

‘Kyiv River Gate’ is a new formula for revitalizing the archaeological heritage in the historical core of the ancient city

Excavations conducted in 2014–2018 on Poshtova Square in Kyiv

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Abstract: Excavations conducted in 2014–2018 by the Center of Archeology of Kyiv of the National Academy of Sciences of Ukraine on Poshtova Square in Kyiv prove that among the archaeological territories of the city there are those where it is possible to observe how the city can remain unchanged in its planning structure for many centuries. These include the place where the modern Poshtova Square is located, which stands out in the relatively flat relief of the Lower Town – Podil. The purpose of this study is collective and multitasking research, which allows to solve a number of pressing issues: preservation of unique archaeological finds, creation of a museum complex directly on the site of archaeological excavations. ‘Kyiv River Gate’ is a fundamental change in the attitude to cultural heritage, “resetting” the attitude to cultural values as an invaluable potential for development and popularization the cultural heritage of the archaeological site as the national and world property.

Keywords: *Medieval archaeology—dendrochronology—Kyiv—underground museum—in-situ museum in urban context—public space*

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Archaeology and dendrochronology of the archaeological object ‘Site of the coastal city quarter of medieval Kyiv’ (11–19th centuries)

The area is located at the foot of the macroslope of the Kyiv plateau in the area of its contact with the south-eastern corner of the Podil pseudo-terrace and the Dnieper riverbed. Increase of the sole of the slope occurred sporadically by proluvial deposits. This is evidenced by the presence of an ancient removal cone at the base of the sole of the macroslope, buried under technogenic deposits (Fig. 1).



Fig. 1 Relief map of Kyiv-Podil and Kyiv plateau. Place of archeological research of the Poshtova Square, 2014–2017.
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The location of archaeological complexes testified that from the second half of the 11th century to the end of the 13th century the removal cone “grew” by several meters. The main source of proluvium should be considered Mikhailovsky (Borychiv?) Uzviz – the route of the modern funicular. Obviously, the chronology of the first arrangement of the descent dates back to the 10th century. This fact can be clarified by further excavations as the initial development horizon lies at a mark that lies 4 m below the studied horizon. As a result of archaeological and geomorphological research, we proposed the hypothesis that the chronicle Pochayna river (right bank of the Dnieper) flowed in the 10–11th centuries along the root bank of the Kyiv Mountains, so it is very likely that Podil during this period should look like a floodplain island.

As it turned out, from the second half of the 11th century, when the channel of the ancient Pochayna was already covered with alluvial-proluvial deposits and moved to the northeast, about two hundred meters closer to the main river Dnieper. Here the building is actively beginning to take shape, and its character is somewhat different from the typical manor and yard buildings of Podil. On the one hand, this was because this was the beginning of the planning axis of Podil – the main street, on the other hand, that it belonged to the structure of the port economy of the city. The street continued to operate until the catastrophic fire in Podil in 1811 (Sagaidak, 2018). It was possible to study the traces of the functioning of several city yards, which stretched along the front of the street, separated by a wooden fence made of semi-logs (Fig. 2).



Fig. 2. A, B. View of the fence of the “big yard” of the 11–12th centuries. © Authors.

The dimensions of one of the most researched yards, with an area of 840 sq. m., attract attention, while the maximum size of the Podil yard is considered to be an area of 600 sq. m. [Сергій Тараненко, 2016]. Traces of at least 9 residential, craft and economic complexes, which functioned on this place from the end of the 11th to the beginning of the 19th century, were found on the territory protected by a wooden fence. The active phase of the yard complex is evidenced by the discovery in the filling of Building 1 – lead ingots, weighing a total of 8 kilograms, and in the northern zone – a series of so-called “hanging” seals, dating from the second half of the 11th to the first half of the 12th century (Fig. 3).



Fig. 3 ‘Hanging’ seals 11–12th centuries. © Authors.

The picture of the building and functioning of the yard is complemented by the fact that on one of the horizons of a whole warehouse of building materials – plinth (slab) – flat and wide brick, which was used in stone construction in medieval Rus' in the 12th century. It should be noted that in 2012, the remains of a small wooden Christian church of the 12th century were excavated in the adjacent section of Podil (Тараненко, 2016).

Dendrochronological analysis on the materials of Kyiv-Podil

Archaeological excavations of Poshtova Square have revealed the remains of an important town-planning hub of Kyiv Podil, the complex of which contained the beginning of the main street of the Lower Town, some port buildings with wooden decks and bridges, a monumental, about 10 m long structure, made of oak logs, apparently for transport purposes, an artificial shaft built of kaolin clay on a wooden base, which protected the city from floods and served as a pier.

New materials obtained from the excavations show that for several centuries the lower part of the road (descent), which connected the port zone of Podil with the Upper Town (Mountain), came out on the site adjacent to the studied “big yard”.

Archaeological materials that have passed the first stage of scientific processing and determinations, including more than 7 thousand only ceramic products, 1700 fragments of glass products, more than 1 thousand metal objects (special attention should be given to rivets for the sides of ships), anthropological and zoological remains (more than 3.5 thousand units), building materials, industrial waste. A number of wooden structures (wet wood) have been dismantled and will be preserved and used to recreate authentic buildings in the exposition of the future underground archaeological museum. Work has begun to determine the chronology of archaeological sites by a method such as dendrochronology. The dendrochronological scale, developed primarily on the materials of Kyiv-Podil, provides a high degree of reliability in determining the time of construction of wooden structures discovered by excavations.

Laboratory processing and construction of chronology were performed using classical dendrochronological methods (Schweingruber, 1988). Initially, samples were prepared in the laboratory for microscopic determination of wood species, as well as the boundary of annual rings. Measurements of the width of the annual increments of the samples were performed on an instrument with an accuracy of 0.01 mm at 20-fold magnification of the microscope.

During the dendrochronological analysis, wood samples were taken from the paving structure, which made it possible to construct a generalized relative chronological curve with a total duration of 85 years for Object 1. The obtained chronological curve used for cross-comparison with samples taken from Object 1 (Report, 2014–2015). The synchronization gave grounds to claim that both objects were built of wood, which was cut down in the second half of the 17th century.

Another object of dendrochronological dating of the specified period of the archaeological monument was a wooden tub standing in the corner of the building. 10 samples were taken from the boards from which the tub was made. The wood from which the boards were made, as well as previous samples, belongs to the annular deciduous species – oak (*Quercus* sp.), has traces of machining. The number of annual increments varies, from 98 to 110. The thicknesses of annual increments were measured, as well as similarity coefficients were determined, which made it possible to construct a relative chronology of 150 years (Fig. 4).

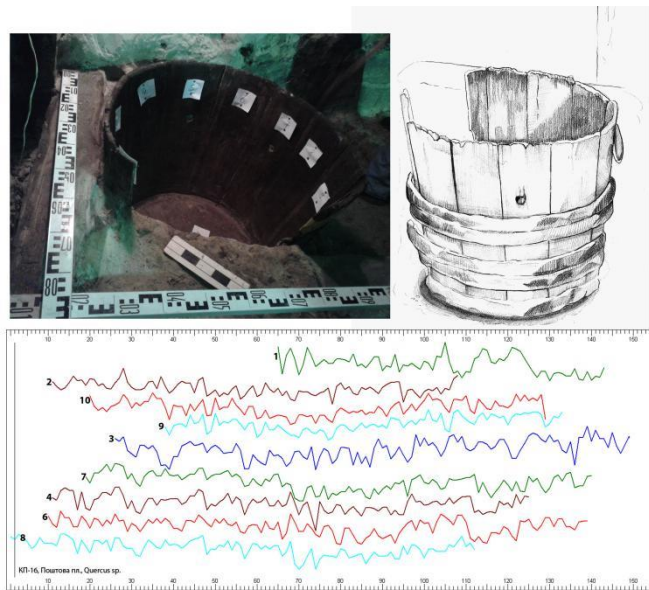


Fig. 4 Graph of annual increments for a series of samples Tub 1. © Authors.

The importance of this place proves the fact that in the study of the estate was discovered a series of so-called “hanging” stamps dating from the second half of 11th to the first half of the 12th century. The attribution of these finds shows that this act material belongs to one of the branches of the Grand Ducal Kyivan dynasty – Monomakhovych.

Poshtova Square is starting point in the development of historical and cultural tourist center

The unique monument of archeology and history ‘Site of the coastal city quarter of medieval Kyiv’ (11th–19th centuries) on one of the oldest squares – Poshtova Square has been the object of public resonance for more than two years and the subject of discussions about the creation of modern Archaeological Museum. The monument is a landmark area of about 6,000 m² of a multi-layered complex of remnants of the medieval quarter, with the remains of the planning structure, roads, protective walls, buildings of the estate. Remains of buildings found under the square are built of hardwood and pine wood. At present, the monument has been studied by archaeologists of the Center of Archeology of Kyiv to the level of the period of the end of the 11th–12th centuries (mark +100 according to the Baltic system) and preserves an even older cultural layer about 4–5 m deep.

Already during the research of the monument in 2014–2016, the planning structure discovered by archaeologists, the remains of wooden buildings and the findings of the medieval quarter on the Poshtova Square entered scientific circulation and aroused considerable interest of the international scientific community. However, by the beginning of 2018, the remnants of the quarter were threatened with destruction by many factors, which together opened the possibility for the construction of an underground shopping center. The very idea of protecting the monument and creating a modern museum on it prompted a large community of Kyiv from more than 15 public associations to launch an indefinite peaceful action on June 20, 2018, which continues to this day. On November 23, 2019, the peaceful action was recognized as a record of Ukraine (registration № 33 / 02–20207).

During the peaceful action, the monument gained national status at the initiative of its participants, and at the initiative of V. Biletsky and the support of the National Union of Architects of Ukraine, the first public competition for the best concept of the historical and cultural tourist center ‘Kyiv River Gate’ was held on Poshtova Square. The aim of the competition was to find the best idea for the

rehabilitation and development of the cognitive resource of the public space of the square, as an integral part of the center of Kyiv. The competition lasted from November 1, 2018 to July 19, 2019. In conducting the competition according to the rules set by the national legislation of Ukraine, we used an unusual technology – a series of expert discussions on urban, transport, historical, tourist, environmental context and provided a completely independent online evaluation for the jury. The winners of the competition were selected by a highly professional jury, and the best competition proposals were the concepts of professional teams of Kyiv architect Lyudmila Bazhenova and Igor Yurchak’s Creative Studio.

The results of the competition, as well as the idea of creating a historical and cultural tourist center ‘Kyiv River Gate’ combined with the marketing concept of V. Biletsky on the development of the territory taking into account the potential of Old Podil, State Historical and Architectural Reserve “Ancient Kyiv” and other areas of Kyiv were repeatedly presented both in the National Union of Architects of Ukraine and in the Kyiv City Council, as well as at the International Architectural Biennale in Krakow MBA Krakow 2019 in the section of concepts. The purpose of the concept of the Center ‘Kyiv River Gate’ is to change the attitude to cultural heritage as a ballast, to reveal its potential, to form a tourist network and to ensure sustainable development with efficient and balanced use of monuments of the oldest urban area of 175 hectares. After all, it is not enough just to create a museum on an archaeological site, it is important that it operates in the system of the tourist network. The concept is aimed at the development of historical and cultural centers as a significant resource for the development of society, culture, tourism, economy and defines their priorities. The foundation and basis of sustainable development of the historical and cultural center is a commercial activity with a wide range of functionality (Fig. 5).

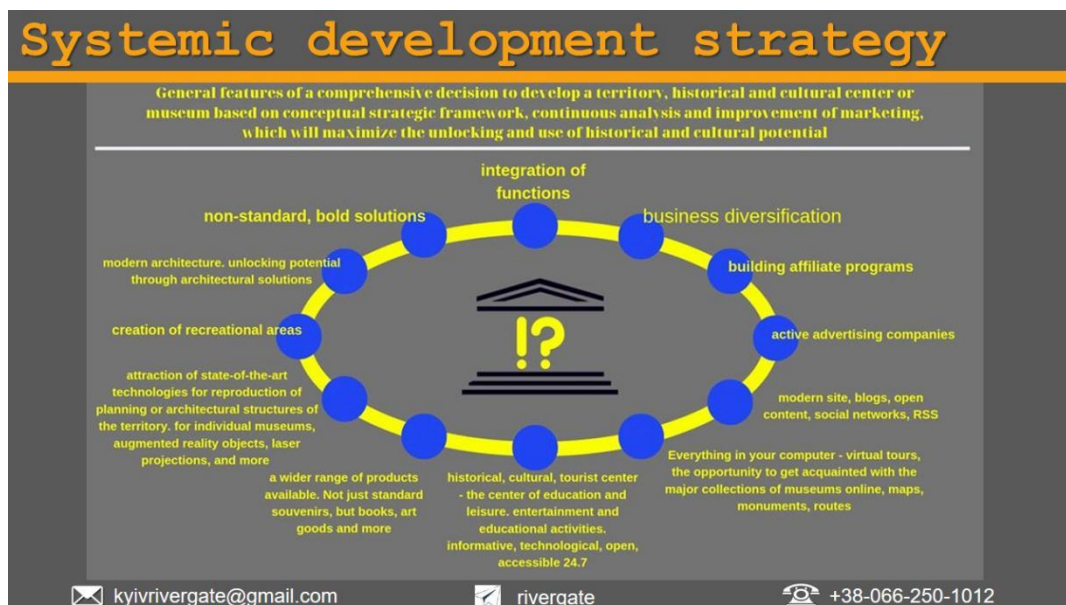


Fig. 5 Concept of development of historical and cultural centers ‘Kyiv River Gate’. © Authors.

An equally important component in the preservation, preparation for the exhibition of archeological monuments of the 11th–19th centuries on the Poshtova Square is the need to involve the maximum range of digital research technologies for a detailed assessment of possible options and volumes of conservation and exhibition. We insist on the maximum use of non-destructive research technologies, as the monument has, according to preliminary findings, another 4–5 m of cultural layer, which

contains the remains of the planning structure, buildings, individual finds of older times. Therefore, the facility needs the most thorough non-destructive testing with in-situ conservation. Full and detailed geo-radar scanning with detailed interpretation of results, laser scanning and 3D modeling, the most detailed photo and video capture of layered disclosure with the creation of an augmented reality channel, conservation, attribution and preservation for future exposure of existing stratigraphic profiles should be the basis of further scientific programs research.

Igor Yurchak' Creative Studio's Concept of the organization of the public space of Poshtova Square presents most comprehensive urban analysis of the location of the object in the body of the city as a result of detailed analysis the perception, accessibility, functional zoning, semantics and physical state of Poshtova Square, and gives the appropriate town-planning decision (Fig. 6).

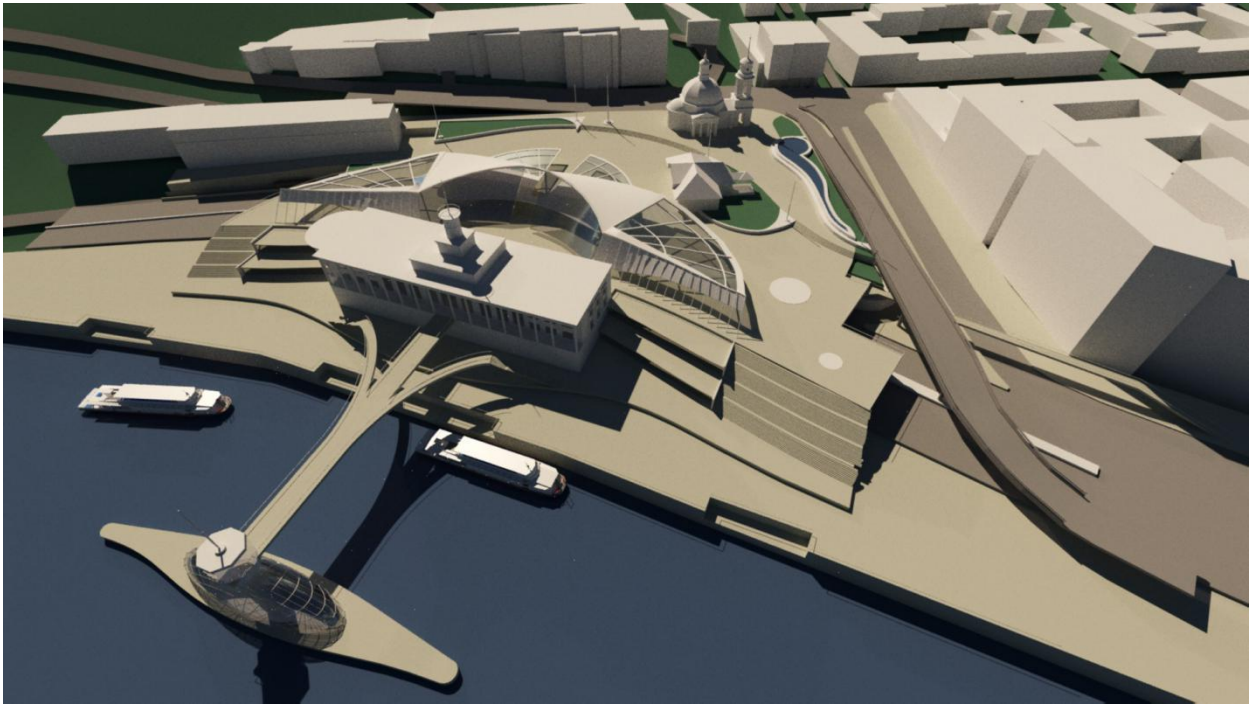


Fig. 6. View of the reconstructed Post Square according to the town-planning concept. © Igor Yurchak's Creative Studio.

Urban concept of the organization of the public space of Poshtova Square

Transport hubs and transits is a main city-planning problem in the space of the Poshtova Square. We propose to lay a number of routes of railway, surface and overground transport in order to arrange a comfortable stay on the Poshtova Square, coverage in a single picture of tourist tricks along the Dnieper, maximum restoration of today's isolated space of the square with its historical connections on the Podil completeness and integrity of the image of the Podil of Kyiv, most ancient part of Kyiv (Fig. 7). In order to arrange a comfortable space of Poshtova Square, to include it in the network of tourist accents along the Dnieper, to maximize the connection of the isolated space of the square with its historical connections at Podil and to form the integrity of the image of Podil on the map of Kyiv:

- Walking tram, to the south, along the "Arch of History" (9 stops), along the cliff above the Dnieper: past the memorial to Magdeburg law, the government quarter, past Askold's Tomb, the Park of Glory, steel sculpture Motherland, through the possession of Kyiv-Pecher Lavra, through the Dnieper Navodnytsky Park, past the Vydubychi Monastery and to the Botanical

Garden, with the possibility at the end of the route to change to a monorail for a walk to the Botanical Garden. The total length of the route “Arc History” is 7 km

- Carriage, to the north, along the small ring of Podil, the total length of the route is 2.8 km
- River tram along the Dnieper, to the south, from the legendary Prytyka to Navodnytsky Park, the total length of the river route – 5.5 km

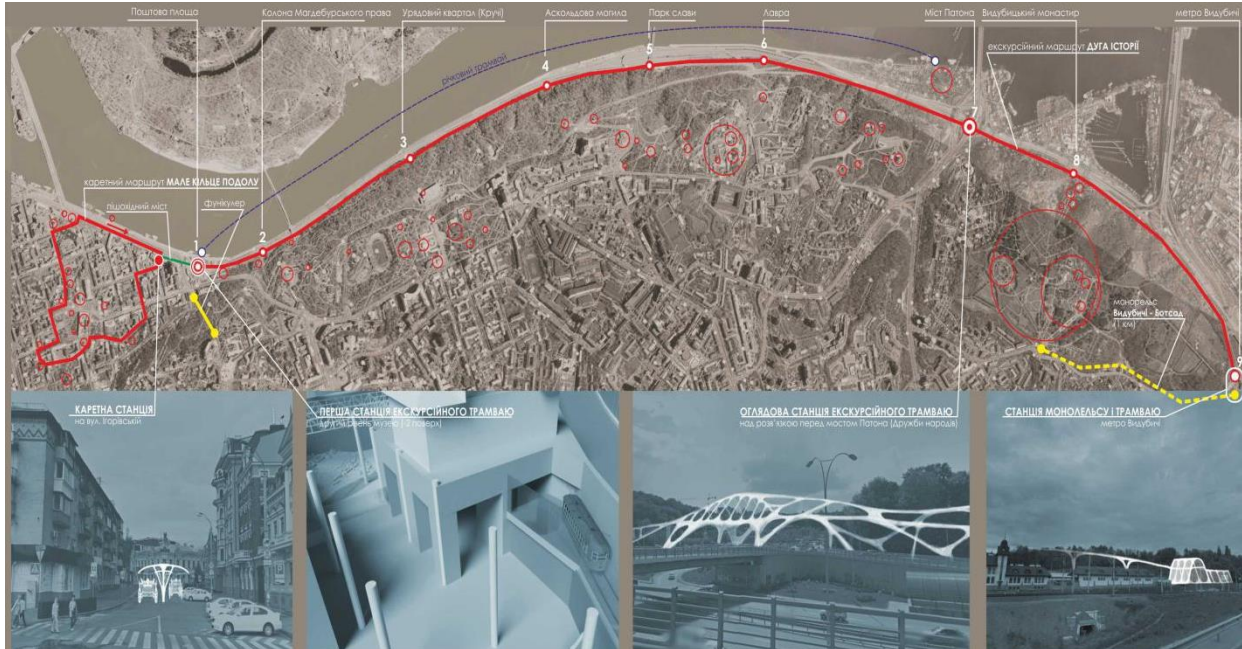


Fig. 7. Scheme of excursion routes adjacent to the Poshtova Square. © Igor Yurchak's Creative Studio.

Underground museum

Poshtova Square is a place where fateful events for Rus' took place, where the chronicle Pochayna River flowed into the Dnieper River, where Ruchai River met the waters of the main artery of the city from the slopes, where were built Prytyka (pier) and Khreschatyk Gate (customs). In addition, archeology reveals through the relatively shallow layers of coastal sediments the remains of buildings, courtyards and shops, which periodically together with climatic fluctuations, hydrological, tectonic and geological changes and anthropological influence, present true demonstration of history. Therefore, the arrangement of the underground museum of Kyiv history with in-situ conservation has become an urgent need given not only the majesty of events, but also the uniqueness of conservation the cultural layers of different historical periods as an example of integration strategies for archaeological heritage in urban context. The Underground Museum on Poshtova Square is a three-level space, which divided into three functional zones:

- Communication and transit zone, which forms the flow of visitors and their distribution in accordance with the program of stay in the museum (through all 3 levels)
- The zone of historical reconstruction, covering all three levels of the museum, two of which are in-situ conservation of archaeological finds at the site of the historical building (quarter) of the corresponding layer. Thus, the exposition of the museum will chronologically demonstrate 2 different cultural layers with the most preserved artifacts and the uniqueness of their occurrence.

- Interactive zone of the multimedia show – through -1, -2, -3 levels, where the history of Poshtova Square is presented using a creative digital product that creates a deep immersive effect (with 3D mapping, panoramic shooting, animation, acoustic and special effects). In addition, the design features provide natural lighting of all levels of the interactive zone through the transparent bottom of the Perun Fountain, which will add depth and effect.
- Underground exposition mine ‘Geology of Podil’ is an excursion route in a glass elevator with the ability to view the geological layers of Poshtova Square through all 3 levels

Exposition zoning

Level -1 provides a museum space with a children’s play area Kyiv Grad, an area of innovative education for groups of preschoolers and schoolchildren (3–5, 6–9, 10–13 years) and locations of partial review of the expositions of lower levels (Fig. 8).

1. Entrance distribution group
2. Elevator of the through underground exposition mine ‘Geology of Podil’
3. Observation deck of the panoramic layout ‘History of Podil’ (highest vantage point)
4. Kyiv Grad play area
5. Children’s interactive area (halls-transformers for mini-theater, lecture hall and games)
6. In-situ exposition zone of historical reconstruction ‘Prehistoric Kyiv’ (overview)

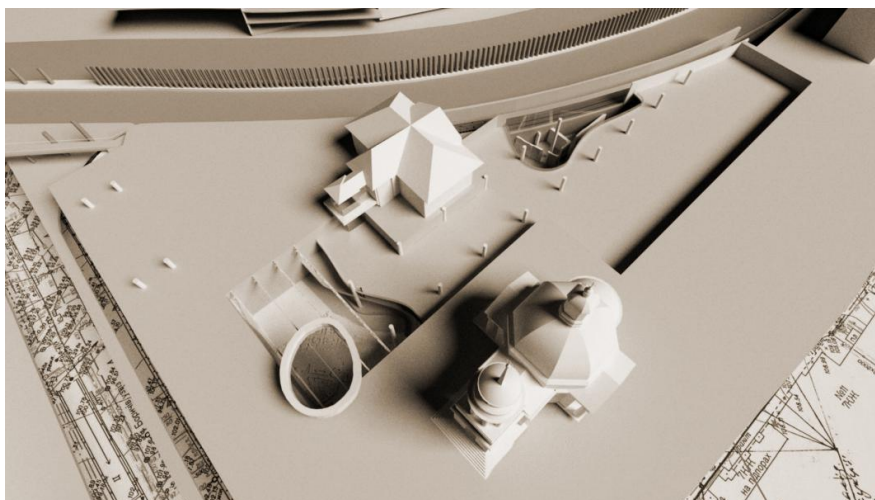


Fig. 8. Exposition zoning, Level -1. © Igor Yurchak’s Creative Studio.

Level -2 provides a in-situ museum space with the main exposition of historical reconstruction ‘The medieval quarter of the Kyiv Podil in the 15th century’ on the site of archeological finds and the area of partial inspection of the exposition of the lower level ‘Prehistoric Kyiv’ and the excursion tram stop along the ‘Arc of History’ (Fig. 9).

1. Entrance distribution group in Level -2
2. Elevator of the through underground exposition mine ‘Geology of Podil’ in Level -2
3. Observation deck of the panoramic layout ‘History of Podil’ in Level -2

4. The main in-situ exposition of the historical reconstruction 'The medieval quarter of the Kyiv Podil in the 15th century'.
5. In-situ exposition zone of historical reconstruction 'Prehistoric Kyiv' in Level -2

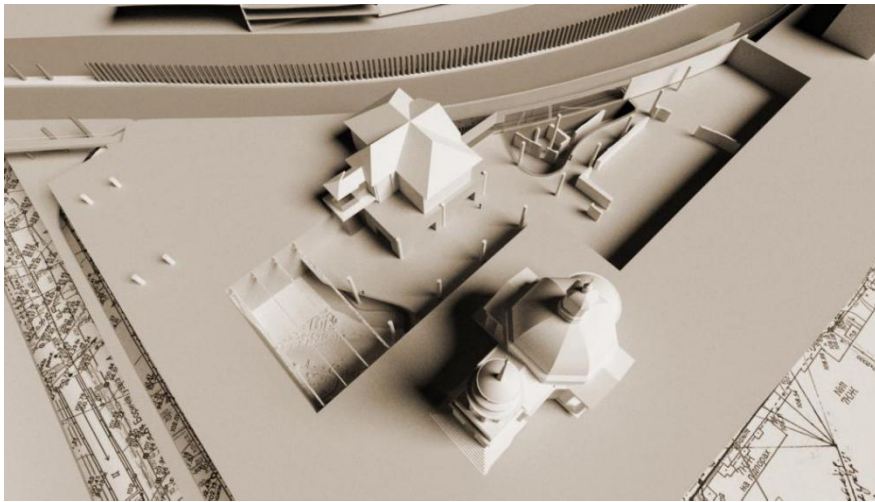


Fig. 9. Exposition zoning, Level -2. © Igor Yurchak's Creative Studio.

Level -3 provides a museum space with an arranged isolated transparent gallery exit of the subway, which is spatially zoning to 2 independent locations: the exposition of historical reconstruction 'Prehistoric Kyiv' on the site of authentic archaeological finds and the interactive area of the multimedia show from prehistoric times to the present (Fig. 10).

1. Entrance distribution group in Level -3
2. Elevator of the through underground exposition mine 'Geology of Podil' in Level -3
3. Isolated gallery exit of the subway
4. Interactive area of the multimedia show 'History of Podil' with an amphitheater
5. The main in-situ exposition of the historical reconstruction 'Prehistoric Kyiv'

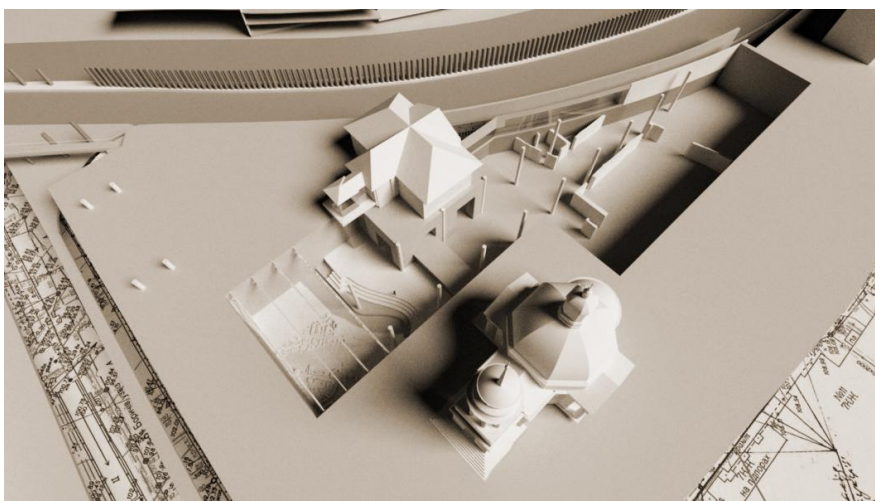


Fig. 10. Exposition zoning, Level -3. © Igor Yurchak's Creative Studio.

Conflict of Interests Disclosure

The authors declared no conflicts of interest.

Author Contributions

All authors contributed equally to the paper.

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