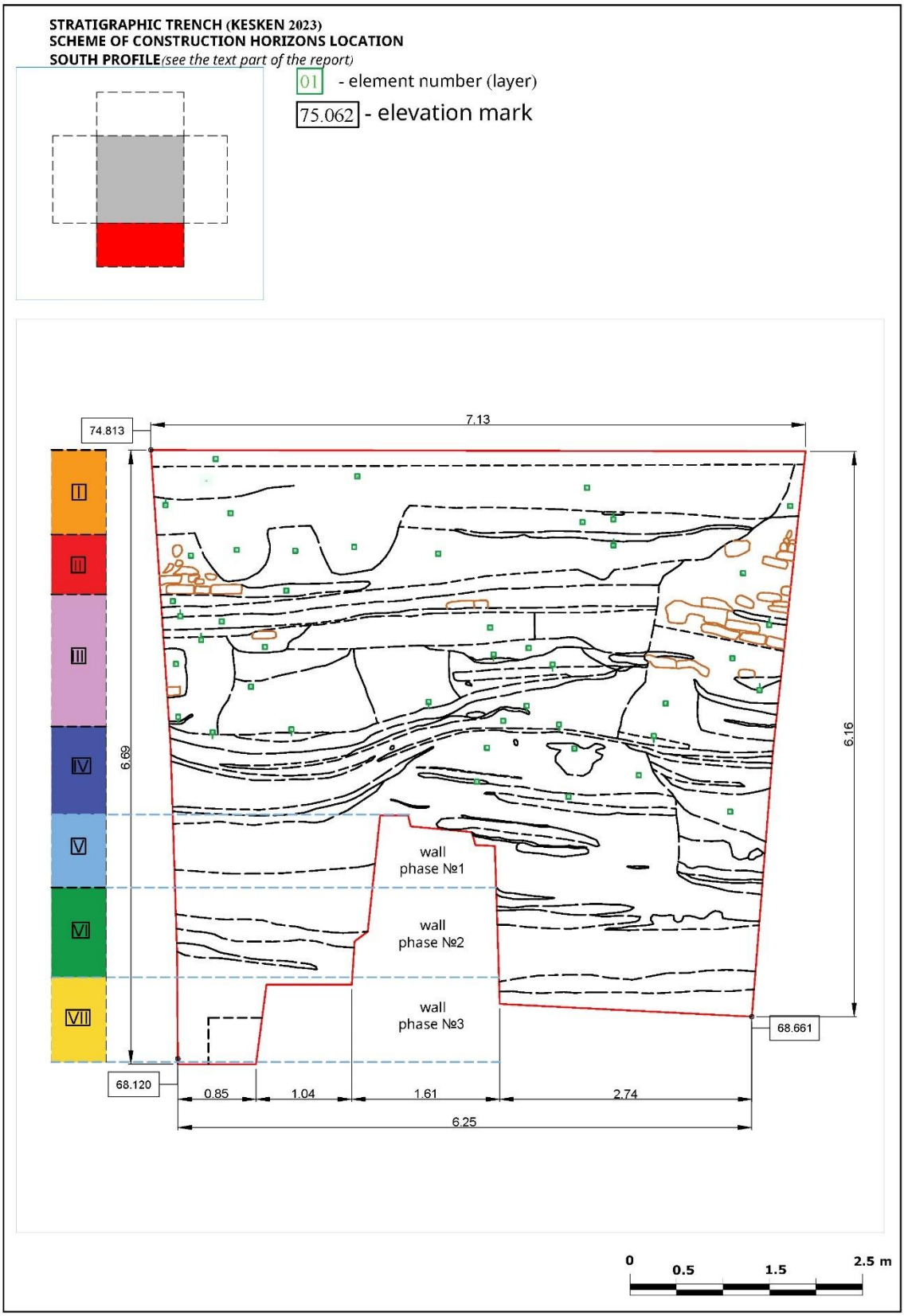


Figure B.25 – Southern Stratigraphic Profile. Diagram with Horizons

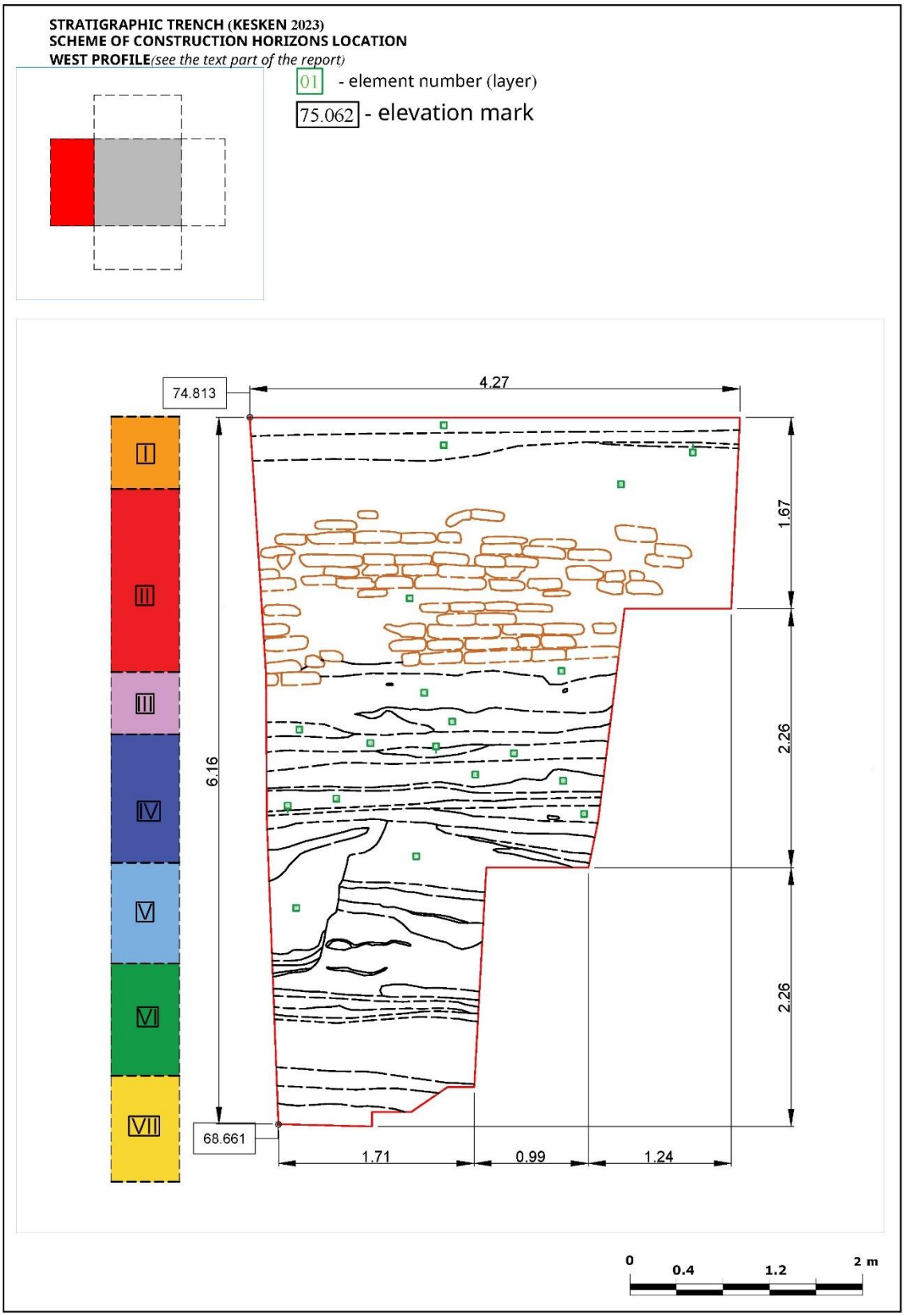


Figure B.26 – Western Stratigraphic Profile. Diagram with Horizons

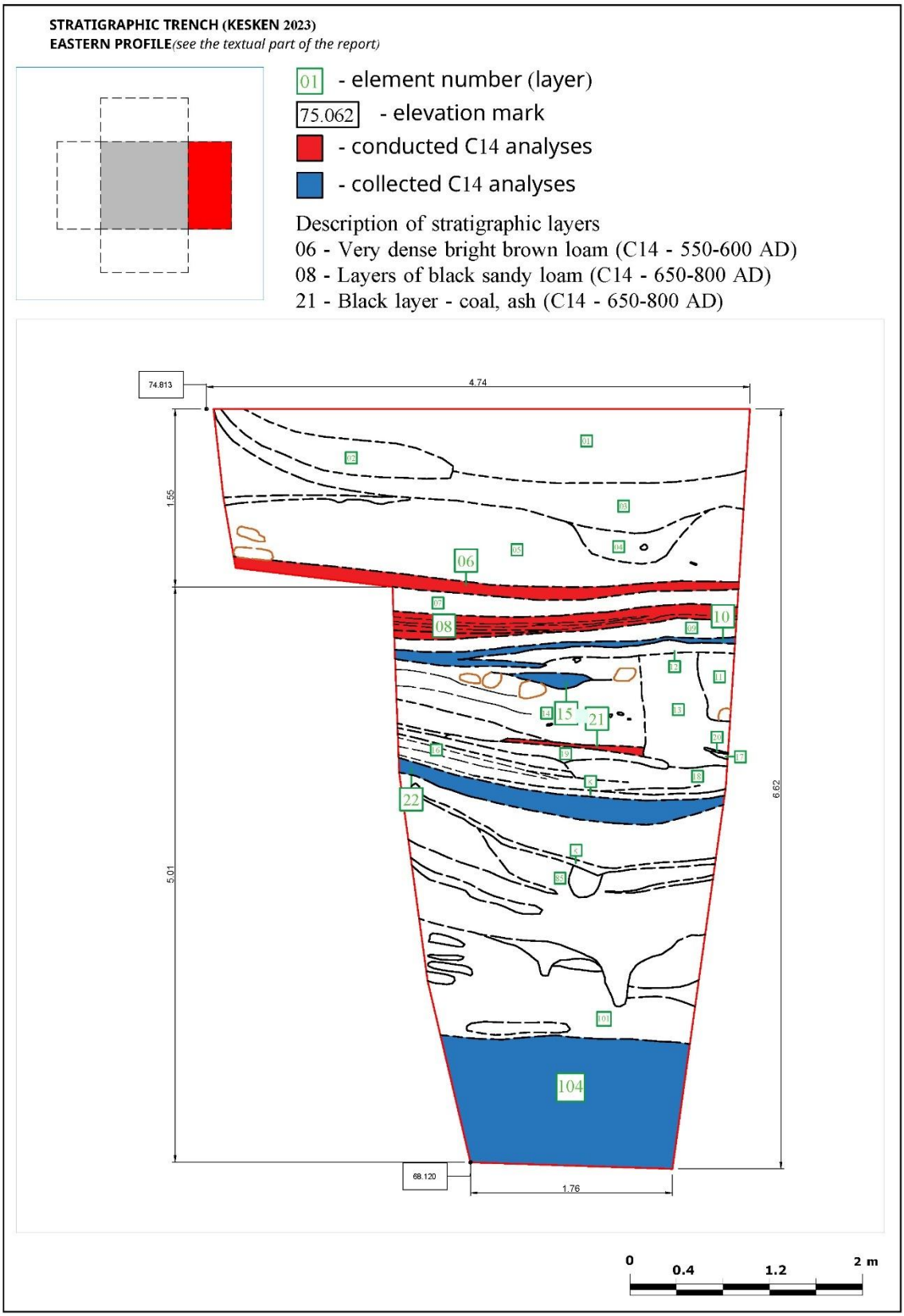


Figure B.27 – Eastern Stratigraphic Profile. Schematic with sample location

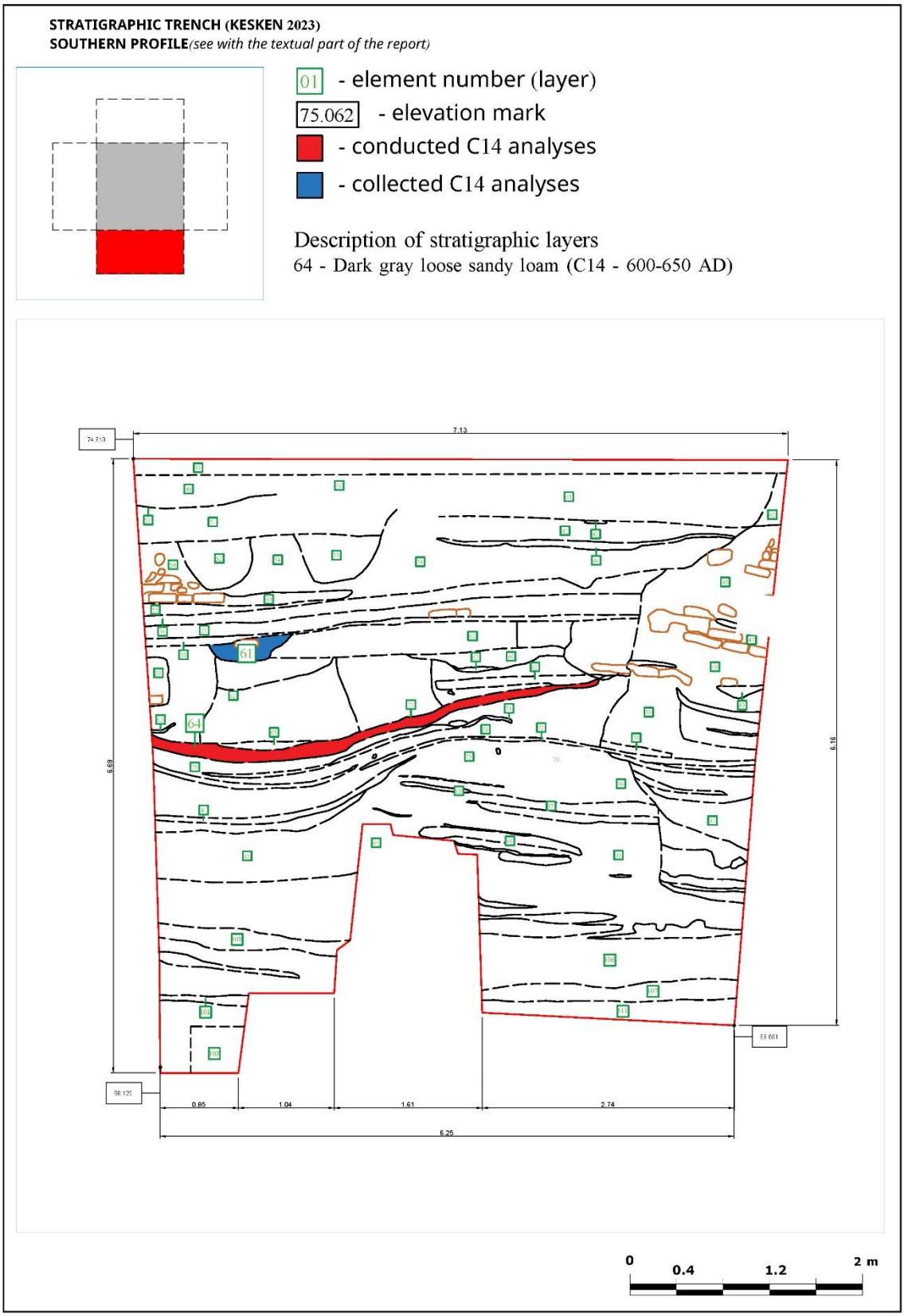


Figure B.28 – Southern Stratigraphic Profile. Schematic with sample location

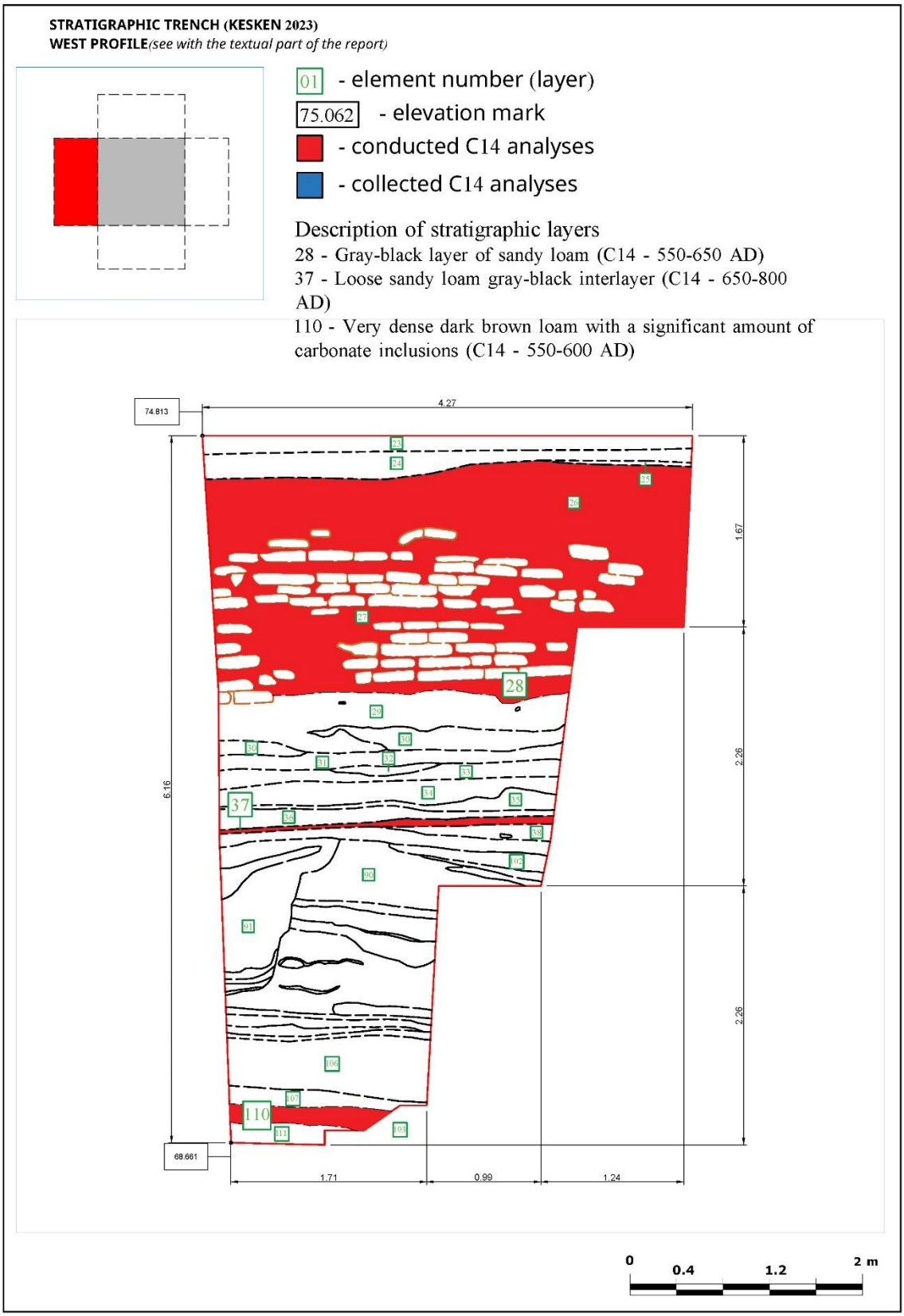


Figure B.29 – Western Stratigraphic Profile. Schematic with sample location

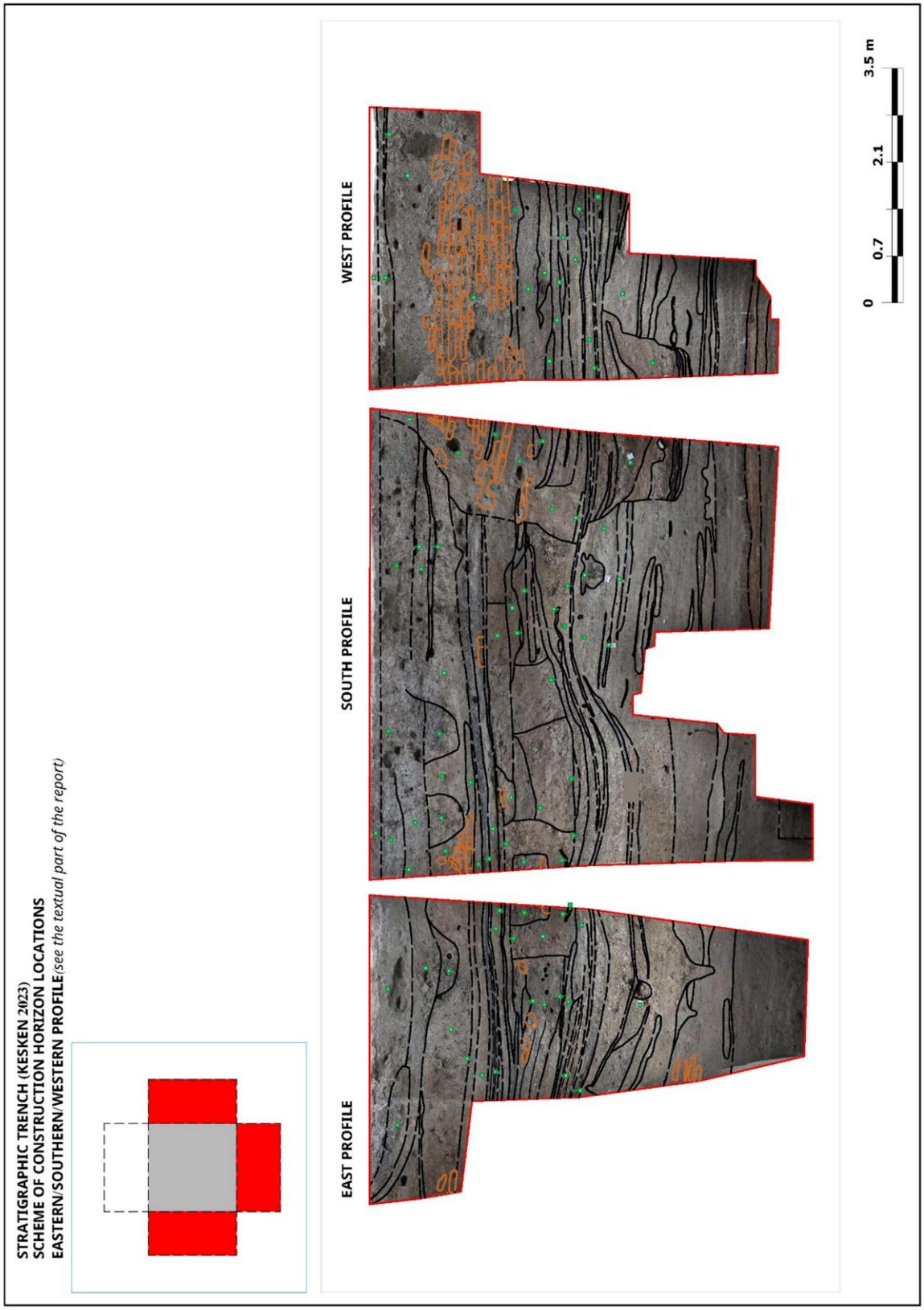


Figure B.30 –Stratigraphic Profile. General scheme

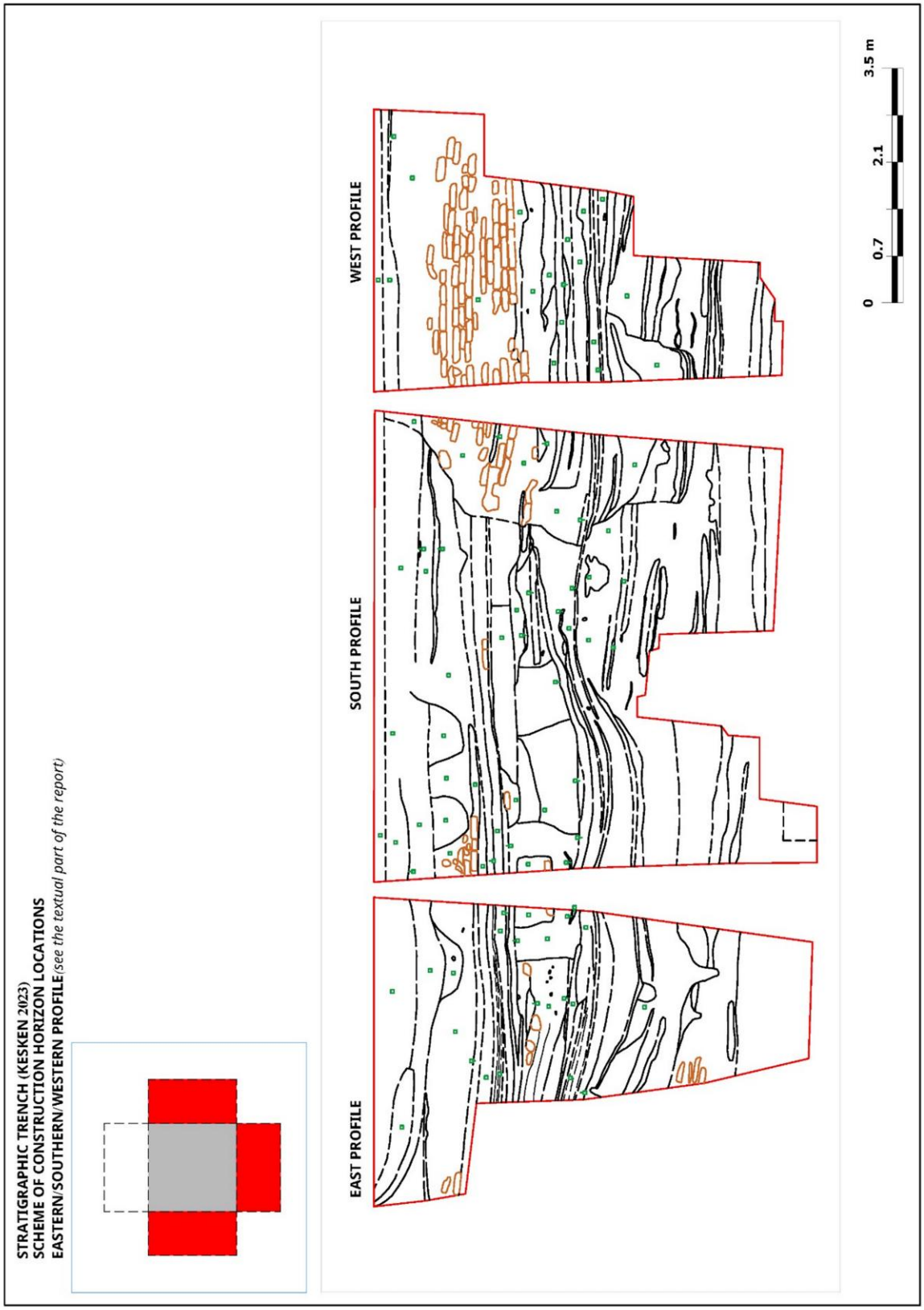
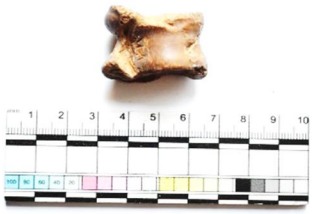
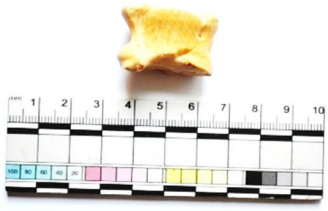
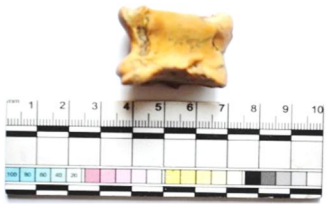
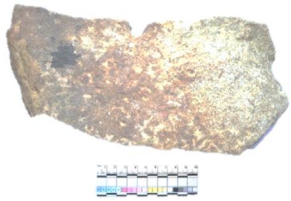


Figure B.31 –Stratigraphic Profile. General scheme

APPENDIX B
Collection Inventory

No.	Artifact Codes	Name and Description of the Item	Photograph
		Area B	
1	Game Asyk Ks-23-01-78-01	The game asyk was discovered during the clearing of the fill. The asyk is painted with a reddish-brown paint, with incisions made by a sharp tool, creating a specific ornament. Date and Time of Discovery: 10/04/2023 at 10:17 AM. Made from bone using the incision polishing method. Size 3.4x2.2x1.9 cm. Weight – 8.4 g.	
2	Game asyk. Ks-23-01-85-01	Game asyk. During the clearing of the fill, a saiga asyk was discovered, marked with notches made by a sharp tool, creating a rhomboid pattern. Date and time of discovery: 10/6/2023 at 08:03. Made from bone using the incision polishing method. Size 3x1.9x1.7 cm. Weight – 7.74 g.	
3	Game asyk. Ks-23-01-85-02	During the clearing of the fill at level 31.722, a possible gaming knucklebone was found. Size 3.5x2.2x2 cm. Weight – 12.5 g. The find was assigned the field number Ks-23-01-85-02. Date and time of discovery: 10/6/2023 at 09:27. Made from bone using the incision polishing method. Tool size 17x7.5-9x9.5 cm. Conical groove 13.5 cm long, 3.2 cm wide. Depth 1.2-1.5 cm.	

No.	Artifact Codes	Name and Description of the Item	Photograph
4	Fragment of a stone millstone. Ks_23_1_85_5	A fragment of a stone millstone was found in the fill of a garbage pit. Part of the millstone is chipped. A drilled hole is observed in the central part. Wide in the form of a depression on the surface, the hole narrows in the center and then widens on the opposite side. The surface is uneven, rough, covered with brown iron oxides. The fragment of the stone millstone is in satisfactory condition. Date and time of discovery: 6.10.2023 at 11:27. Made by casting and rolling method. Size 27.5x9-12.5x5.4 cm. The diameter of the drilled hole is 1-2.7 cm. Weight – 3125 grams.	
5	Fragment of a bone overlay Ks_23_1_90_2	rectangular in shape, made from the tubular bone of an animal, by sawing and grinding method. Date and time of discovery: 6.10.2023 at 9:10. Sawing, turning, grinding. The size of the bone overlay: 3.7x3.1x0.2-0.8 cm. Weight – 10.75 g.	

No.	Artifact Codes	Name and Description of the Item	Photograph
6	Copper coin. Ks-23_1_0_1	The copper coin was found during the survey of the settlement on the surface of the rabat. The coin is partially covered with green oxide. On one side of the coin, a tamga in the form of a trident stand can be traced, with an inscription in the Khorezmian alphabet visible along the edges. On the reverse side, an image of the ruler's head is visible. The coin was minted by the local ruler of the Kerder region, Khosro. The coin dates back to the early 8th century AD. Date and time of discovery: 3.10.2023 at 10:40. Made of copper by smelting and minting. Diameter 2.6 cm. Weight – 2 g.	
7	Onyx bead. Ks-23_1_0_3	The bead was found during the survey of the settlement on the surface in the northwestern part of the shahristan. The bead is made of a multi-layered semi-precious stone – onyx (chalcedony). The surface of the bead is polished. Onyx bead of cylindrical octagonal shape, black-brown-gray in color. The width of the bead's facets varies. A through hole is drilled along the entire length of the bead. Date and time of discovery: 10/2/2023 at 10:12. Made using sawing, drilling, faceting, grinding, and polishing. The width of the bead's facets varies from 0.4 to 0.8 cm. Height 3.3 cm, width 1.3-1.5 cm. Through hole, diameter 0.2 cm. Weight – 13.6 g.	

APPENDIX G
Description of the ceramic complex

Unglazed fragments of ceramic vessels and items

Ks-23_1_0

Lid

A fragment of a ceramic molded item was found, presumably the upper part of a lid, made of well-kneaded dense clay of a light orange-beige color, with minor visible inclusions of small sand particles in the break. The surface of the item is burnished and covered with a dark, almost black slip, with a glossy burnish; due to uneven firing, the color of the clay varies significantly from beige to gray. The upper part of the lid has a round indentation, inside which two intersecting straight lines are drawn, and there is also a through hole with a diameter of 0.4 cm in the central part of the circle. The inside of the lid is not smoothed in any way, has an uneven rough surface, the edges of the lid are not preserved, the wall at the edge has a visible break, the thickness of the lid is 0.6-0.8 cm.

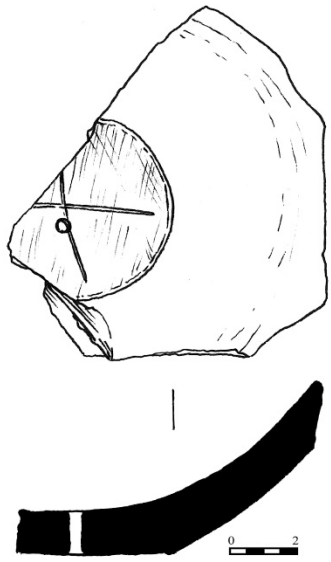


Figure G.1 - Ks-23_1_0_1

Other

A round ceramic item was discovered, presumably a spindle whorl blank. The item is made from the wall of a vessel composed of well-mixed dense gray clay, with minor visible inclusions of small sand particles and mica in the fracture. The inner surface is partially covered with a layer of red slip with a pinkish hue, while the outer surface shows a coating of light slip and burnishing without gloss. On the inside of the fragment in the central part, there is a recess

with a diameter of 0.5 cm, the edges of the spindle whorl are processed – smoothed, the size of the item is 3.4x3.6 cm, the thickness of the item is 1.8 cm.

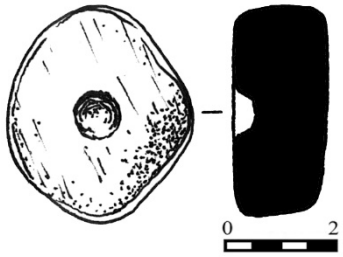


Figure G.2 - Ks-23_1_0_2

Ks-23_1_85

Rims

A fragment of a rim from a molded vessel was discovered, presumably part of a high neck from a jug (jar-shaped vessel). The fragment is made of medium-mixed loose gray clay, with multiple visible inclusions of small and large sand particles in the fracture. The inner surface is covered with a layer of gray slip, with visible traces of soot. The outer surface is covered with a partially preserved dense layer of beige slip, on top of which dark slip spots are applied. The rim of the vessel has a high straight neck, 4.6 cm in height, with slightly outwardly bent edges of an oval cross-section. On the outside, in the central part of the neck, there is an attached protrusion of a sub-triangular shape, approximately 5.2 cm wide and 1.2 cm thick. The edge of the protrusion is slightly raised upwards, with a sub-rectangular cross-section, presumably a pseudo-handle. Additionally, the entire outer surface of the neck is decorated with alternating inclined zigzag lines, drawn horizontally one above the other. The diameter of the rim is approximately 17 cm, and the wall thickness is 1-1.5 cm.

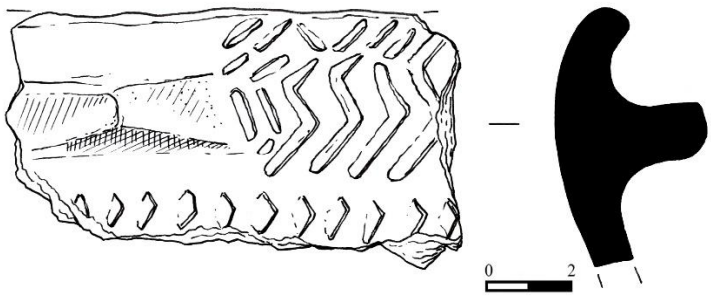


Figure G.3 - Ks-23_1_85_1

A fragment of the rim from a molded vessel, presumably a pot, was found. It is made of medium-mixed loose gray clay, with numerous visible inclusions of small and large sand particles in the break. The surface of the vessel on the outside is covered with a layer of gray slip, while the inside surface is burnished to a shine and shows traces of soot and smoke. The

rim is slightly flared outward, with edges that are flattened-oval in cross-section. Below the rim, there is a bead-like protruding line running around the entire diameter, on the surface of which alternating small impressed dashes are applied. The diameter of the rim is 15 cm, and the wall thickness of the vessel ranges from 0.6 to 1.3 cm.

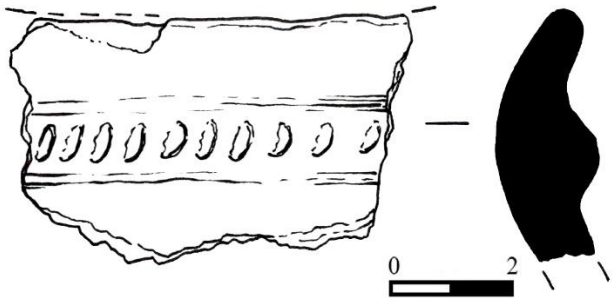


Figure G.4 - Ks-23_1_85_2

A fragment of the rim from a large molded bowl, hemispherical in shape, made of medium-mixed dense gray clay, with minor visible inclusions of small sand particles and white inclusions, was discovered. The surface of the vessel is covered with a layer of light yellow-beige slip on the inside and partially on the outside, with dark gray spots visible due to uneven firing. On the outer side, the surface is either rough and untreated, or there are traces of coating. The rim of the vessel is thickened, the edges are slightly beveled inward, forming a gentle platform 1.6 cm wide. The diameter of the rim is 33 cm, and the wall thickness of the vessel is 0.8-0.9 cm.

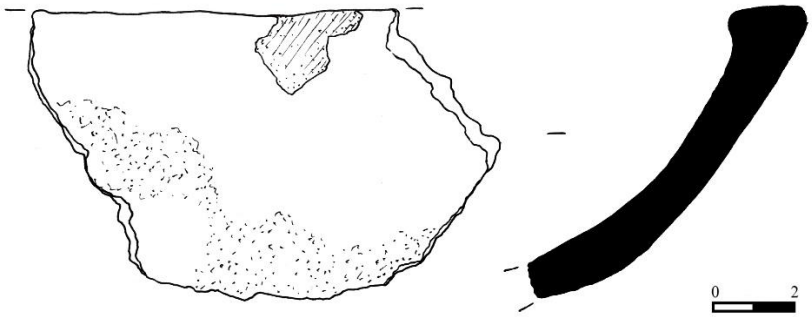


Figure G.5 - Ks-23_1_85_3

Handles

During the excavations, a fragment of the side of a molded vessel was found, with a handle attached to the side. The handle has a sub-triangular cross-section, and on the outer side, there are alternating vertical indentations along the entire surface of the back. The fragment is made of medium-mixed dense gray clay, with multiple visible inclusions of small and large sand particles, and various small inclusions. The surface of the handle is covered with a layer

of light slip, yellow-beige in shade, with dark brown spots also visible. The wall thickness is 0.8-1 cm, the handle height is 4.5 cm, the rim width is 4 cm, and the handle protrudes 3 cm outward.

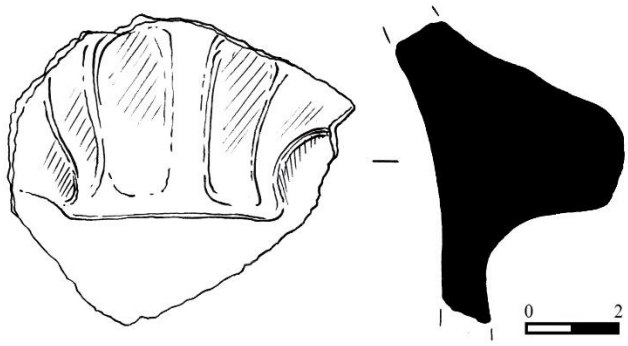


Figure G.6 - Ks-23_1_85_4

Other

A ceramic round object was also found, presumably a blank for a spindle whorl, made of dense medium-mixed brown clay, with minor visible inclusions of small sand particles and white inclusions in the fracture. The object is made from the wall of a vessel, the inner surface of which is covered with a layer of dark brown dense slip, and burnishing is also visible; the outer surface is partially covered with a layer of red-brown slip. On the inner side, there are randomly drawn intersecting straight lines, the edges of the blank are unprocessed, the wall thickness is 0.7 cm, and the size of the item is 4.2x3.6 cm.

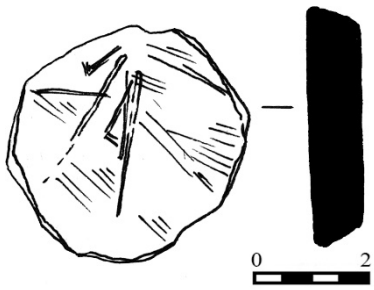


Figure G.7 - Ks-23_1_85_5

Ks-23_1_90

Rims

A fragment of the rim from a molded vessel of the wide-necked jug type was found, made of well-kneaded dense red clay, with an orange-beige tint, and with minor visible inclusions of small sand particles in the fracture. The surface on the outside and partially on the inside is covered with a light beige slip, with soot stains also visible. The rim of the vessel has a thickened outwardly projecting edge, with a flattened-oval cross-section, and the rim diameter is 19 cm. A loop-shaped vertical handle, round in cross-section, is attached to the rim edge and the shoulder, with a width of 1.6 cm, a thickness of 1.7 cm, and the height of the vessel's neck

is 5.4 cm. The shoulder of the vessel has a slightly protruding roll-shaped ornamentation extending from the lower part of the handle, with a wall thickness of 0.7-1 cm.

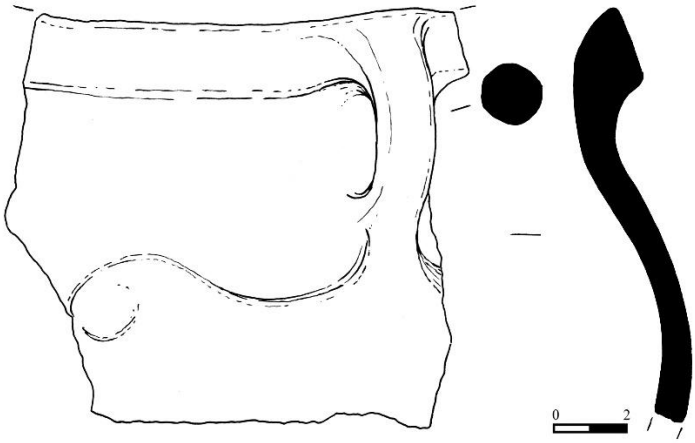


Figure G.8 - Ks-23_1_90_1

A fragment of the rim from a molded vessel of the cauldron type was also found, made of medium-mixed loose gray clay, with multiple visible inclusions of small sand particles and various other inclusions in the fracture. The surface of the fragment on the outside is covered with a layer of gray slip, while the inside surface is covered with light beige slip. Due to uneven firing, the color of the clay varies from dark gray to greenish-beige, and soot and smoke traces are also visible along the edge of the rim. The rim of the vessel has a straight, low neck, with edges that are flattened-oval in cross-section. The diameter of the rim is approximately 30 cm. Just below the lip, a protruding pseudo-handle of a sub-triangular elongated shape is attached to the side of the vessel. Its dimensions are 5x1.1 cm, the thickness of the edge is 1.4 cm, and the wall thickness of the vessel is 1-1.4 cm.

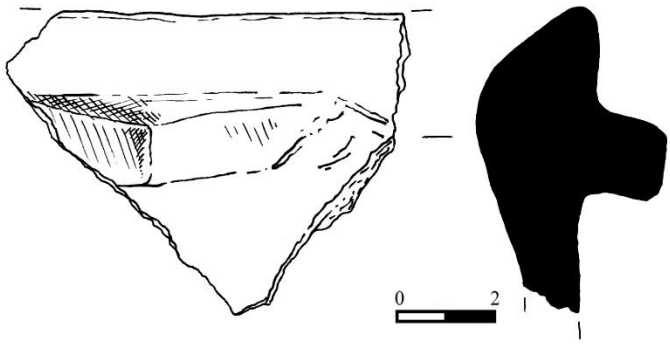


Figure G.9 - Ks-23_1_90_2

A fragment of the rim from a large thick-walled vessel of the khum type was discovered. It is made of medium-mixed dense red clay, with numerous visible inclusions of small and large particles of sand, mica, and chamotte in the fracture. The surface of the fragment on the outside is covered with a layer of light gray-beige slip, and the rim is decorated with a belt of incised zigzag lines along the edge and protruding roll-like lines around the entire diameter. The edges

of the rim are thickened, slightly slanted outward, oval in cross-section, with a diameter of 36 cm on the outside, and the wall thickness of the vessel is 2.5 cm.

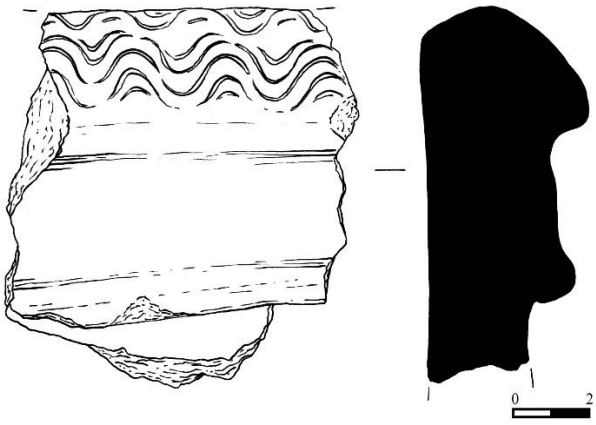


Figure G.10 - Ks-23_1_90_3

Ks-23_1_91

Rims

A fragment of a rim from a molded vessel was found, made of medium-mixed loose brown clay, with multiple inclusions of small and large sand particles and white inclusions. The surface of the fragment is covered with a dense brown-red slip on the outside and partially on the inside. The rim has a low neck and slightly outwardly bent edges, with a flattened-oval shape in cross-section, the diameter of the rim is 15 cm, and on the outside at the transition from the neck to the shoulder, there is an attached applique of a sub-triangular shape, 3.2 cm wide, 1.2 cm thick, protruding by 1.2 cm. There is also ornamentation on the outer side of the neck in the form of several alternating vertical impressed lines. The wall thickness of the vessel is 0.9-1 cm.

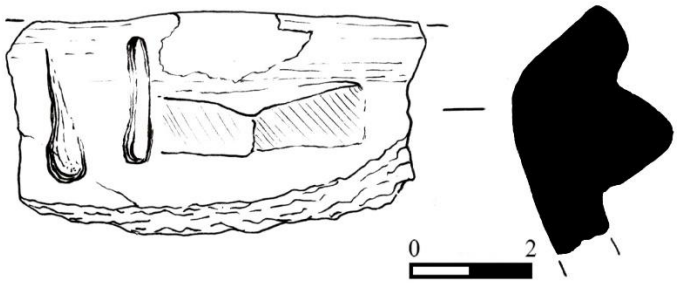


Figure G.11 - Ks-23_1_91_1

Lids

A large handle from a lid was found, made of medium-mixed loose brown clay with numerous visible inclusions of small and large sand particles, as well as chamotte inclusions.

The handle has a mushroom shape, with a flat cap on a thick, short stem, the diameter of the top is 5.7 cm, the edge thickness is 0.9-1 cm, the edge section is almost rectangular, the height of the stem without the top is 3 cm, the preserved wall thickness of the lid is 1.4 cm. The edges of the top are decorated with alternating finger indentations around the entire diameter, forming a wavy edge.

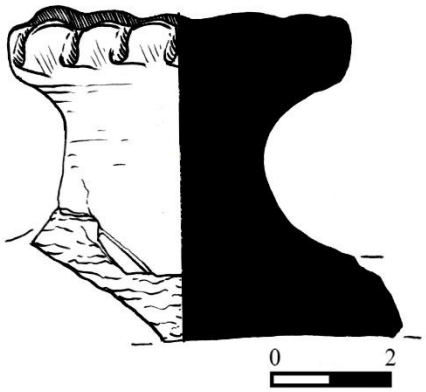


Figure G.12 - Ks-23_1_91_2

Other

A fragment of clay roof coating of a house was found, measuring 13.7x11.5x5.3 cm. Imprints of reed stems and leaves (cane) have been preserved on the inner surface. The weight of the fragment is 457 grams.

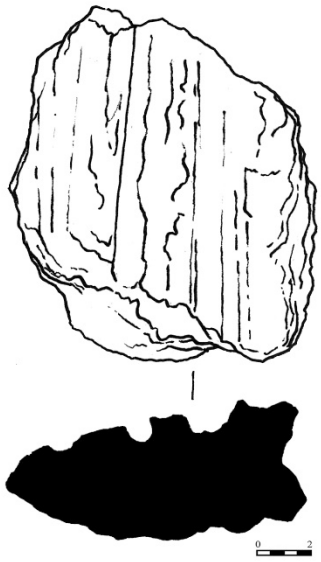


Figure G.13 - Ks-23_1_91_3

Ks-23_1_98

Rims

A fragment of the rim from a large molded vessel was discovered, made of medium-mixed loose gray clay, with multiple visible inclusions of small and large sand and chamotte particles in the break, as well as white inclusions. Due to uneven firing, the color of the clay varies from dark brown to beige. The surface of the fragment is covered with a layer of light beige slip on both the inside and partially on the outside, with striped burnishing visible on the inside. On the outside, the color of the slip on the rim changes from gray to brownish shades. The vessel's rim is straight with a high neck, the edges are flattened-oval in cross-section, with a diameter of 28 cm. There is impressed ornamentation on the outside, made with a rectangular tool, in the form of alternating indentations arranged in a horizontal line. The thickness of the vessel walls is 0.8-1 cm.

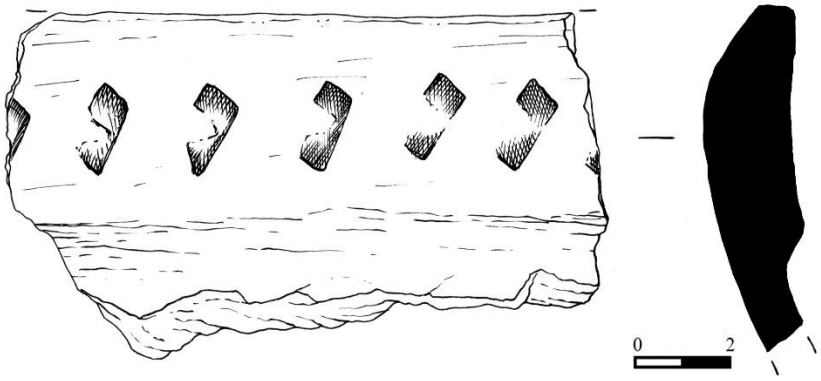


Figure G.14- Ks-23_1_98_1

Handles

During the excavations, a fragment of the side of a molded vessel with a handle attached to it was found. The handle is vertically attached to the body, has two finger indentations on the sides, and the back of the handle is decorated with vertical impressed lines. The fragment is made of medium-mixed loose red clay with numerous inclusions of small and large sand particles. The surface of the fragment on the outside is covered with a layer of dense beige slip, and due to uneven firing, the color of the paste changes from dark brown to pink. The height of the handle is 4 cm, the width at the base is 5.8 cm, the width of the back in the central part is 2.7 cm, and the thickness of the vessel wall is 0.7-0.9 cm.

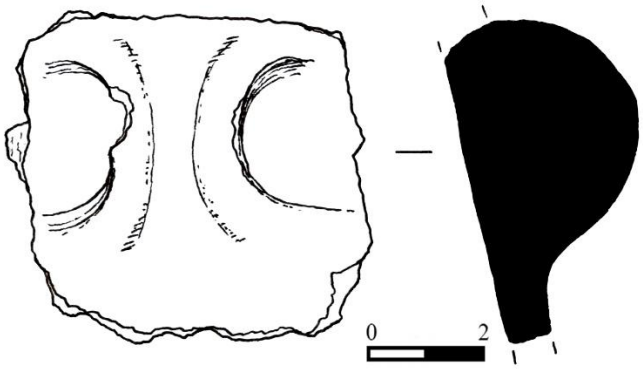


Figure G.15 - Ks-23_1_98_2

Bases

A fragment of a flat base from a small vessel, presumably a mug, was found. It is made of well-mixed dense brown paste, with minor visible inclusions of small sand particles and white inclusions in the breaks. Due to uneven firing, the color of the paste changes to a grayish tint. The surface of the fragment is covered with dark brown slip on the outside, and striped burnishing with a sheen is also visible. On the inside, the surface of the fragment is covered with a dark red dirty layer of dense slip, and burnishing is also visible. On the side of the vessel wall, there is a trace of handle attachment; the handle was lost, the bottom of the vessel is flat with a diameter of 4 cm, and there are two intersecting straight incised lines in the center on the outside of the bottom. The thickness of the vessel walls is 0.5-0.7 cm, and the thickness of the bottom is 0.4-0.5 cm.

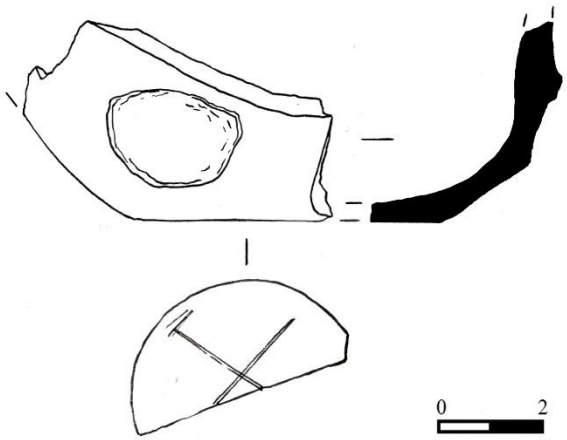


Figure G.16 - Ks-23_1_98_3

Lids

A fragment of the edge of a molded lid was discovered, made from medium-mixed dense gray clay, with multiple visible inclusions of small sand particles and mica in the fracture. The surface of the fragment is covered with a light slip, yellow-beige in shade, on both the exterior and interior sides. Due to uneven firing, the color of the clay varies from dark gray to beige, and soot traces are visible along the inner edge of the lid. The edges of the lid are straight, with

a sub-rectangular cross-section, the edge thickness is 1.2 cm, and the wall thickness of the lid is 1 cm. On the outer surface, there is an incised ornamentation in the form of slightly left-twisted alternating lines; the lid was presumably slightly convex outward.

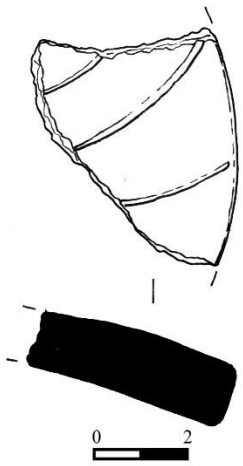


Figure G.17 - Ks-23_1_98_4

Ks-23_1_100

Rims

A fragment of the rim from a small handmade pot-type vessel was found, made of medium-mixed loose gray clay, with numerous visible inclusions of small sand particles and mica in the fracture. The surface of the fragment is covered with a light slip on the exterior and partially on the interior side, with a yellow-beige tint. Due to uneven firing, the color of the paste varies from gray to brown in some areas. The rim has a low straight neck, with edges in a flattened-oval cross-section shape. The diameter is 17 cm, and the wall thickness of the vessel is 0.7 cm. On the exterior side of the neck, there is an incised ornamentation in the form of alternating inclined lines, creating a zigzag pattern.

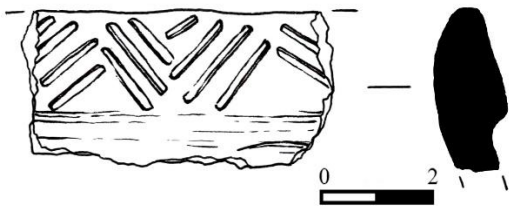


Figure G.18 - Ks-23_1_100_1

Lids

A fragment of a molded lid was discovered, made from medium-mixed loose red-colored clay with a yellow-beige tint, containing numerous inclusions of small and large sand particles, as well as chamotte. The surface of the lid on the outside is covered with a layer of light beige slip, and there is also visible ornamentation on the outside in the form of alternating inclined lines crossing the entire surface lengthwise. The edges of the lid are oval in cross-section, with a diameter of 18 cm. In the upper part on the outside, traces of attachment for a loop-shaped handle can be seen, the handle is missing, and the wall thickness is 1.1-1.2 cm.

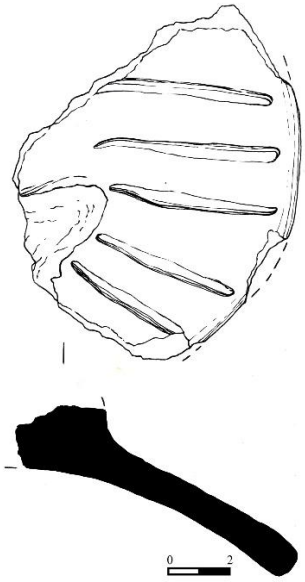


Figure G.19 - Ks-23_1_100_2

Ks-23_1_101

Rim

During the excavations, a fragment of the rim from an open vessel of the cauldron type with a hemispherical shape was found. It was made of dense, medium-mixed gray clay. The surface of the fragment is burnished on both sides, and traces of soot and smoke are visible. There is also a dark gray slip coating. The rim is straight, the edges are slightly tapered inward, with a sub-rectangular cross-section, the diameter is difficult to determine, presumably equal to 25 cm. A vertical loop-shaped handle, oval in cross-section, 2.1 cm wide, 1.6 cm thick, and 5.5 cm high, is attached to the body just below the rim.

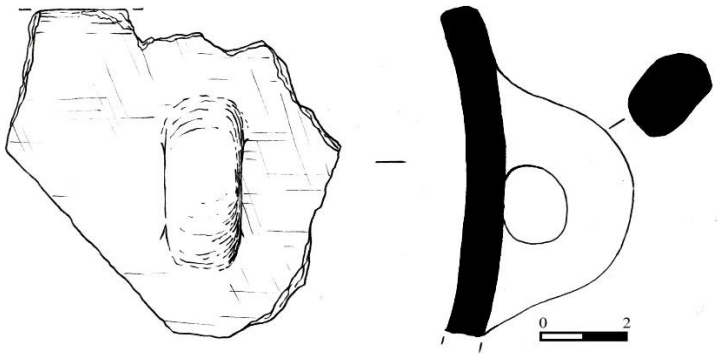


Figure G.20 - Ks-23_1_101_1

Ks-23_1_104

Rims

A fragment of the rim from a molded vessel was found, presumably from a large pot, with a straight high neck, made of medium-mixed loose gray clay, due to uneven firing, the clay color outside has a reddish tint, and inside it is gray, which is well visible in the break. The surface of the fragment on both the exterior and interior sides is covered with a light-red slip, with an orange-beige tint. The rim is straight, with edges in a flattened-oval cross-section, slightly bent outward, with a diameter of 30 cm and wall thickness of the vessel ranging from 1 to 1.7 cm. On the exterior side of the neck, there is ornamentation in the form of impressed rhomboid indentations, forming a horizontal band.

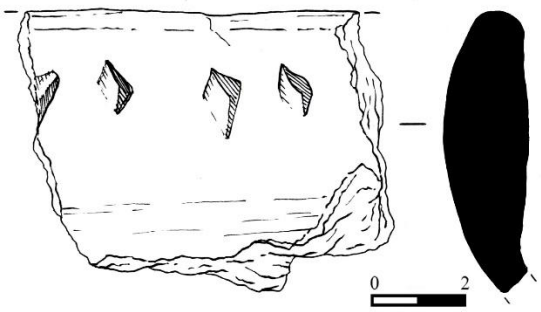


Figure G.21 - Ks-23_1_104_1

Lids

A fragment of a ceramic molded lid was also found, made from medium-mixed dense gray clay; due to uneven firing, the clay color is reddish on the outside and gray on the inside, which is clearly visible in the break. The surface of the fragment is covered with light red slip on both the inside and outside, with traces of soot and smoke remaining on the outside. The edges of the lid are oval in cross-section, the lid had a slightly convex shape, its diameter is 29

cm, the wall thickness is 1.2-1.3 cm, there are two through holes in the lid, presumably made for its restoration, the diameter of the holes is 0.5 cm, and there is also an incised ornamentation on the outside in the form of inclined lines forming a zigzag pattern (Figure G).

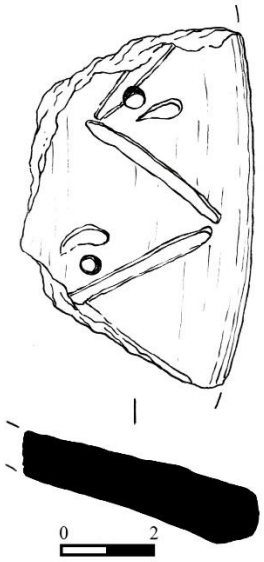


Figure G.22 - Ks-23_1_104_2

Other

A fragment of a ceramic item was discovered, presumably a blank for a spindle whorl, oval in shape, made from the wall of a vessel – from medium-mixed loose gray clay, with numerous visible inclusions of small and large sand particles and white inclusions in the fracture. The surface of the fragment on the outside is partially covered with a layer of light slip, on top of which brown spots are visible. The edges of the rim are not processed, the wall thickness is 1 cm, the fragment size is 6.2x5.8 cm.

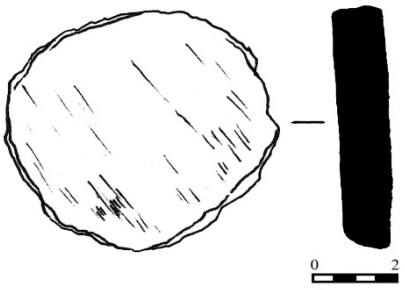


Figure G.23 - Ks-23_1_104_3

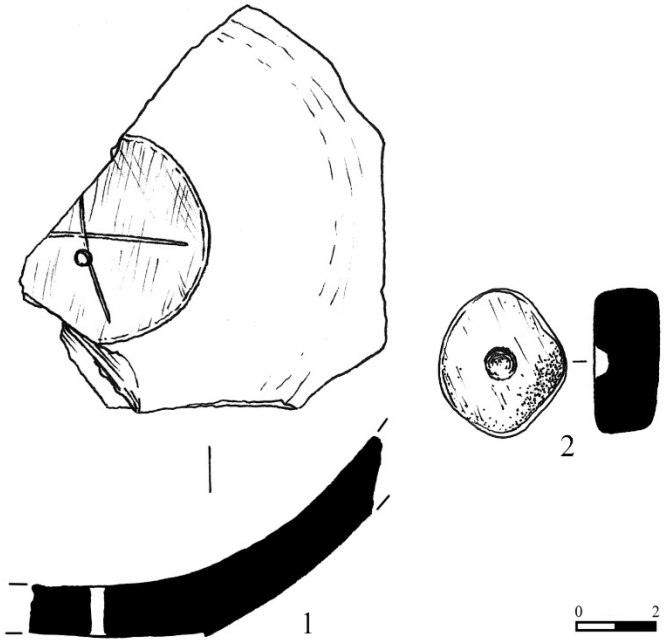


Figure G.24 - 1) Ks-23_1_0_1, 2) Ks-23_1_0_2

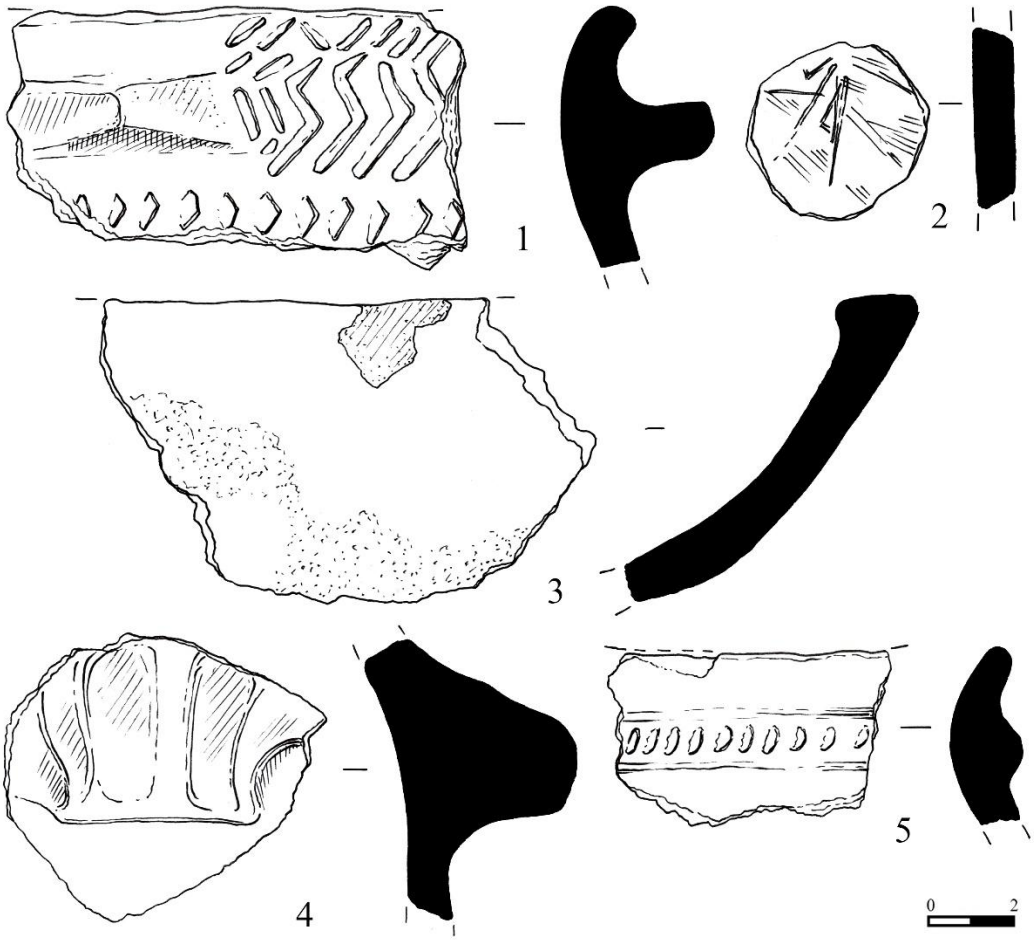


Figure G.25 - 1) Ks-23_1_85_1, 2) Ks-23_1_85_5, 3) Ks-23_1_85_3, 4) Ks-23_1_85_4, 5) Ks-23_1_85_2

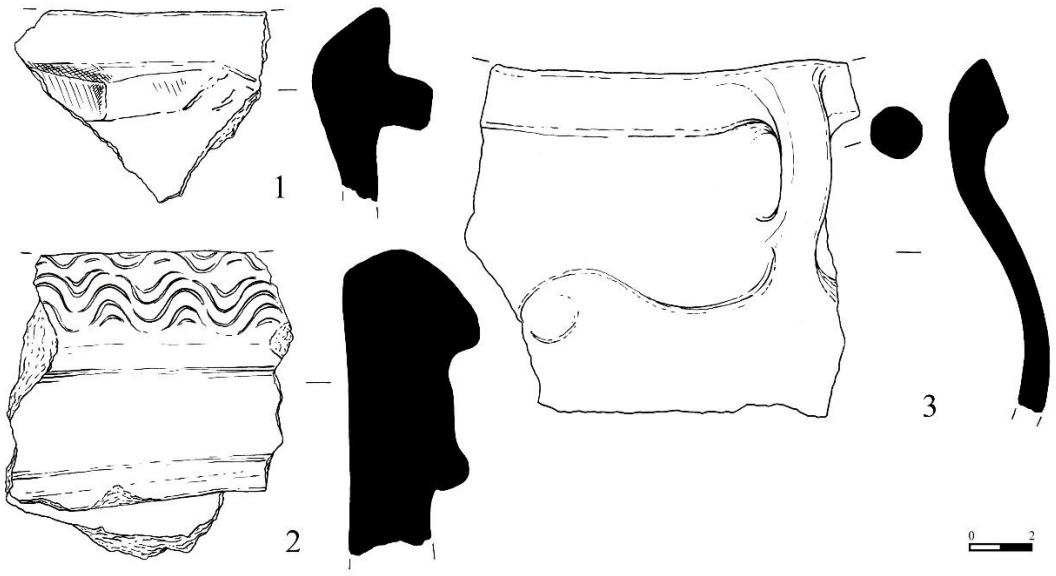


Figure G.26 - 1) Ks-23_1_90_2, 2) Ks-23_1_90_3, 3) Ks-23_1_90_1

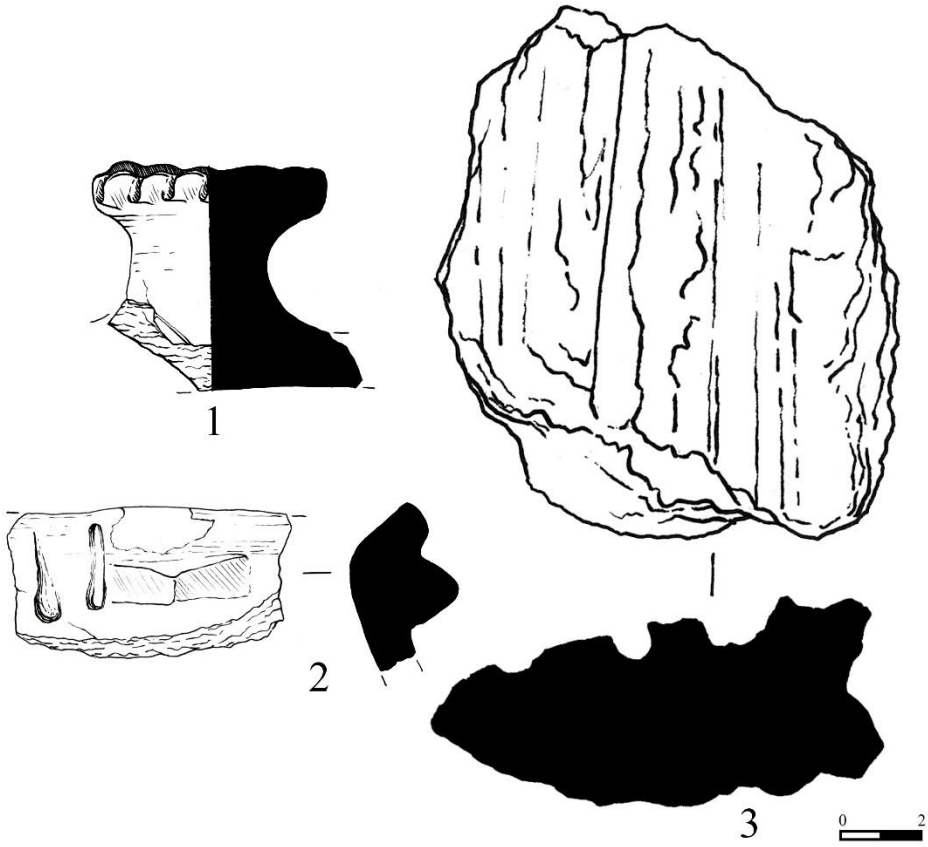


Figure G.27 - 1) Ks-23_1_91_2, 2) Ks-23_1_91_1, 3) Ks-23_1_91_3

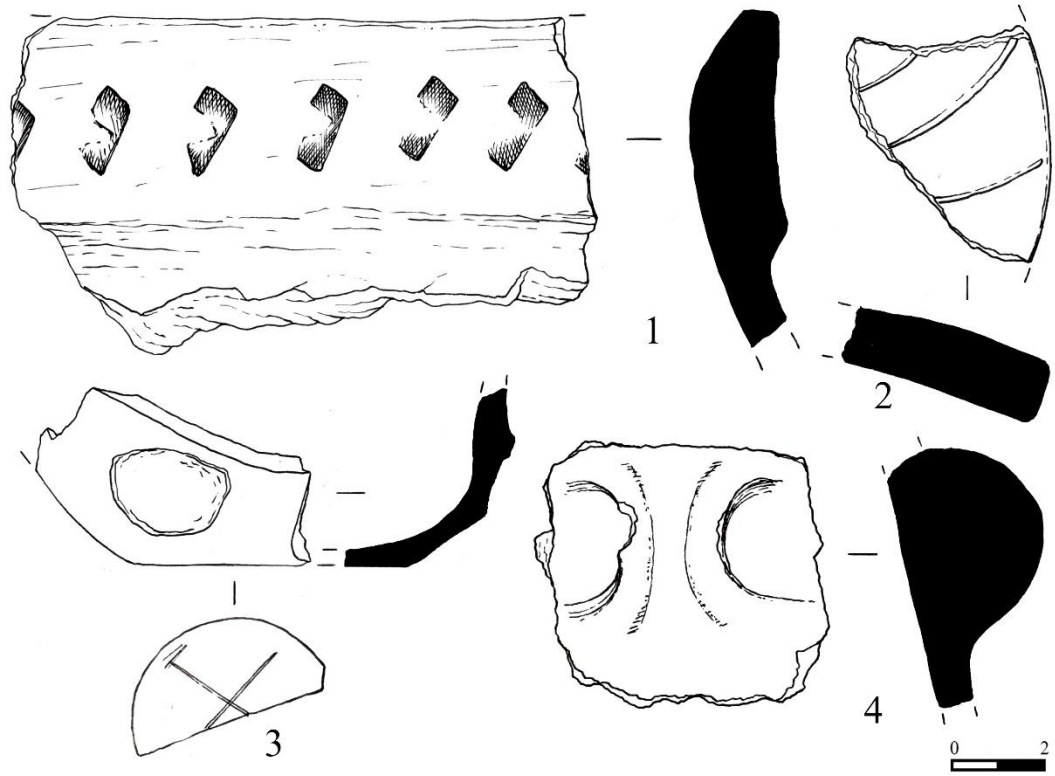


Figure G.28 - 1) Ks-23_1_98_1, 2) Ks-23_1_98_4, 3) Ks-23_1_98_3, 4) Ks-23_1_98_2

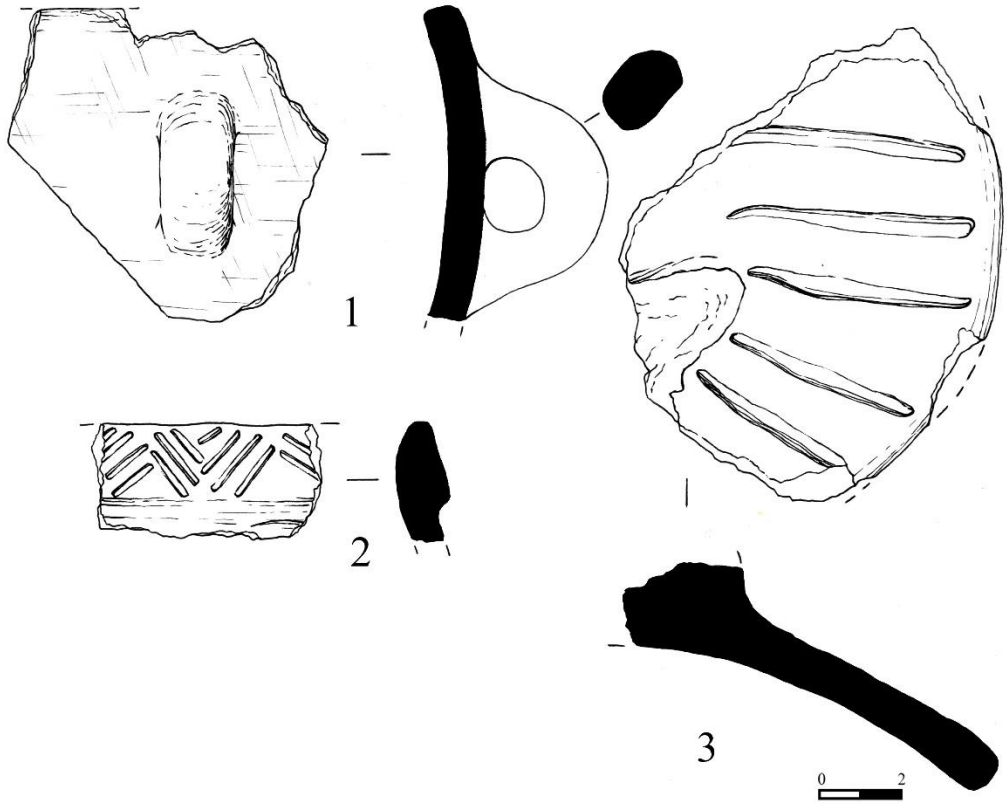


Figure G.29 - 1) Ks-23_1_101, 2) Ks-23_1_100_1, 3) Ks-23_1_100_2

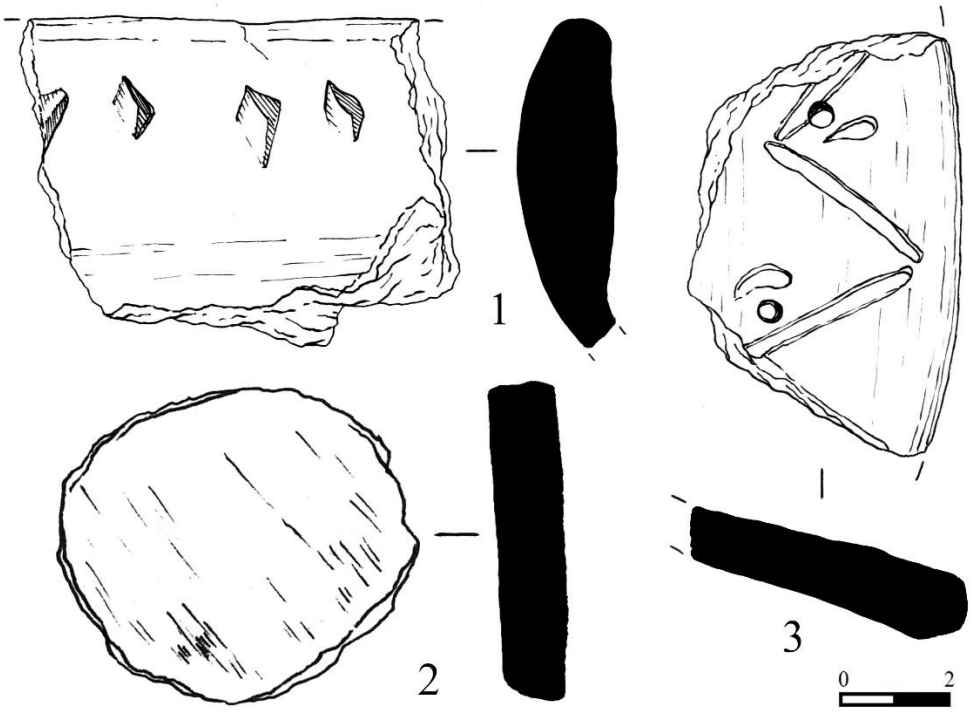


Figure G.30 - 1) Ks-23_1_104_1, 2) Ks-23_1_104_3, 3) Ks-23_1_104_2