

Archaeological Excavation of the Ravne 6 Tunnel (Visoko, Bosnia and Herzegovina): Results from the 2025 Field Season

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Abstract

Ravne 6 forms part of the Ravne underground complex near Visoko, Bosnia and Herzegovina (43°59'44" N; 18°09'39" E; 496.650 m a.s.l.). In 2025, a formally authorized stratigraphic excavation was conducted in this tunnel section for the first time. Work focused on documenting sedimentary infill, architectural features, and depositional relationships within a confined subterranean environment developed in conglomeratic deposits. Excavation proceeded manually following stratigraphic principles. All excavated sediments were dry sieved through a 5 mm mesh. Organic materials were recovered by hand using gloves and stored separately; no flotation was employed. The tunnel plan and excavation extent were recorded through a geodetic survey. The exposed sequence consisted of compact clay-rich deposits with rounded conglomerate inclusions, locally interrupted by dry-stone constructions, including a linear wall-like feature extending approximately 5 m along one section of the tunnel. Material recovered from documented contexts includes wooden artifacts and faunal remains. Several dry-stone structures were recorded in situ. Three wood samples (FTMC-DT95-1, 2, 3) were analyzed by accelerator mass spectrometry at the Vilnius Radiocarbon Laboratory. The conventional radiocarbon ages (415 ± 29 BP; 433 ± 28 BP; 402 ± 29 BP) calibrate to the late 15th-early 16th centuries CE (IntCal20, 2σ). These dates indicate phases of use or deposition during the late medieval period and relate specifically to the dated wooden material. The 2025 excavation provides a controlled stratigraphic and architectural record for Ravne 6 and establishes a documented empirical basis for continued investigation within the Ravne underground complex.

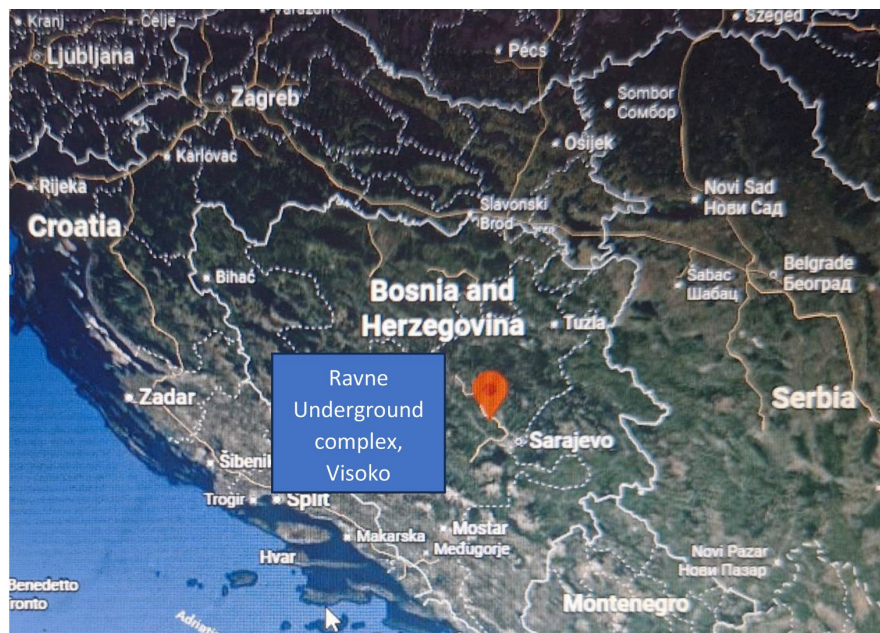
Keywords

Ravne 6 Tunnel, Subterranean Archaeology, Archaeological Excavation,

1. Introduction

Subterranean archaeological contexts present specific methodological challenges. Restricted space, limited visibility, variable structural stability, and complex sedimentary processes complicate excavation and interpretation (Moyes, 2012; Fairchild & Baker, 2012; Gillieson, 1996; Moyes et al., 2010; Stratford, 2011). Depositional sequences in tunnels and underground passages often reflect prolonged infill, episodic reopening, or reuse rather than single formation events (Trimmis, 2019; Bergsvik & Skeates, 2018; Palacio-Pérez, 2010; Bosch et al., 2015). Careful stratigraphic control and systematic documentation are therefore essential.

The Ravne underground complex is located near Visoko in central Bosnia and Herzegovina (Figure 1). It consists of a network of documented subterranean passages developed within conglomeratic geological formations. Previous investigations in other sections of the complex have identified stratified infill deposits and architectural elements constructed in dry-stone technique (Osmanagich, 2026a; Šabanija-Softić, 2026; Osmanagich, 2025). These findings indicate anthropogenic modification within a complex depositional environment.



Regional map showing the location of Visoko within Bosnia and Herzegovina and the broader Balkans. The location of the Ravne underground complex is indicated. Source: base map: Google Earth.

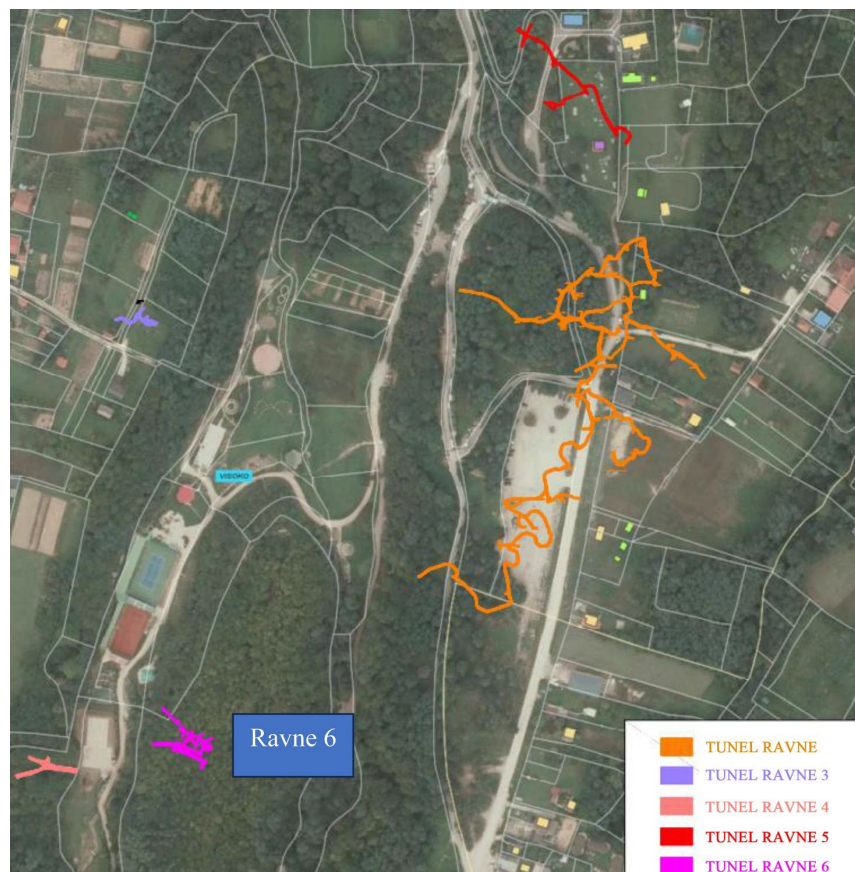
Figure 1. Geographic location of the Ravne underground complex, Visoko, Bosnia and Herzegovina.

Ravne 6 represents a distinct segment within this system (**Figure 2**). The entrance was identified during preparatory fieldwork in October 2022, when surface clearance exposed an underground opening sealed beneath soil and clay deposits (**Figure 3**) (Osmanagich, 2026a). These early activities were limited to documentation and stabilization and did not involve systematic excavation. Controlled archaeological investigation was undertaken only during the 2025 field season (**Figure 4** and **Figure 5**).

The 2025 campaign marked the first stratigraphic excavation of Ravne 6 conducted under formal permits and institutional oversight (Šabanija-Softić, 2026). The work focused on documenting sedimentary infill, architectural features, and depositional relationships within the accessible sections of the tunnel. Interpretation is limited to observations supported directly by field data.

1.1. Site Location and Spatial Metadata

Ravne 6 is situated within the Ravne underground complex near Visoko, Bosnia and Herzegovina (**Figure 1**).



Plan view showing the relative position of the Ravne 6 Tunnel in relation to other documented tunnel sections within the Ravne underground complex. *Geodetic survey and mapping*. Geoprom d.o.o., Visoko.

Figure 2. Location of the Ravne 6 Tunnel within the Ravne underground complex, Visoko, Bosnia and Herzegovina.



Composite figure showing (a) surface clearance and removal of overlying soil and clay deposits, (b) first exposure of an underground opening located beneath approximately one meter of sediment, and (c)-(d) initial interior conditions documented following limited access. Activities were carried out during preparatory fieldwork in October 2022 and involved the field archaeologist, project leadership, workers, and volunteers. These operations preceded the formal archaeological excavation conducted in 2025. *Photographs*: A. Agić.

Figure 3. Initial identification and opening of the Ravne 6 Tunnel prior to systematic excavation.



Composite figure showing (a) surface clearance and removal of overlying soil and clay deposits, (b) first exposure of an underground opening located beneath approximately one meter of sediment, and (c)-(d) initial interior conditions documented following limited access. Activities were carried out during preparatory fieldwork in October 2022 and in Composite figure showing the same tunnel section prior to archaeological intervention and following the initial phase of controlled excavation during the 2025 field season. The images document changes in passage profile and floor level resulting from the removal of loose infill deposits. Scale bars and field documentation boards are visible. *Photographs*: A. Šabanija Softić.

Figure 4. Interior view of the Ravne 6 Tunnel at approximately 28 m from the entrance, before and after initial excavation.



Composite figure showing (upper) a linear dry-stone feature (Feature S9) extending for approximately 5 m along the tunnel wall, documented during excavation, and (lower) the initial condition of a newly uncovered section of the Ravne 6 Tunnel prior to further archaeological intervention. Both images illustrate construction characteristics, sediment context, and passage morphology as recorded during the 2025 field season. *Photographs:* A. Šabanija Softić.

Figure 5. Architectural feature and newly exposed tunnel section in Ravne 6.

Entrance coordinates:

- Latitude: 43°59'44" N.
- Longitude: 18°09'39" E.
- Elevation: 496.650 m a.s.l.
- Gauss-Krüger coordinates:
 - Y: 6513311.590.
 - X: 4872362.840.

The tunnel develops within conglomeratic deposits composed of rounded clasts embedded in a sandy-clay matrix (Osmanagich, 2025). These geological conditions influence stability, passage morphology, and sediment infill processes.

Prior to the 2025 season, a total of 65 m of Ravne 6 had been opened, of which 28 m had undergone archaeological investigation.

During the 2025 campaign, an additional 60 m of previously inaccessible tunnel were cleared and documented. Following this work, the total accessible length of Ravne 6 reached approximately 125 m.

The configuration of the tunnel before and after the 2025 excavation season is shown in the geodetic plan produced from measured survey data. The plan records passage orientation, junctions, exposed sections, and architectural features documented during controlled excavation.

1.2. Scope and Objectives

This article is limited to archaeological data generated during the 2025 excavation season at Ravne 6. The objectives were:

- 1) To document stratigraphic units within accessible tunnel sections.
- 2) To record architectural features, including dry-stone constructions and junctions.
- 3) To recover and catalogue material remains under controlled conditions.
- 4) To obtain radiocarbon dates from selected wooden samples.

The contribution is primarily descriptive. It establishes a documented stratigraphic and architectural record for Ravne 6 and provides a basis for future comparative and analytical work within the Ravne underground complex (Osmanagich, 2026a; Osmanagich, 2025).

2. Site Location and Geological Context

2.1. Geographic Setting

The Ravne underground complex is located near the town of Visoko in central Bosnia and Herzegovina, approximately 30 km northwest of Sarajevo (Figure 1). The tunnel network extends beneath a hilly, wooded landscape developed within Quaternary sedimentary formations. Ravne 6 occupies the northern sector of the documented underground system and connects spatially with adjacent tunnel sections mapped through geodetic survey (Figure 2).

The regional terrain consists of moderate slopes separated by shallow valley depressions. Surface conditions are characterized by mixed woodland and localized colluvial accumulation. The tunnel entrance lies at 496.650 m above sea level and opens into conglomeratic deposits forming the structural matrix of the underground passages.

Microclimatic conditions inside the tunnels are relatively stable, with consistently elevated humidity and a mean temperature of approximately 13°C. These conditions contribute to the preservation of organic material and influence sediment compaction and secondary mineral deposition.

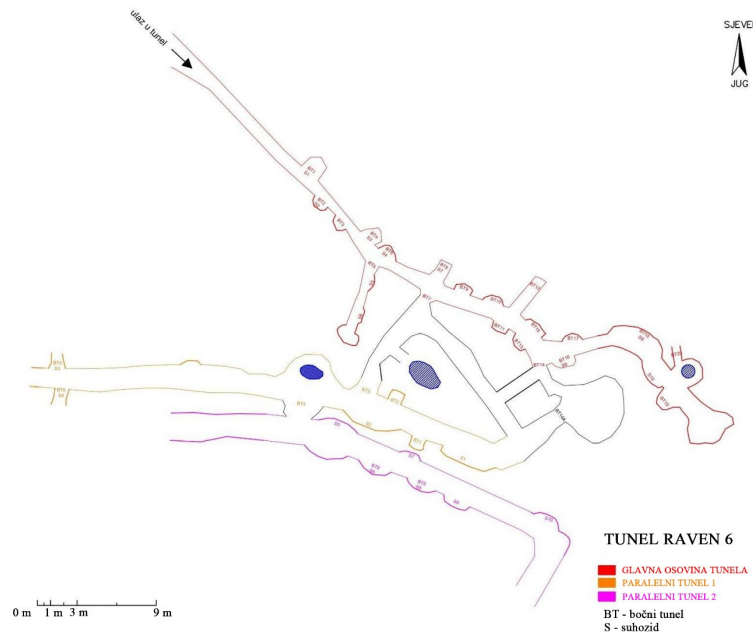
2.2. Geological Background

The Ravne tunnels are developed primarily within a consolidated conglomerate composed of rounded-to-subrounded clasts of varying sizes embedded in a sandy-clay matrix (Osmanagich, 2025). The conglomerate is moderately lithified, exhibiting natural fracture planes and irregular internal voids.

In the section, the contrast between lithified conglomerate walls and unconsolidated tunnel infill is visually distinct (Figures 4-7). Consolidated conglomerate forms stable passage boundaries, while infill deposits consist of loose, poorly sorted sediment with mixed pebble sizes and no cementation. This distinction is essential for differentiating natural geological substrates from later anthropogenic fill.

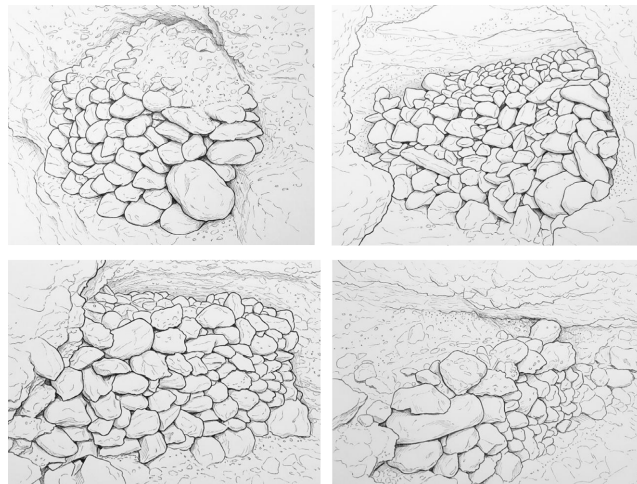
Within Ravne 6, excavation exposed compact clay-rich deposits containing rounded conglomerate inclusions. The sediment shows variable compaction and localized stratification near architectural features. No evidence of speleothem growth or karstic dissolution processes characteristic of limestone cave systems was observed. Instead, the tunnel morphology corresponds to excavation or enlargement

within a conglomeratic substrate.



Geodetic plan illustrating the configuration of the Ravne 6 Tunnel prior to archaeological excavation and following controlled excavation carried out during the 2025 field season. The figure documents changes in passage accessibility, exposed sections, and recorded features resulting from the removal of infill deposits. Scale bar and orientation are indicated. *Geodetic survey and mapping*: Geoprom d.o.o., Visoko.

Figure 6. Plan of the Ravne 6 Tunnel showing documented conditions before and after the 2025 excavation season.



Composite drawing showing multiple views of a dry-stone feature recorded during excavation, illustrating stone size variability, stacking arrangement, and contact with surrounding tunnel surfaces. The illustration is based on direct observation and field documentation and is intended to supplement photographic records by clarifying construction details. *Illustration*: H. Mutevelić (MA, Academy of Fine Arts), Sarajevo, Bosnia and Herzegovina.

Figure 7. Archaeological illustration of a dry-stone feature documented in the Ravne 6 Tunnel.

The geological composition has direct implications for stratigraphy:

- Conglomerate walls represent stable, lithified boundaries.
- Unconsolidated infill reflects secondary depositional processes.
- Interfaces between consolidated substrate and loose infill are sharply defined in several sections.

These sedimentological distinctions form the basis for stratigraphic unit differentiation described in Section 4.

3. Materials and Methods

3.1. Legal Framework and Institutional Oversight

The 2025 excavation of Ravne 6 was conducted under permits issued by the competent Cantonal Ministry of Culture. Permission was granted following formal review and approval by the Federal Institute for the Protection of Cultural Heritage, which provided the required professional assessment of the research proposal.

In accordance with national heritage regulations, a formal cooperation agreement was signed between the Archaeological Park: Bosnian Pyramid of the Sun Foundation and the local Heritage Museum in Visoko. The museum provided institutional collaboration and oversight during the excavation process.

All fieldwork was carried out under these permits and agreements. Excavation activities were supervised by qualified archaeological personnel and conducted in compliance with applicable cultural heritage legislation of Bosnia and Herzegovina.

3.2. Excavation Strategy

Excavation was conducted using stratigraphic principles adapted to a confined underground environment (Trimmis, 2019; Bosch et al., 2015; Osmanagich, 2025). Work progressed incrementally along the main tunnel axis and selected adjacent sections, with excavation units defined by observable changes in sediment characteristics, compaction, and composition. Loose infill deposits were removed manually using hand tools to minimize disturbance to stratigraphic relationships and architectural features. Excavation limits were adjusted as required by tunnel morphology, stability conditions, and safety considerations.

3.3. Documentation and Recording

All excavation activities were documented using a combination of written records, photography, measured drawings, and geodetic survey. Stratigraphic units were described in terms of color, texture, clast size, compaction, and spatial relationships. Architectural features were documented in situ prior to any modification. Photographic documentation was undertaken at each stage of excavation, including before, during, and after sediment removal.

Geodetic documentation of the tunnel layout was conducted by a licensed surveying firm using standard surveying instruments. Plans produced from these

measurements record tunnel geometry, excavation extent, and the location of documented features and junctions.

3.4. Architectural and Illustrative Documentation

Where photographic documentation was insufficient to clearly record construction details, archaeological illustration was employed. Hand-drawn illustrations were produced from direct observation, measurements, and photographic references. These drawings were intended to clarify the arrangement of stones, stacking patterns, and the relationships between architectural elements and the surrounding sedimentary contexts.

3.5. Recovery and Treatment of Finds

All material finds were documented in situ prior to recovery. All excavated sediment was dry sieved through a 5 mm mesh. Provenience data, including location, depth, and associated stratigraphic unit, were recorded for each find. Organic materials and faunal remains were recovered manually and placed in appropriate containers for transport. Basic cleaning and stabilization were carried out prior to further analysis. No conservation treatments were applied that would alter the original surface characteristics of the finds.

3.6. Radiocarbon Sampling and Analysis

Selected wooden samples were submitted for radiocarbon dating following standard archaeological sampling procedures (Figures 8-10). Samples were pretreated and analyzed using accelerator mass spectrometry at the Vilnius Radiocarbon Laboratory. Pretreatment followed established acid-base-acid protocols. Radiocarbon ages were reported in years BP and calibrated using internationally accepted calibration curves. Detailed laboratory results are presented in Section 4.7.

4. Results

4.1. Structural and Stratigraphic Framework

Excavation in Ravne 6 revealed a stratigraphic configuration consisting of three principal components:

- 1) Lithified conglomerate forming the tunnel walls and ceiling.
- 2) A compacted clay floor layer.
- 3) Unconsolidated sand-pebble infill deposits.

The tunnels are developed within a natural conglomerate formation composed of rounded pebbles and larger clasts embedded in a sandy matrix. The conglomerate is strongly compacted and forms stable vertical and overhead boundaries. Observed passage heights range between approximately 1.2 m and 2.4 m. (Figure 4 and Figure 5)

The conglomerate mass extends several meters beyond the exposed tunnel interior and represents the natural geological substrate into which the passages were excavated.



Composite figure showing (left) the wooden object in situ within a sedimentary context during excavation, with scale and surrounding deposits visible, and (right) the same object after recovery, cleaning, and documentation in a controlled environment. The photographs document the context, state of preservation, and morphology at the time of excavation. Interpretation of function and chronology is not addressed at this stage.

Figure 8. Wooden object recovered from a stratigraphic context in the Ravne 6 Tunnel.



Composite figure showing (upper left) an elongated wooden object recovered from the main tunnel axis at approximately 32 m from the entrance (Find R62025-001), (lower left) an assemblage of animal bone fragments recovered from fill deposits in a newly opened parallel tunnel section (Find R62025-005), and (right) an upright wooden object documented in situ near a dry-stone feature and the entrance to a side tunnel at approximately 45 m along the main tunnel axis (Find R62025-003). All finds were documented in stratigraphic context, recovered under controlled conditions, and sampled for further laboratory analysis.

Figure 9. Selected organic and faunal finds recovered during the 2025 excavation season in the Ravne 6 Tunnel.



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Vilnius Radiocarbon

Performed by

DATING CERTIFICATE

No. 2025-10-09-FTMC-DT95

28th October 2025

1. Applicant for analysis: Ms Ajla Šabanija Softić, Foundation "Archaeological park: Bosnian Pyramid of the Sun", Ravne bb, Visoko
2. Material of sample: Wood
3. Date of sample receiving: 2025-10-15
4. Analysis date: 2025-10-28
5. Equipment used for analysis: Single stage accelerator mass spectrometer (SSAMS, NEC, USA), Low-Energy Accelerator (LEA, Ionplus AG, Zürich), Automated Graphitization Equipment AGE-3 (Ionplus AG, Zürich).
6. Method of analysis: Samples were pretreated with an acid-base-acid-bleaching 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
R6 - 1	FTMC-DT95-1	415±29	94.97±0.34
R6 - 2	FTMC-DT95-2	433±28	94.76±0.33
R6 - 3	FTMC-DT95-3	402±29	95.13±0.34

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 $^{13}C/^{12}C$ -ratio. The radiocarbon ages must be translated to calibrated radiocarbon years.

8. Calibrated radiocarbon dates:

Radiocarbon dating certificate issued by the Vilnius Radiocarbon Laboratory (FTMC) showing measured radiocarbon ages and calibrated probability distributions for three wood samples recovered during the 2025 excavation season (samples R6-1, R6-2, R6-3). All samples were analyzed using Accelerator Mass Spectrometry (AMS) following standard pretreatment protocols. Calibration was performed using internationally accepted calibration curves. The results provide a chronological record of sampled organic material; archaeological interpretation is discussed in the text.

Figure 10. Radiocarbon dating results for wooden samples recovered from the Ravne 6 Tunnel.

4.2. Compacted Clay Floor

Beneath the present walking surface, a compacted, sedimented hard clay layer was documented. This clay unit forms a distinct, continuous floor surface within the tunnel.

Observations indicate:

- Strong compaction.
- Homogeneous clay texture.
- Clear separation from loose overlying fill.

The clay layer extends downward more than 1 m below the current surface, based on exposed sections and probe depth. The full thickness remains undetermined but exceeds one meter in the investigated areas.

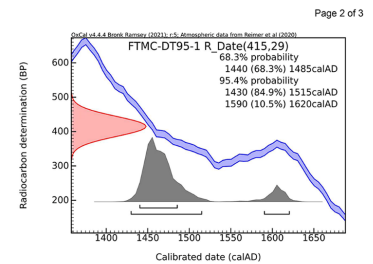


Fig. 1. Radiocarbon date 415±29BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

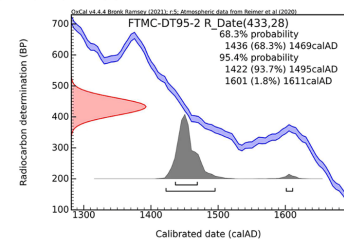


Fig. 2. Radiocarbon date 433±28BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

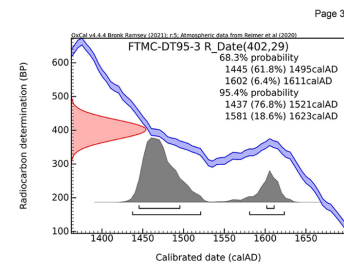


Fig. 3. Radiocarbon date 402±29BP (red), part of the calibration curve (blue) and the calibrated probability density function (grey) calculated in OxCal.

9. The results of the certificate are valid only for the tested sample. Without written permission from the laboratory, it is prohibited to reproduce or distribute individual parts of the certificate by any means.

Responsible person: dr. Zilvinas Ezerinskis

The clay floor contrasts sharply with both the conglomerate walls and the loose infill deposits. Its consistency and compaction differ markedly from the surrounding natural sediment matrix.

4.3. Anthropogenic Infill (Backfill Deposits)

The uppermost deposits consist of loose, non-compacted sand and pebbles. These materials differ clearly from the lithified conglomerate:

- No cementation.
- Poor sorting.
- Mixed clast sizes.
- Loose structure.

The infill deposits occupy the upper portions of the tunnel and, in several areas, completely block passage openings. The height of accumulated infill corresponds to the internal passage height, ranging from approximately 1.2 m to 2.4 m, depending on the tunnel section.

Sedimentological characteristics and spatial configuration indicate that these deposits function as intentional fill sealing previously accessible tunnel segments. Contacts between conglomerate walls and infill are typically sharp.

The principal stratigraphic units documented during excavation are summarized in **Table 1**.

Table 1. Stratigraphic units documented in Ravne 6 (2025 excavation season).

Unit	Description	Thickness	Contact Type	Interpretation
SJ 001	Loose sand and pebble fill; poorly sorted; no cementation	Up to full tunnel height (1.2 - 2.4 m)	Sharp against conglomerate	Backfill sealing deposits
SJ 002	Compacted hard clay floor; homogeneous texture	>1 m (minimum observed)	Sharp over conglomerate; distinct from SJ 001	Natural compact clay accumulation forming stable floor surface
SJ 003	Lithified conglomerate (rounded clasts in sandy matrix)	Several meters (structural)	Structural boundary	Natural geological substrate

4.4. Architectural Features

Several dry-stone constructions were documented within the excavated sections. These consist of stacked river cobbles arranged without mortar. Stones vary in size but are intentionally positioned to create linear wall-like features.

One prominent feature (Feature S9; see **Figure 5** and **Figure 7**) extends approximately 5 m along one tunnel wall. The stones are placed in horizontal courses, resting directly against conglomerate surfaces. No binding material was observed.

The relationship between dry-stone features and surrounding sediment indicates that they predate at least part of the infill sequence.

4.5. Wooden Artifacts

Three wooden artifacts were recovered from stratified contexts:

- 1) An elongated wooden object interpreted as a possible arrow-like form.
- 2) An upright wooden object with a broadened base.
- 3) A fragmentary, elongated wooden piece.

All were documented in situ prior to removal (**Figures 8-10**). The wood is darkened, likely due to prolonged exposure to humid subterranean conditions. Surface preservation is variable, with minor cracking but no evidence of modern tool modification.

Three samples derived from these wooden finds were submitted for AMS radiocarbon analysis.

4.6. Faunal Remains

A total of 11 faunal fragments (NISP = 11) were recovered from stratified tunnel infill deposits.

The assemblage consists primarily of:

- Two elongated long-bone shafts.
- Several short shaft fragments.
- Small indeterminate bone fragments.

All material was recovered from unconsolidated fill contexts. Macroscopic examination revealed:

- No visible cut marks.
- No burning traces.
- No deliberate modification.

Surface preservation is moderate, with coloration consistent with prolonged burial in humid clay-rich sediment. No taxonomic identification has yet been undertaken, and the assemblage remains classified as indeterminate mammalian bone pending specialist analysis (**Figure 9**).

4.7. Radiocarbon Dating

Three wooden samples recovered from stratified contexts were submitted to the Vilnius Radiocarbon Laboratory (FTMC) for Accelerator Mass Spectrometry (AMS) analysis.

According to the laboratory certificate:

Sample	Lab Code	¹⁴ C Age (BP)	pMC
R6-1	FTMC-DT95-1	415 ± 29 BP	94.97 ± 0.34
R6-2	FTMC-DT95-2	433 ± 28 BP	94.76 ± 0.33
R6-3	FTMC-DT95-3	402 ± 29 BP	95.13 ± 0.34

Pretreatment followed an acid-base-acid protocol as specified by the laboratory. Conventional radiocarbon ages were corrected for isotopic fractionation using

measured $^{13}\text{C}/^{12}\text{C}$ ratios.

Calibration was performed by the laboratory using the IntCal20 calibration curve. The calibrated ranges at 2σ probability fall predominantly within the late 15th to early 16th century CE, with probability maxima centered in the late 1400s and early 1500s. (**Figure 10**)

The three dates form a tight chronological cluster, indicating a temporally coherent phase of activity. These results constrain episodes of deposition or use within Ravne 6 during the late medieval period.

Potential interpretive limitations include:

- Possible secondary deposition within tunnel infill.
- The “old wood” effect if inner growth rings were sampled.
- Reuse of wooden material prior to deposition.

Despite these considerations, the clustering of three independent samples supports late 15th-early 16th-century activity within the excavated sections.

5. Discussion

5.1. Tunnel Morphology and Geological Setting

Ravne 6 is developed within a compacted conglomerate formation consisting of rounded clasts in a sandy matrix. The walls and ceiling are lithified and structurally stable, while the interior passages range between approximately 1.2 m and 2.4 m in height.

The presence of a compacted clay layer forming the tunnel floor is a consistent feature. Stratigraphically, this clay appears distinct from the loose overlying infill and from the lithified conglomerate substrate. Based on current observations, it is best interpreted as natural clay accumulation that was subsequently used as a stable walking surface. Its thickness, exceeding one meter in exposed sections, suggests prolonged sedimentation rather than a thin constructed surface.

No evidence of karstic dissolution typical of limestone cave systems was observed. Instead, the tunnels occur within conglomeratic deposits, and the morphology reflects excavation or enlargement within this material. The structural geometry and continuity of the passages indicate organized subterranean development, though the precise excavation technique cannot be determined from the present exposures.

5.2. Infill and Passage Closure

The upper portions of the tunnel contain loose, non-compacted sand and pebble deposits that differ clearly from the surrounding lithified conglomerate. These deposits block several sections of the tunnel and correspond in height to the dimensions of the internal passage.

The sedimentological characteristics—poor sorting, absence of cementation, and abrupt contacts with conglomerate walls—indicate secondary deposition. These deposits function as sealing fills that obstruct previously open segments.

However, it cannot be assumed that the current blocked sections represent the

only historical access points. The possibility that additional entrances existed in the past remains open. The infill deposits may therefore represent localized closure episodes rather than complete system abandonment.

5.3. Dry-Stone Features

Dry-stone wall segments documented in Ravne 6 demonstrate intentional placement of river cobbles without mortar. The stones are arranged in horizontal courses and positioned directly against conglomerate surfaces. (Šabanija-Softić, 2026)

Their relationship to surrounding sediment suggests that at least part of the infill accumulated after the construction of these features. However, without broader exposure to adjacent contexts, the full chronological relationship between wall construction and sediment deposition cannot yet be established.

The architectural characteristics correspond to dry-stone constructions documented in other sections of the Ravne complex (e.g., Ravne 3 and Ravne 4), indicating shared construction principles across multiple tunnel segments.

5.4. Radiocarbon Chronology

The three AMS radiocarbon determinations cluster within the late 15th to early 16th century CE. The close grouping of dates indicates a coherent episode of activity associated with the recovered wooden artifacts. (Šabanija-Softić, 2026)

These dates establish the presence of human activity within Ravne 6 during the late medieval period. They relate specifically to the wooden materials sampled and to their stratigraphic contexts within the excavated sections. No broader chronological inference is made beyond this documented phase of activity.

When considered alongside previously published findings from other parts of the Ravne underground complex—including Neolithic artifacts, Roman-period material, extensive medieval ceramic assemblages, and speleothem formations indicating much earlier geological development—the Ravne 6 results contribute an additional securely dated horizon within a multi-period context (Osmanagich, 2025a; Osmanagich, 2026b).

5.5. Implications and Context

The 2025 excavation clarifies the structural relationships among the conglomerate substrate, natural clay floor accumulation, dry-stone constructions, and loose infill deposits in Ravne 6. It documents architectural features and material remains under controlled stratigraphic conditions and provides radiocarbon dates that anchor one phase of activity in the late medieval period.

Previous investigations within the Ravne complex have demonstrated the presence of cultural material spanning multiple chronological periods, including Neolithic, Roman, and medieval contexts, as well as geological indicators extending far deeper in time. The Ravne 6 excavation does not attempt to synthesize this broader sequence but adds a securely documented dataset from one tunnel segment.

Several questions remain open:

- The full spatial extent of Ravne 6 beyond currently accessible sections.
- The relationship between dry-stone features and surrounding sedimentary phases.
- The functional interpretation of faunal remains and wooden artifacts.
- The number and location of the former entrances.

Future excavation and specialist analyses will be necessary to integrate Ravne 6 more fully into the broader archaeological and geological framework of the Ravne underground complex.

6. Conclusion

The 2025 excavation of Ravne 6 provides the first controlled stratigraphic documentation of this tunnel segment within the Ravne underground complex. Excavation clarified the structural relationship between lithified conglomerate walls, a compacted clay floor layer, loose sand-pebble infill deposits, and dry-stone architectural features. Passage heights range between approximately 1.2 m and 2.4 m, and the accessible tunnel length now extends to approximately 125 m following the 2025 campaign.

Material remains recovered from documented contexts consist of three wooden artifacts and eleven faunal fragments. No evidence of cut marks or burning was observed on the bone material. Three wooden samples were dated by AMS analysis at the Vilnius Radiocarbon Laboratory, producing calibrated results within the late 15th to early 16th century CE. These determinations document a phase of late medieval activity within Ravne 6.

The excavation establishes a reproducible stratigraphic and architectural record for this section of the tunnel system. While broader chronological and functional questions remain open, the 2025 campaign provides securely documented field data that contribute to ongoing research within the Ravne underground complex.

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Author Contributions

MA Ajla Šabanija-Softić directed the 2025 excavation at Ravne 6, conducted field documentation, and prepared the primary excavation report. Sam Osmanagich

contributed to project supervision, research design, data interpretation, and manuscript preparation. Both authors reviewed and approved the final manuscript.

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All archaeological research was conducted under permits issued by the competent heritage authorities of Bosnia and Herzegovina and in accordance with applicable national regulations governing archaeological investigation and cultural heritage protection.

Data Availability Statement

All data generated or analyzed during this study are included in the published article or are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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