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Ayaz Kala, Uzbekistan. Practical training workshop on conservation of earthen structures in Central Asia and Afghanistan. Preventive conservation work

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► To cite this version:

Mahmoud Bendakir, David Gandreau. Ayaz Kala, Uzbekistan. Practical training workshop on conservation of earthen structures in Central Asia and Afghanistan. Preventive conservation work. CRAterre; UNESCO. 2006, pp.89. hal-04048289

HAL Id: hal-04048289

<https://hal.science/hal-04048289>

Submitted on 27 Mar 2023

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CentralAsianEarth

Ayaz Kala

Uzbekistan

Practical training workshop on conservation of earthen structures in Central Asia and Afghanistan

Preventive conservation work



CRATerre-ENSAG
Mahmoud Bendakir
David Gandreau

October 2006

CentralAsianEarth

Ayaz Kala

Uzbekistan

**Practical training workshop on conservation of earthen structures in
Central Asia and Afghanistan**

and

Preventive conservation work

October 2006

Mission undertaken within the framework of Central Asian Earth program, the UNESCO CCT project “Follow-up to the Director’s general Initiative for innovative and inter-sectorial Approaches to the Aral Sea Basin”, and the UNESCO activity “*Training in Conservation of Earthen Structures in Central Asia and Afghanistan, Sub regional cooperation among post-conflict countries*”

Report prepared by:

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Central Asian Earth is a programme of the World Heritage Centre of UNESCO realised in partnership with the National Institutions of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan) responsible for the conservation of immovable cultural heritage, UNESCO offices in Central Asia (Almaty, Tashkent and Tehran), other UNESCO divisions, ICCROM, ICOMOS, specialised institutions, and with the technical support of CRATerre-ENSAG.

Central Asian Earth aims at building capacity of the site-management authorities and technical experts in Central Asia for enhanced conservation, presentation, and management of the world cultural heritage or future world cultural heritage in this region through close co-operation at international, regional, and national levels.

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Views of Ayaz Kala

Opening ceremony of the training workshop

Acknowledgements

The organisation of the workshop and the preventive conservation works implemented at Ayaz Kala would not have been possible without the assistance and hospitality of the local and national authorities in Uzbekistan and the collaboration of UNESCO Tashkent office. Grateful acknowledgements are particularly due to:

UNESCO Office in Tashkent

Mr. Barry Lane, Head of UNESCO Office in Tashkent

Mrs. Dinara Abdullaeva, Secretary

Mrs. Guzal Bakhrambaeva, Administration Officer

Mrs. Elena Chemulova, Culture Officer

Mr. Sanjar Allayarov, Project Assistant

Ministry of Culture, Uzbekistan

Arch. Abdusafi Rhakmonov, Deputy Head/ Board of Monuments, Ministry of culture and Sports of the Republic of Uzbekistan

Mr. Kuvonch Sharipov, Head of Board of Monuments, Karakalpakstan

Mr. Khudaiberganov Rozimboy Atajanovitch, Head of restoration dpt., Ellikala District, Karakalpakstan.

Mr. Raimbay Babadjanov, Head of Inspection of historical monuments of Khorezm region (Khiva)

National experts

Mr. Rakhmatilla Salikhov, Architect

Mr. Abdulha Mamatkulov, Mason

and also :

Professor Yagodin, Archaeologist, Director of Archaeological Institute, Nukus

Mrs. A.V.G. Betts, Archaeologist, University of Sidney, Central Asian Programme

CRATerre-ENSAG

Mr. Thierry Joffroy, Director

Mr. Peeyush Sekhsaria, and Mr. Sébastien Moriset, architects

Mrs. Marina Trappeniers and Mrs Sylvia Bardos, administration

Ayaz Kala tour :

Mr. Zakir Nouratdinov

Mrs. Dilbar Karimberdieva

and finally

Mr. Artur Ambartzumyan, Translator.

The views expressed in this report are those of the authors, and not necessarily those of UNESCO or those of the Board of Monuments Protection of Uzbekistan. However, the mission was undertaken in a spirit of partnership and respect of all points of view, and efforts to prepare a synthesis have been made.



Ayaz Kala I. Main gate view from east

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Summary

Project background

Overall assessment mission (October 2005)

The preliminary overall condition survey carried out by Thierry Joffroy and Peeyush Sekhsaria in October 2005, has permitted to identify 3 categories of monuments at Ayaz Kala:

- the standing monuments such as the fortified elements (Fortress): Ayaz kala 1 and 2
- the ruined monuments, such as Ayaz kala 3 and N/E Bastion (watch tower)
- the archaeological remains and the excavated zones

The 2005 study concluded that those monuments are affected by 7 main erosion processes:

- Direct rainfall on the structures
- Circulation of water and water stagnation inside the structures
- Rainwater circulation within the structural elements
- Combination of humidity in structures and frost
- Presence of high water table
- Growth of vegetation
- Visitors

For each category of monuments, a series of treatments to be experimented at a reduce scale were proposed:

The standing monuments: For those monuments which are still standing but suffer from humidity and structural problem threatening their stability, urgent intervention is required. This can include the following actions:

- Propping
- Treatment of the surrounding environment (cleaning, drainage...)
- Superficial treatment to ensure a good flow of the rain waters
- Restoration of the wall base (re-pointing, replacing spoilt or missing elements...)
- Restoration of the walls (re-pointing, or re-plastering ...)

The ruined monuments: This category of monument has lost some structural elements which ensured its protection. Without a roof and without a resistant base, the walls are prone to a slow but continuous decay process. These monuments require a longer period of study and experimentation. Conservation techniques selected must be tested first before being applied on a large scale. The conservation techniques proposed for this type of monument include:

- Peripheral drainage
- Removal of the embankment below the undercut, and removal of the plants
- Structural reinforcement (stuffing and filling cavities)
- Sacrificial coating
- Protective coatings

The archaeological remains: Priority has always been given to new excavations, without implementing an efficient conservation policy. Some excavations have been left exposed to the rains and other agent of erosion. Some of the excavated monuments have partially disappeared and others are waiting for adapted technical solutions to protect them. The conservation techniques proposed for this type of monument include:

- Backfilling. This consists in covering the structures left open (filling the holes) to protect them. This technique can serve as a temporary or a final solution to protect the archaeological excavations against different erosion factors. It consists in covering the

structures left open after the archaeological investigation. Several backfilling techniques should be experimented.

- Protection and presentation. For ruins with high historical values, conservation of the ruins with minimal intervention could be an option. The ruins selected for presentation will need to be well studied, presented and protected.
- Creation of a drainage system to keep water away from the exposed structures
- Implementation of preventive conservation measures
- Definition of ways to protect the archaeological dig temporarily from rains between the excavation campaigns

Second mission (September 2nd to October 5th 2006)

Based on the results of the overall condition survey at Ayaz Kala and on the proposals made for its conservation, a second expert mission has been implemented in September, October 2006. (*Activities described in the present report*)

Terms of reference of the activity

As stated in the fee contract n°3240098761, between UNESCO Tashkent and CRATerre-ENSAG, the terms of reference of the mission related in this report were the following:

3. Within the framework of the UNESCO activity “Training in Conservation of Earthen Structures in Central Asia and Afghanistan, Subregional cooperation among post-conflict countries”, realize and implement the following tasks according to the recommendations and budget breakdown attached in annex to this contract.

3.1. Prepare an overall practical training programme for preventive conservation of earthen structures

3.2. Organize two expert missions (first expert during 28 mandays, second expert during 20 man days, August-September, 2006) to Ayaz Kala to prepare and undertake demonstrative preventive conservation works at selected places according to the report « Overall condition survey and proposals for its conservation » Ayaz Kala, Uzbekistan, by CRATerre-ENSAG, Novembre 2005

3.3. During the implementation of these sample works, organize a 5 days in-situ training workshop for 11 professionals from Uzbekistan, Tajikistan, Afghanistan, Kyrgyzstan, and Kazakhstan

3.4. Prepare a comprehensive illustrated report presenting and evaluating the practical training activities and the results of the on-site preventive conservation measures

3.5. Submit a financial statement with all supporting receipts and other supporting documents

Time frame and working methodology

The second mission to Ayaz kala was carried out from September 2nd to October 5th 2006 by CRATerre-ENSAG, represented by Mahmoud Bendakir and David Gandreau in collaboration with representatives of the Ministry of culture, namely Mr. Khudaiberganov Rozimboy Atajanovitch, Head of restoration dpt., Ellikala District, Karakapalstan and Mr. Raimbay Babadjanov, Head of Inspection of historical monuments of Khorezm region (Khiva)

1- Preparation of the mission in France and Uzbekistan:

2- Preliminary work at Ayaz Kala: 2nd - 3rd - 4th of September

The work accomplished during this phase includes:

- Site inspection
- Assessment and preparation of urgent needs for the mission in terms of capacity building, workers, equipment, tools and building material;
- Discussion on activities with UNESCO, national and local authorities;
- Selection of intervention zones and threatened structures
- Planning of mid to long-term conservation measures and preparation of an emergency preventive conservation programme

The persons involved were:

Mahmoud Bendakir (CRATerre-ENSAG), Barry lane, Sanjar Allayarov (UNESCO Tashkent), Abdussafi Rhakmonov (Ministry of Culture), Local authorities (Kuanisbek Joldasbekovich, Khudaiberganov Rozimboy, Raimbay babadjanov)

3- Implementation of preventive conservation works: 5th to 10th of September

The work accomplished during this phase includes:

- Identification of local building materials sources
- Experimentation on building material (Cob, rammed earth, plastering)
- Implementation of first preventive conservation measures in order to prevent fast deterioration of selected structures which are at risk;
- implementation of a series of emergency works to stop deterioration processes compromising the stability of standing buildings,
- Training of the local staff and from Khorezm region regularly involved in conservation activities through the above works.
- Archaeological cleaning of the main gate and documentation (Ayaz Kala 1)
- Superficial drainage with adjustments of the ground surface
- Treatment of the corridor at the western side of the main gate

The persons involved were:

Mahmoud Bendakir and David Gandreau (CRATerre-ENSAG), Local authorities (Kuanisbek Joldasbekovich, Khudaiberganov Rozimboy, Raimbay babadjanov), Local workers

4- Regional training workshop on preventive conservation: 11th to 17th of September

The work accomplished during this phase includes:

- Theoretical sessions
- Practical sessions
- Site visits
- Continuation of the preventive conservation works engaged at Ayaz Kala 1

The persons involved were:

Barry Lane and Sanjar Allayarov (Unesco Tashkent), Abdussafi Rhakmonov (Ministry of Culture), Mahmoud Bendakir and David Gandreau (CRATerre-ENSAG), Local authorities (Kuanisbek Joldasbekovich, Khudaiberganov Rozimboy, Raimbay babadjanov), Professor Yagodin, Professor Betts, Participant from Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Afghanistan, Local workers

5- Implementation of preventive conservation works: 18th to 3rd of October

The work accomplished during this phase includes:

- Training of the local staff and other participant from Khorezm region regularly involved in conservation activities through the above works.
- Preventive conservation of the main gate
- Treatment of the guard spots from sides of the main gate
- Superficial drainage with adjustments of the ground surface (treatment of water stagnation zones and canalisation of flow at main water exits)
- Treatment of the corridor at the western side of the main gate
- Treatment of the exit zones of the water flows
- Sample reinforcement of standing walls
- Preventive conservation of the excavated palatial building
- Cleanings and plant removal of the remains

The persons involved were:

David Gandreau (CRATerre-ENSAG), Local authorities (Kuanisbek Joldasbekovich, Khudaiberganov Rozimboy, Raimbay babadjanov), Local workers

6- Finalisation of the mission report: mid October

Recommendations adopted by the participants by the end of the training workshop

Ayaz Kala site as a part of the ancient Khorezm history represent a very important step in the process of the development of the golden ring region. This project should be developed as a pilot project in the widest sound strategy for the valorisation of Illik Kalla region.

Therefore all the participants to this seminar present at the cloture session agreed upon the following recommendations:

1. They stressed all together the fact that the site need urgent preventive conservation work in order to safeguard the most endangered parts of the site. The priority is given to the preparation of a preventive conservation plan
2. Local, regional and international partnership should be developed to insure the proper implementation of the objectives of the project
3. The documentation of the site should be completed. There is a need to gather all information concerning the site (archaeology, archives, publication, reports, references, bibliography...)
4. Archaeological survey should be implemented on international standards
5. Local capacities should be reinforced. Training programme should be developed involving the masons and workers from neighbouring villages
6. A monitoring programme should be developed in order to set a scientific and technical database for the study and comprehension of decay processes which affect the site.
7. Legal status of the site should be defined.
8. Fund raising from the increasing tourist activity should be organised
9. Draw up a map of urgent needs to define the priority of action
10. An action plan for middle and long term based on the previous activities should be drown up

Proposed future actions

The set of actions proposed hereafter is based on the discussion with the partners of this project, the recommendation adopted by the participants at the final session of the training workshop and the assessment of the situation made during the first CRATerre mission completed with the observation and the results of the second CRATerre mission.

Short term

- Develop the project engaged at Ayaz Kala as a pilot project for Ellik kalla region
- Assess the situation for the other sites of the Ellik Kala region
- Gather and study all the available documentation on Ayaz Kala and the other sites of the Ellik kalla region
- Equip the site with tools and vehicle adapted to the conservation works
- Implement a second series of in-situ works, including training of local workers
- Launch a set of experimental researches adapted to the condition of Ayaz Kala
- Do complementary monitoring of the structures with focus on AK1 and AK2.
- Prepare a preventive conservation plan for AK1, AK 2 and AK 3
- Improve the circulation of visitors
- Install very small orientation panels giving directions to interesting view points
- Reinforce the partnership between stakeholders
- Explore the possibility to set-up a permanent management mechanism

Middle term

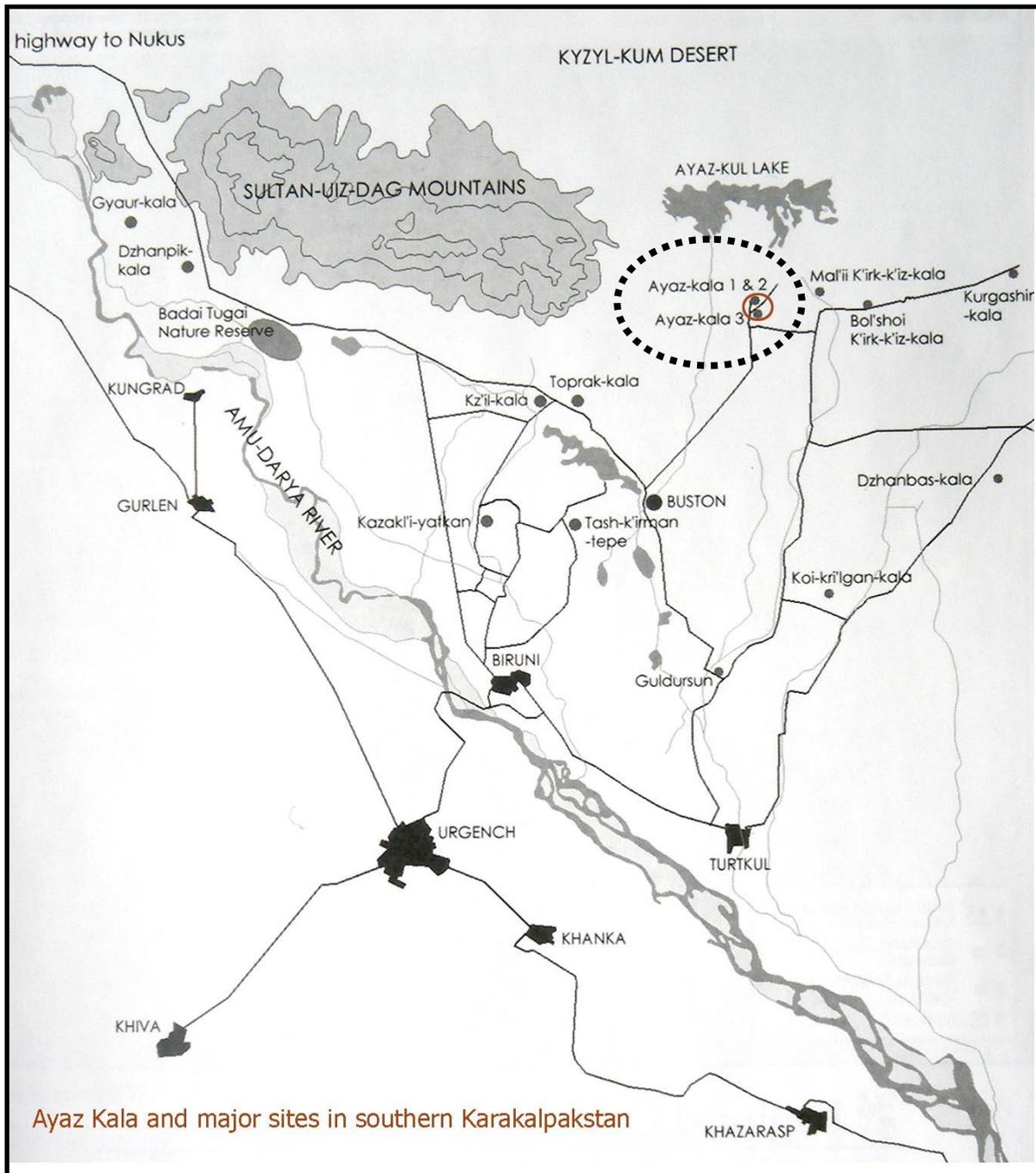
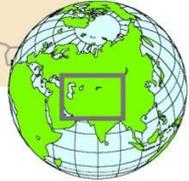
- Increase training activities to build capacities of the authorities in charge of the cultural heritage of Illik Kalla region
- Clarify the legal status of the site and its surroundings
- Ensure that the site can generate revenues that can be re-injected in maintenance (entry fee as well as other possible revenues from derived products)
- Study further possible investments that will not only benefit to Ayaz Kala tour, but also to the overall community of the area.
- Conserve the portions of the remains which are more meaningful. Those include the remains of vaults at Ayaz Kala 1, and the external wall of Ayaz Kala 2 which obviously needs treatment.
- Prepare a comprehensive management plan which will provide orientation for further implementation of conservation / valorisation activities at Ayaz Kala.
- Prepare a management plan for Ayaz Kala and the Earthen heritage of Ellik Kala region

What can be foreseen is that efforts for the long term will be to find ways of stabilising the state of conservation of Ayaz Kala. That will be done through two types of means.

First is to bring the structure to a state where there would have minimum possibilities for destructions and second is to set in place a precise monitoring system and a minimal maintenance schedule.

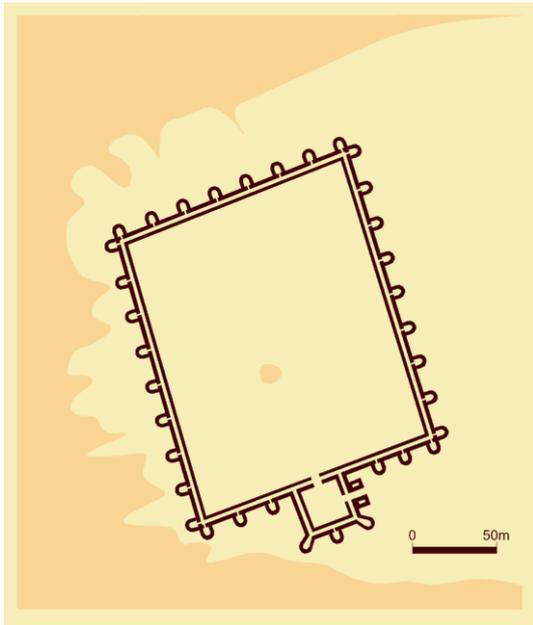
Minimal in the sense that there should not be any over maintenance work carried out as this would present the risk to completely change the aspect of the ruin.

The number and the variety of monuments in Ayaz Kala are an obstacle to cover all the pathologies of erosion, but also a pedagogic advantage. It offers an exceptional opportunity to work simultaneously on different types of structures, and develop a variety of solutions fitting each situation on one site. Most of the conservation problems observed in Ellik Kalla region can be identified in Ayaz kala and the experience which will be developed during this program will certainly benefit other sites in the region.



Ayaz Kala and major sites in southern Karakalpakstan

Ayaz Kala 1



From findings made by archaeologists, Ayaz Kala 1 would date back to the 4th – 3rd century B.C. It is located on the top of a flat hill which arose from marble shaped limestone of the Devon period. The height of the hill is approximately 100 m. This fortress has an area of 2,7 hectares and is rectangular in plan (182.5 x 152 m), with its main axis oriented South-North. On that axis, at the southern end of this rectangle, there is an additional square structure, which housed the entry (eastern side). This complex gateway is typical of Khorezmian frontier fortresses: “The approach lies parallel to the south east wall where invaders would be vulnerable to attack from above. A massive gateway defended by two rectangular towers leads into a small rectangular chamber overlooked on all sides by high walls from which bowmen could shoot at the enemy should the first gate be breached. A right angle turn towards the second gate leading directly into the fort would break the force of a charge through the first breach.” (Yagodin, Betts 2006)

The galleried enclosure of the fortress is composed of two walls with a vaulted corridor in between them. Above the vault, the walls continue so as to have a protected rampart walk. Inside the external wall, there are numerous arrow slits which also serve the purpose of rainwater channels. The total height of the walls has a maximum of 10 m. The thickness of the wall reduces gradually. At their base they are about 2,4 m and 2.2 m thick, respectively for the external and internal wall. The building material is adobe blocks, with a square shape (42x42 x 10 to 44x44x12). The vault is built in slices with bricks, rectangular in shape (42 x 16x 10).

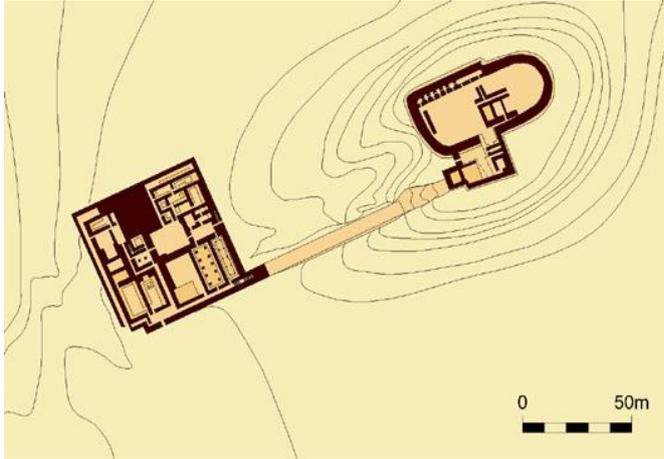
The walls are strengthened by forty five watch towers with a half elliptical form. They are located about 11,5 m one from the other on the northern side and almost 14 m on the eastern and western sides. The towers are not bonded with the main wall. In general the semi elliptical walls of the towers are filled with successive layers of adobe bricks. However, some of them were filled with small stones.

On the eastern side, one of the towers which has been gradually eroded shows the presence of an arch which, at the origin was most probably covering a rainwater exit. There is another arch/water exit on the Northern side, just after the second tower from the north-eastern angle. Most of the towers located on the eastern and western sides are half the height of those on the northern side.

The fortress is thought to have continued in use up to around the 1st century CE, although it may have provided refuge for local inhabitants well into the early medieval period.



Ayaz Kala 2



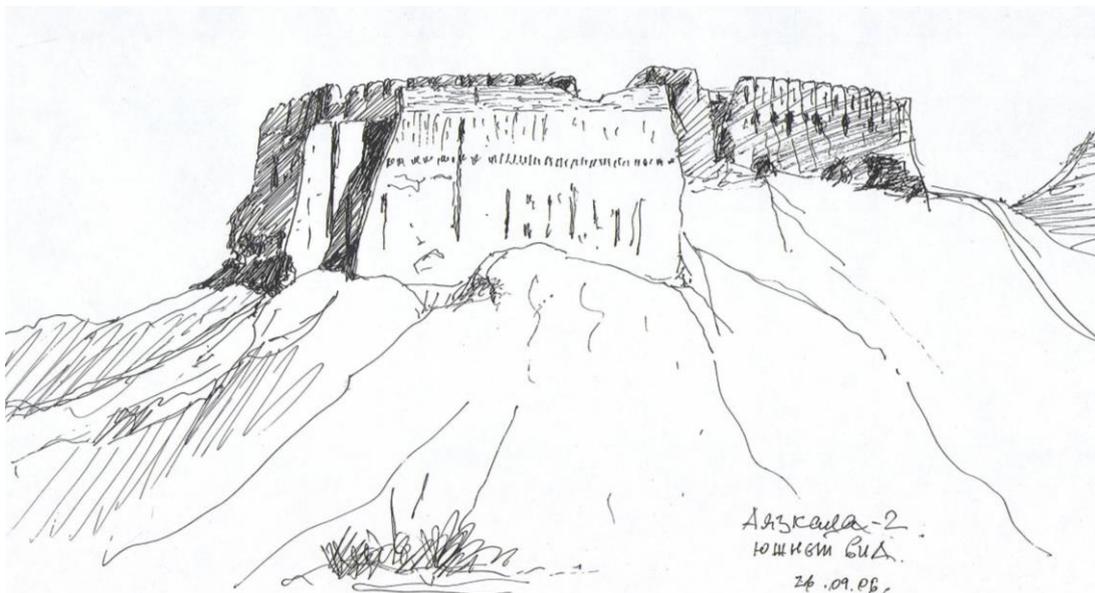
Ayaz Kala 2 has been dated back to the 7th – 8th century A.D., in the Afrighid period. It is built on the top of a smaller conical hill located south of the main hill on which Ayaz Kala 1 is built. The height of this hill is about 40 m above the plain. It is composed of very characteristic sandstone with numerous inclusions of iron concretions.

This little fortress which could have been used until the 13th century A.D. is composed of two main parts, the entry, located on the south western end and the main oval shape part.

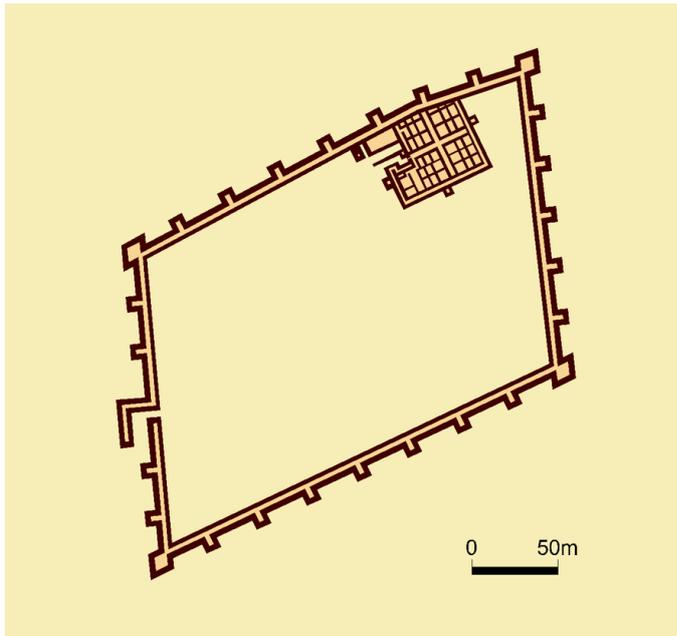
The entry is accessible by a long walkway (50 m ramp) which ends with stone steps at the level of the entry gate. It is composed of several sub parts. The entry seems to have been an inclined platform. On the southern side, there is a platform built of compacted soil inside an external wall built with Paksha (cob) with adobe bricks at its top. On the north eastern end, there are remains of a vaulted room.

Access to the main platform is not very clear. This platform is about 1,5 m higher than the lower one. It is built of layers of adobe bricks laid inside a corrugated external wall built with Paksha (cob). The overall shape of the wall is oval, but the western end is almost circular and in the central part, the walls are almost straight. The corrugations correspond to the location of the gutters and thus are present only where there was a need to get water flow out of the structure. They have a very regular shape and size. Walls have a trapezoidal shape, with a much larger size at the base than at the top. The height of the parapet is rather limited as compared to Ayaz Kala 1 with a height of about 1 m. On the western end of the platform, there is a large “well”, about 15m diameter and 3.5 m deep, where rocks are visible.

The film “Gengis Khan” was shot at Ayaz Kala 2. At this occasion, some of the walls were “repaired” and the entry gate “rebuilt”. There are no documentation of these works, however the additions can be detected as the adobe bricks used are of smaller size than the original ones



Ayaz Kala 3



The site is about 5 hectares in area and the enclosure walls date to the 1st -2nd centuries AD, while a monumental building in the north-east corner may have an earlier foundation date around the 5th - 4th centuries BC.

The enclosure wall is one of the largest fortified fortresses which can be found in Karakapalstan. It has a shape close to a parallelogram with dimensions 260 x 180 m. The structure of the external wall is very similar to that of Ayaz Kala 1, with a total width of 7.5 m. The watch towers have a circular form. Their size averages 8 m. All elements were built with paksha (cob) at their base with masonry for the upper parts, made of adobe blocks of a similar size to that of Ayaz Kala 1. The fortress has its entrance on the western side. It is composed of an extension of the external

wall which forms a S shape plan. Inside the fortress is mainly empty.

The remains of the monumental building in the north-east corner include numerous rooms, with a total area of 2400 sq mts. The building however appears to have four main parts which could have housed 10 dwellings. There are remains of narrow corridors on three sides of the building. Southern and Eastern walls have in their centre small square shaped watch towers, 1.9 x 1.9 mts.

“It is likely that Ayaz Kala 3 was used in Kushan times in the first centuries AD as a garrison, or possibly as a ruler's residence and refuge for the local farming population, while a small force may still have manned the old Ayaz Kala 1 fortress on the hilltop simply as a lookout post.” (Yagodin, Betts 2006)



Other remains

Besides these three main elements of the site, numerous other structures had been built. Some might not have been discovered yet but there are today several other visible remains. Those comprise the following.

At the base of Ayaz Kala 2, there are very visible remains of a palatial building which have been excavated extensively. A ramp once extended the two monuments. This palace has been described as the most beautiful early medieval building in all of Central Asia, “with its large columned halls, elegant bench seating, ceremonial platform, wall murals, and fire sanctuary. Coins of the Afrighid Khorezmian kings were found here, notably those of king Bavik. This palace was built around the 4th century AD and was later destroyed by two successive fires. It was briefly reinhabited as a domestic dwelling in the 6th/7th centuries AD.” (Yagodin, Betts 2006)



South of this ensemble, there were remains of what were probably houses. Those have also been excavated very extensively. But as they are in a more humid zone, and probably built with soil of lesser quality, those are nowadays very much destroyed.

Surrounding the enclosure of Ayaz Kala 3 were found the remains of many farmsteads with dwellings, fields, field walls and vineyards. The remains of those are also very poorly visible today.

A watch tower is located on the north eastern side of the main hill. It allows observing the overall northern side as well as the eastern side.

The lake

One of the important assets of the site, examined within its overall environment is the lake, as it is very probable that the lake itself had also a protective role. It is the first barrier on the side of the arid zones located north of the Khorzem Oasis. Moreover, it appears that the lake is not fully natural and, as is the case today, there was in ancient time a canal which allowed flow of water from the Amou Daria to the lake. That has been and is still making the lake larger than its natural size, and so making it a better “natural” defence.

The lake is likely to serve as an important stop for migratory waterfowl that fly through this area towards their wintering grounds in Asia. The islands in this lake serve as an important nesting ground for terns. This has been confirmed through the investigations by a Danish bird watching group that spent some time at Ayaz Kala Tours. The potential importance for birdlife and other wildlife of this lake and its surroundings should not be underestimated and care should be taken to maintain the pristine nature of this lake and its environs. Members of Ayaz Kala Tours have also mentioned the presence of the *caracal* and *lynx* (wild cat species) in this area. Further investigations should be carried out.

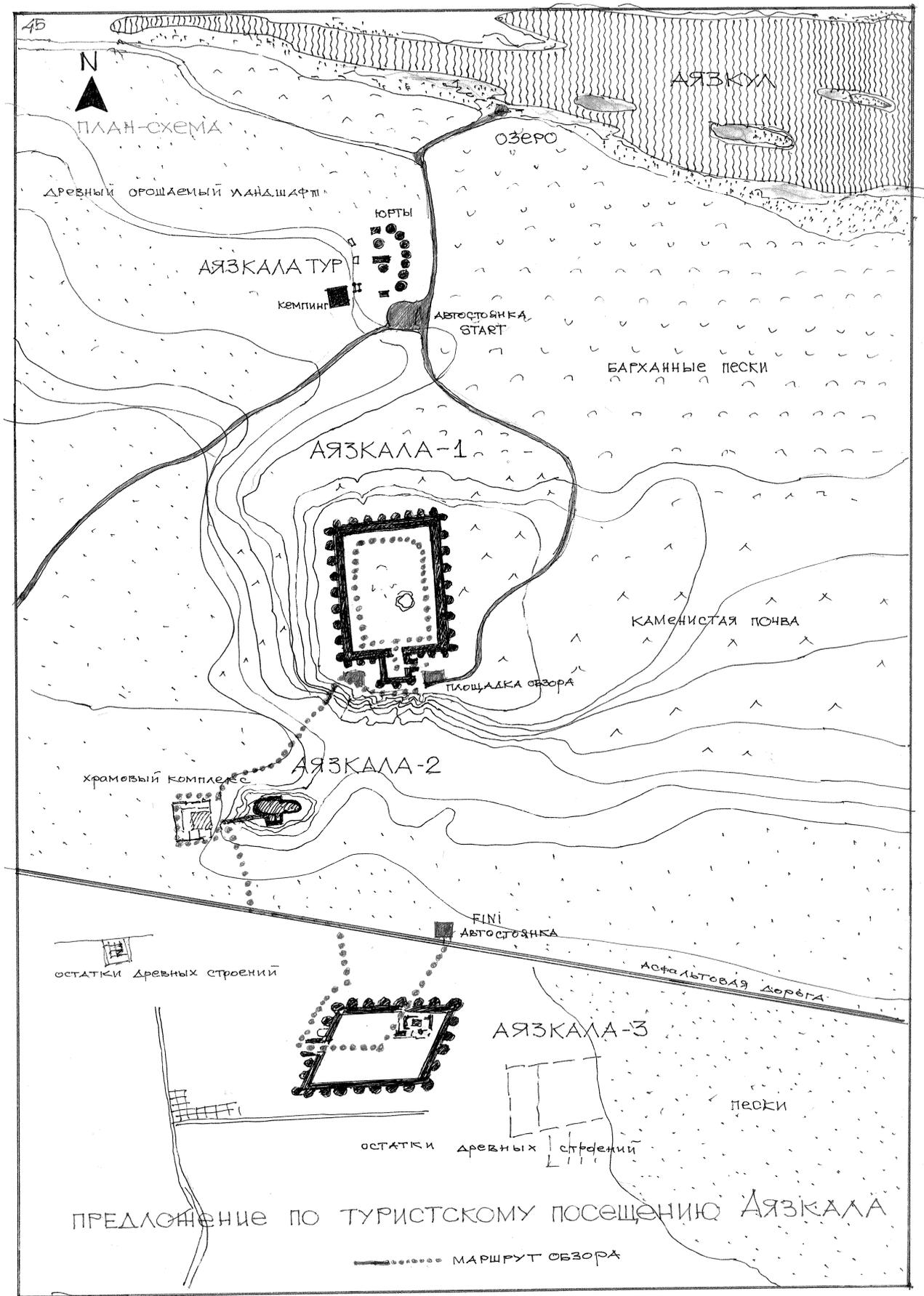


AyazKala tour

Most of the land around the fortresses belongs to Ayaz Kala tour, a private firm which organises tours for tourists. Its core activity is through a youth camp which serves as an hotel and restaurant, but are also organised tours to the fortresses, tours in camel and various activities around the lake, including boating, swimming and birds observations.

Ayaz Kala is easily accessible from Urgentch (and therefore from Khiva). Access is through 70 km of bitumen road. There are just some 2 km of earth/stone/sand road at the end of the journey which allows reaching the Yurt Camp. Almost all places of interest can be accessible by vehicle. However, visits to the fortresses are mostly done by foot. There are numerous footpaths, some of them being rather rath (Ayaz Kala 1 to Ayaz Kala 2).





2. Preventive conservation programme

2.1 Preliminary work

2.1.1. Discussion on the activities with UNESCO Tashkent and the national authorities

A site inspection was carried out on 3rd and 4th of September, in presence of the national, regional and local responsible in charge of the project. The discussions engaged on site lead to the conclusion that the intervention should better be localised on two zones due to the difficulty to accede many parts of the site: Ayaz Kala 1 and the excavated palatial temple down of Ayaz Kala 2. Grouping most of the interventions on limited area was also seen as advantage in terms of training and visibility of the work accomplished.

The cause and effects of the threats affecting those two zones were examined and a series of responses aimed at reducing their impact was proposed. Finally, a list of urgent works to be implemented was established. This list covers different pathologies of erosion which represent the most common problems observed on the site.



2.1.2. Work plan

The zones selected for intervention during the site inspection and the conservation programmes established were as follow:

1. Preliminary researches on materials and supplying at the site
 - Identification of local building materials sources
 - Experimentation on building material (Cob, rammed earth, plastering)
2. Archaeology and Conservation works at Ayaz Kala 1
 - Archaeological cleaning of the main gate and documentation
 - Preventive conservation of the main gate
 - Treatment of the guard spots from sides of the main gate
 - Superficial drainage with adjustments of the ground surface
 - Treatment of the corridor at the western side of the main gate
 - Treatment of the exit zones of the water flows
 - Sample reinforcement of standing walls
3. Preventive conservation of the excavated palatial building
 - Cleanings and plant removal of the remains
 - Sample superficial drainage with adjustments of the ground surface

2.2. Implementation of preventive conservation techniques

2.2.1 Preliminary researches on materials

Identification of local building materials sources and supplying

Many soils of different composition, colours and characteristics are available in the surrounding areas of Ayaz Kala: From white to dark brown soils, and from clayey to gravelly soils. Variety of sands; gravels and stones is also rich. This important diversity of resources offers many interesting possibilities for conservation and the first experiments are really promising.



31 trucks of soil have been delivered to repair the access road and allow the circulation to the main gate of Ayaz Kala 1. 6 trucks of brown soil and 6 others of green soil, 10 water tanks, about 2000 mud-bricks of different sizes, gravel, straw and all the equipment and tools were then brought directly the conservation site.



Samples of soils and material exhibited at Ayaz Kala to show to the local workers, the national authorities and the participants of the workshop the variety of resources available in the close surrounding of Ayaz Kala

Experimentation on building material (Cob, rammed earth, plastering)

A preliminary series of tests has been carried out to analyse the soils found around the site and find the most suitable ones for each technique of use:

Cob: first experiments showed lot of cracks and problems of adherence with the support. This has been improved by adding sand (1 for 8 in volume) and more straw in the mud mixture.



Rammed earth: Tests have been developed with a soil green in colour found 3 km at the east of Ayaz Kala which appeared to be gravelly. The results are quit efficient after ramming. Gravels have been added on the surface to reduce the speed of erosion due to rain waters.



Plastering for Ayaz Kala (outside): After one week, the soil mixed with water and straw starts to smell moisture. This attention given to the soaking period has permitted to avoid the apparition of cracks which occurred with the first tests done with soil mixed with water for only one or two days.



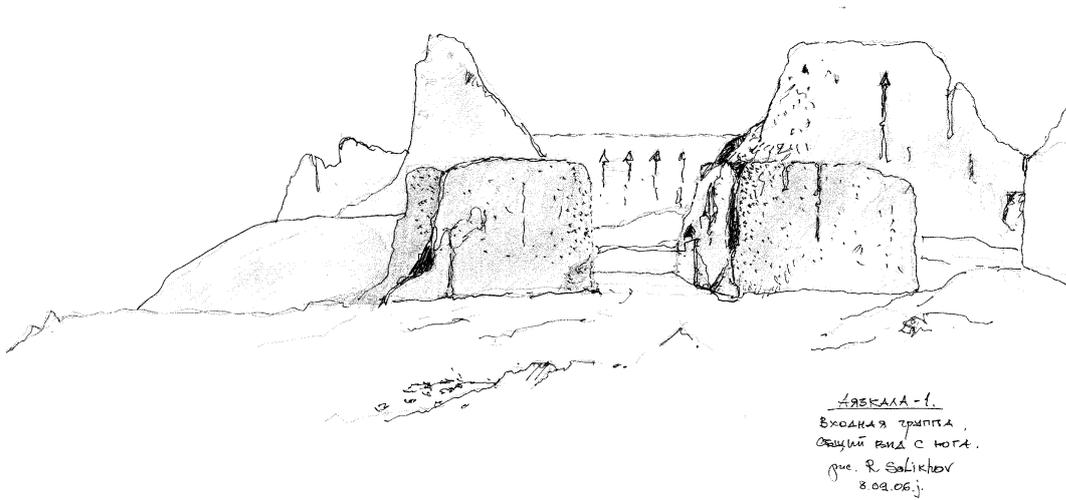
Plastering for the winter camp of Ayaz Kala tour (inside): Mixed with sand from the desert and water (1 soil / 1 sand, in volume), the red, yellow, green, brown and white soils found close to Ayaz Kala have given very goods plastering. Those are easy to reproduce and would be especially appropriated to decorate the rooms of the winter camp build near the yurts.

However further researches should be done to explore the high potentials offered by such a diversity of soils.



2.2.2 Archaeology and Conservation works at Ayaz Kala 1

Archaeological cleaning of the main gate and documentation

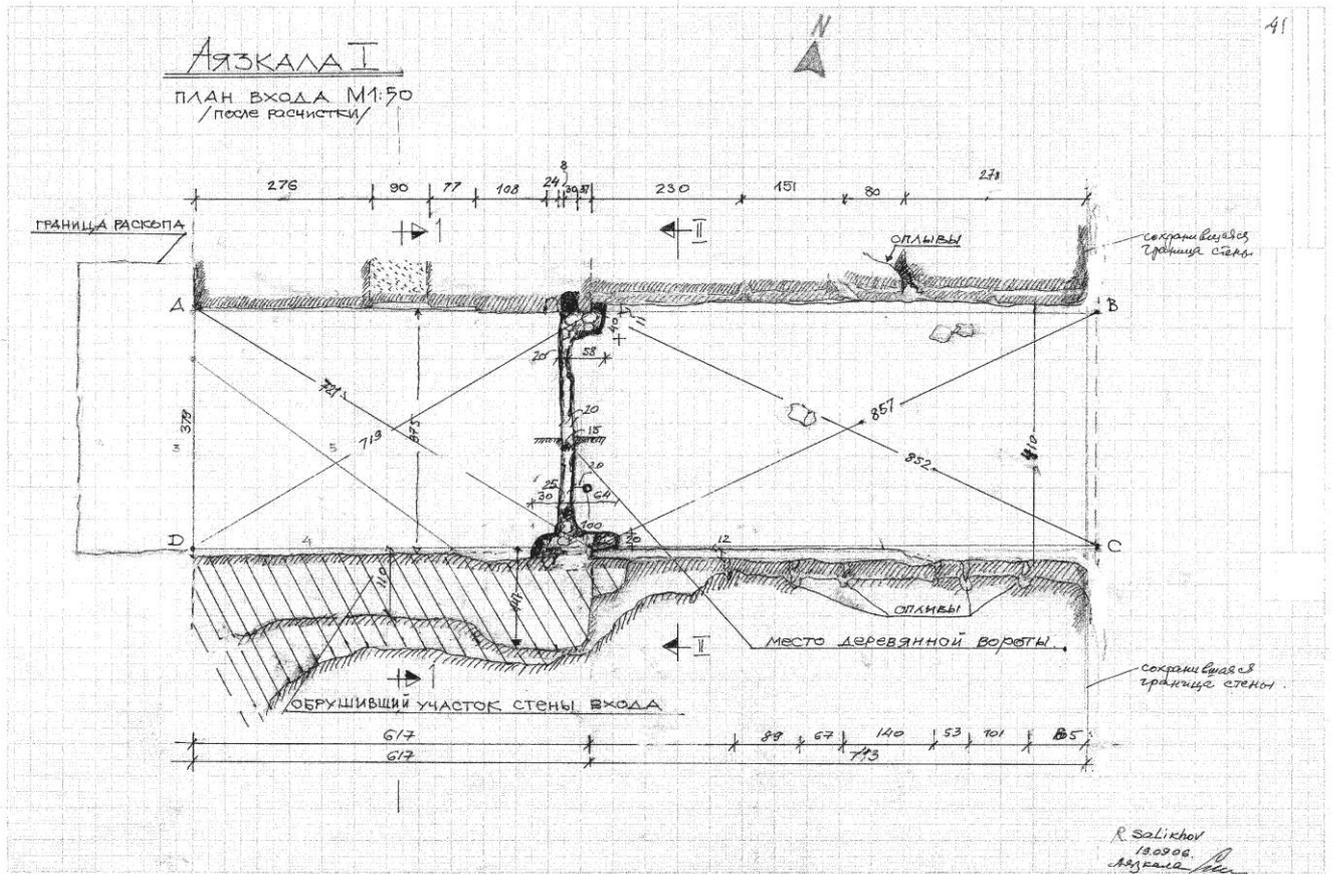


All the rain water collected in this first courtyard of the citadel were evacuating by this depression which goes inside the southern wall of the gate, causing important degradations. The zone has been cleaned with archaeological care and the surface modified to allow a proper drainage through the gate





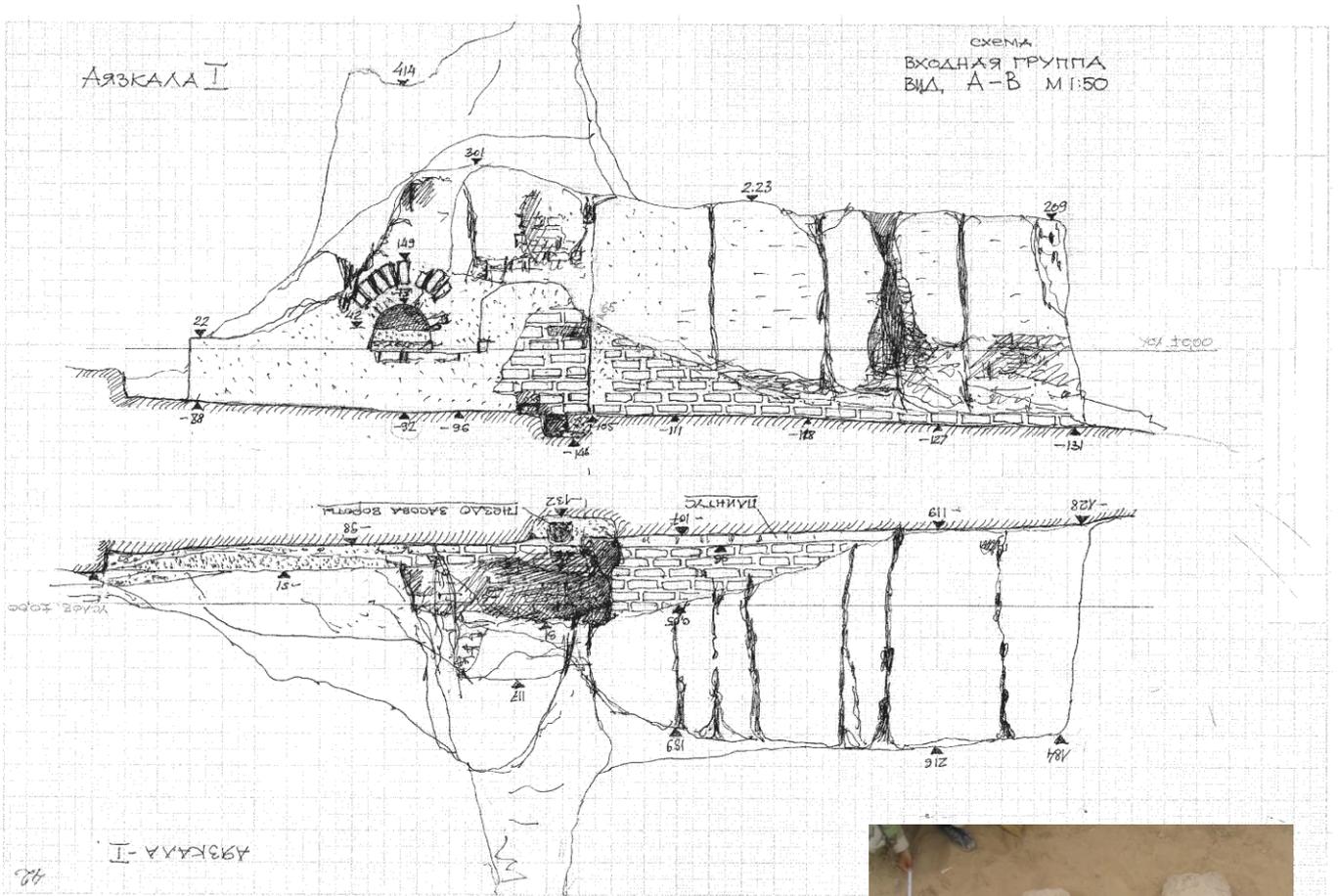
Archaeologists at work



Piece of wood

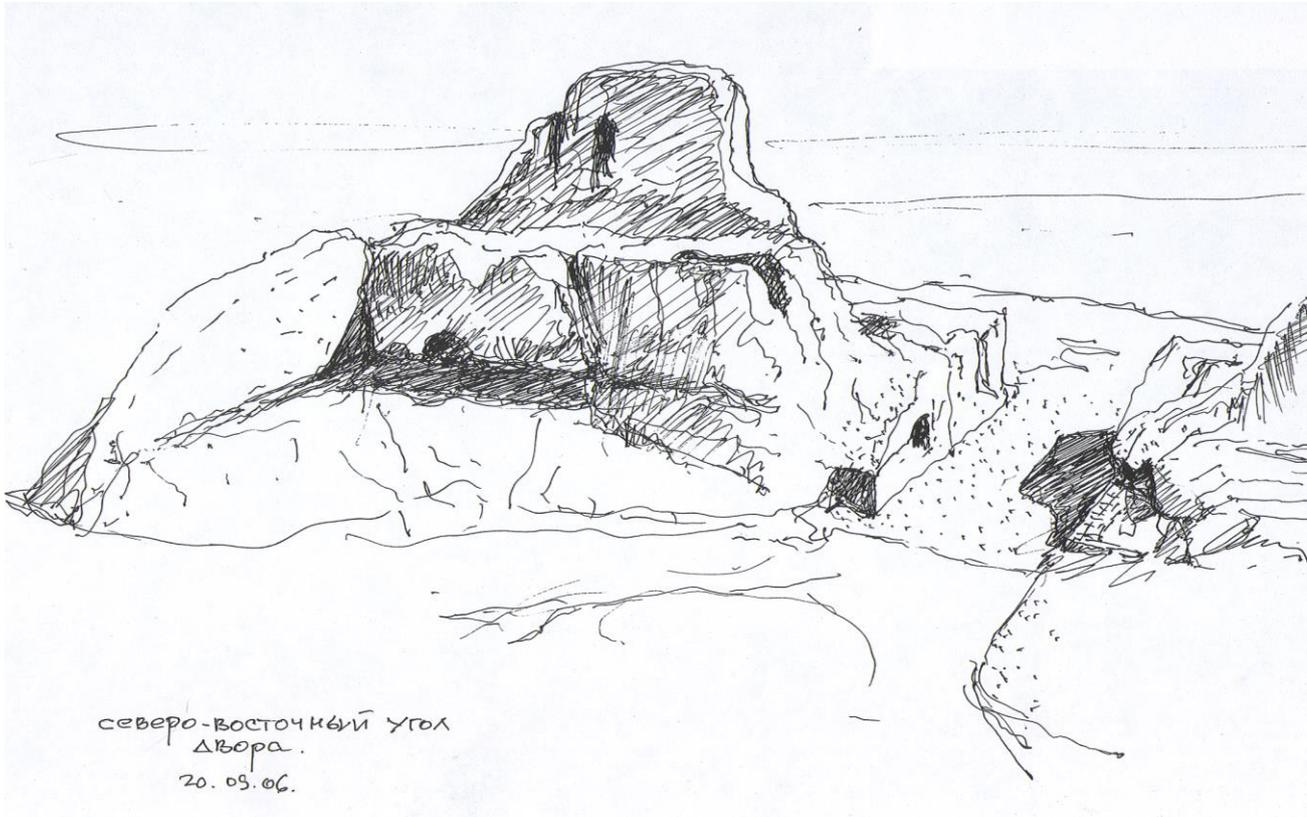


Circulation ground of the gateway and traces of a wooden massive door



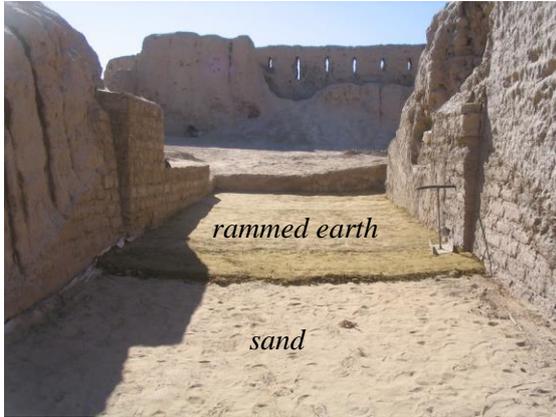
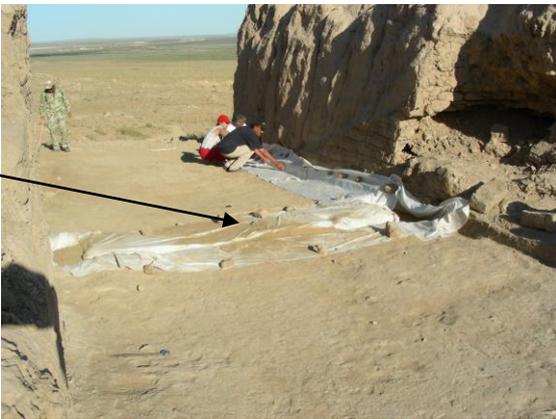
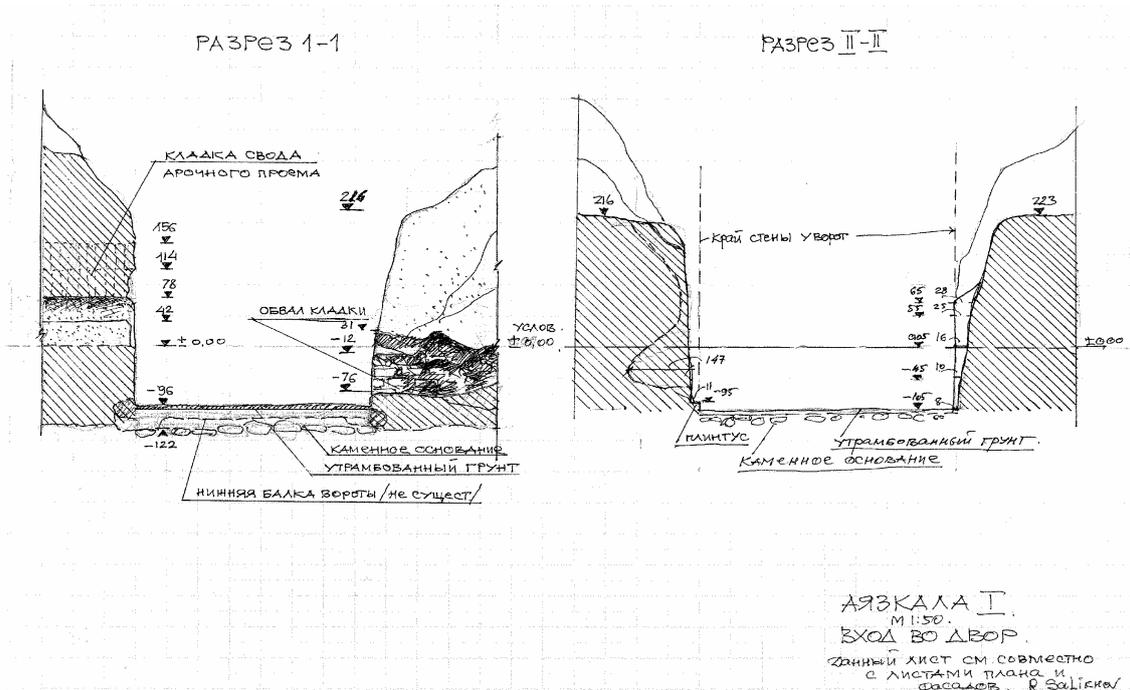
Sides of the gateway (elevation), mud-bricks (coming from the upper structures of the gateway?) and successive destruction/erosion/sedimentation layers discovered by archaeologists

Preventive conservation of the main gate



The Preventive conservation techniques implemented to protect the main gate just after archaeological cleaning include:

- Protection of the fragile evidences with geotextile (traces of a massive wooden door)
- Addition of protective layers of sands and rammed earth on the circulation ground (18 cm)
- Addition of an embankment along the walls
- Restoration and partial restitution of the south western wall of the main gate
- Plastering of the well preserved walls on both sides of the gate



Preventive conservation of the circulation ground of the main gate and the traces of the wooden door just after archaeological cleaning.



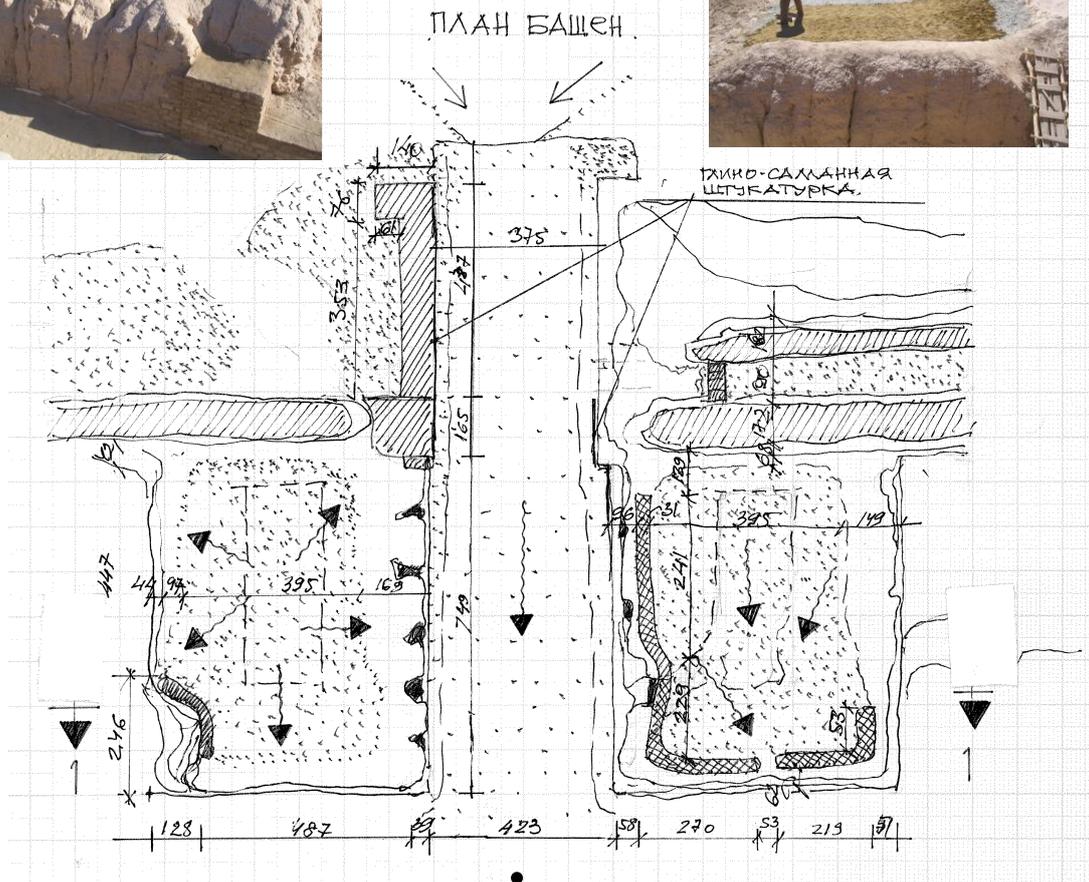
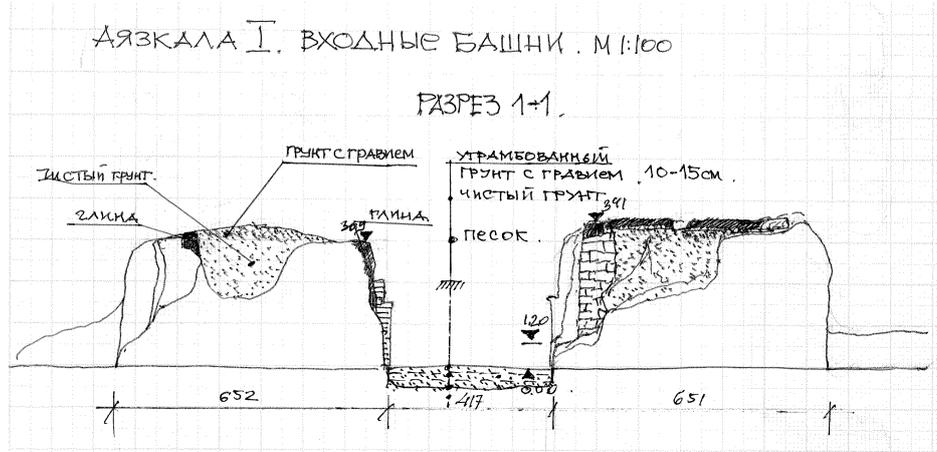
Restoration and partial restitution of the south western wall of the main gate, heavily affected by erosion. The new masonry will avoid further degradation of the original wall by channelling the water flows away from it



Protective plastering of the walls on both sides of the main gate

Treatment of the guard spots from sides of the main gate

The two rectangular towers situated one both sides of the main gate have suffered the typical erosion processes which have affected most of the forty five watch towers of Ayaz Kala 1. The rain waters are retained inside the towers and create huge gullies to evacuate at the bottom. Decision was taken to backfill those towers, add a protective top and treat the gullies. This experimental work will serve to evaluate the techniques and estimate if it can be extended to other towers

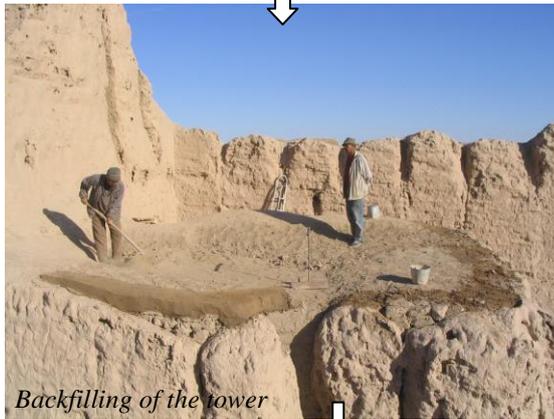


South rectangular tower

North rectangular tower



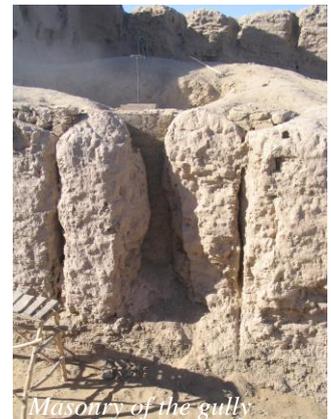
Original state



Backfilling of the tower



Protective top



Masonry of the gully



After conservation

North rectangular tower



*South rectangular tower
Application of soil mortar as sacrificial layer on gullies dug by the rain flows*

Superficial drainage with adjustments of the ground surface

Superficial drainage of the structures is crucial in Ayaz Kala as most of the decays are due to water stagnations and water flows. This work has been generalised to the whole gateway and the first courtyard with adjustment of the surfaces and addition of embankment made of rammed earth along the walls

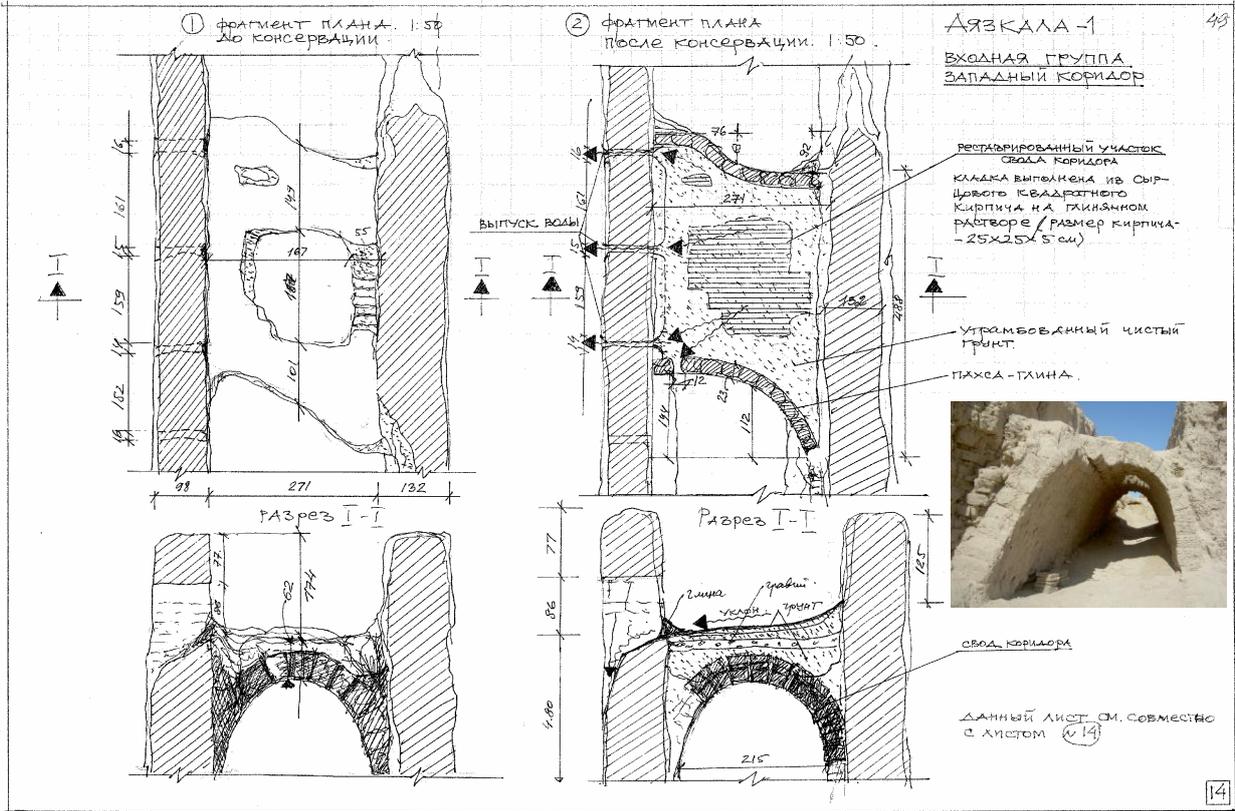




*Views of the gateway at Ayaz Kala 1,
Before / after archaeological cleaning and preventive conservation interventions*

Treatment of the corridor at the western side of the main gate

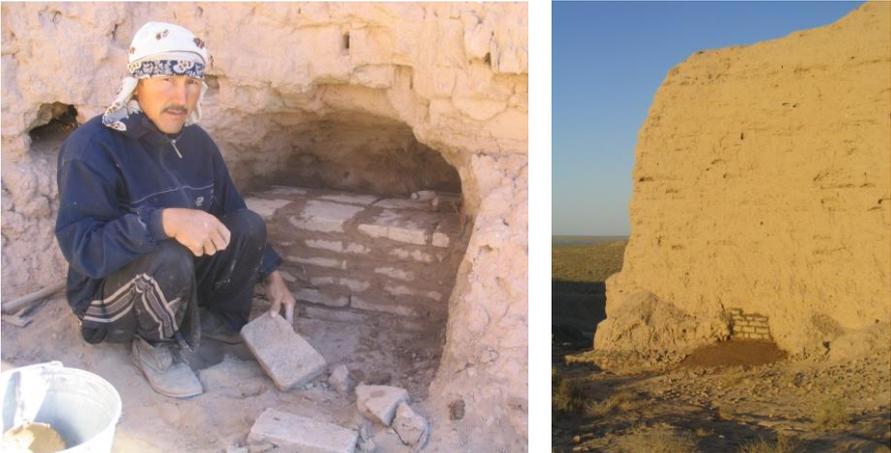
The majority of the vaulted corridors which surround Ayaz Kala have collapsed, but some remain and they must be conserved in priority as they are the last visible evidences of this particular system. The work accomplished on the vault situated on the western side of the main gate consisted on repairing part of it (filling the void which was the starting point of punctual erosion) and to ensure a proper drainage on top of it.





Drainage of the corridor

Other interventions at Ayaz kala 1



Sample reinforcement of standing walls



Treatment of the exit zones of the water flows on the eastern side of Ayaz Kala with addition of a embankment made of stone masonry along the most affected wall

2.2.3 Preventive conservation of the excavated palatial building

Cleanings and plant removal of the remains



Two days were dedicated to the removal of plants and trees growing within the remains of the temple

Superficial drainage with adjustments of the ground surface



The preventive conservation techniques of superficial drainage were also employed on the remains of the temple

2. Practical training workshop

2.1. Structure of the workshop

The practical training workshop on conservation of earthen structures in Central Asia and Afghanistan extended over a six-day period from 11th to 17th of September 2006. The workshop was structured to include:

- General presentation of Ayaz Kala and the regional historical context.
- Theoretical sessions on preventive conservation issues.
- A comprehensive visit of Ayaz Kala followed by practical sessions where participants could plan and implement several preventive conservation techniques.
- Small group exercises and plenary sessions where participants could debate and expand on issues emerging from the practical sample works implemented.
- Participants also had visits at the archaeological site of Tash-k'irman, conducted by Mrs Alisen Betts (University of Sidney) and at Kz'il-Kala.

The first two days were devoted to an introduction of the training programme, the participant presentations and the theoretical sessions. This was followed by 4 days of on site practical training and visits of surrounding sites. The workshop concluded with a discussion and the adoption of recommendation for Ayaz Kala. Finally, a visit to Khiva was organised, followed by a reception offered by the mayor of Khiva.

2.2. Theoretical sessions:



The participants of each state party have delivered presentations regarding conservation issues in their countries and their experience in the field. The case studies presented have led to open discussion and debates on the conservation principles.

Theoretical sessions were also delivered on the following topics:

- Historical background of the ancient Khorezm
- Problematic and methodology of the conservation of earthen structure
- Preventive conservation: principles, ethics and practices
- Management planning: designing a conservation plan

At the end of the workshop, participants have presented the reports of the preventive conservation techniques implemented by each group and discussed the results obtained.

2.3. Practical sessions



- Site condition, analyses on major threats and decay processes, discussion on proposed conservation techniques



- Documentation



- Conservation of archaeological remains just after excavation



- Preventive conservation techniques

2.4. Site visits with participants



Tash-K'irman-Tepe



Kz'il-Kala



Khiva, Ishan Kala

Appendixes

- Agenda of the practical training workshop on conservation of earthen structures in Central Asia and Afghanistan
- List of participants to the training workshop
- Mission schedule
- List of workers involved in the preventive conservation activities
- List of material, tools and equipment
- Plans and drawings



UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

AGENDA

PRACTICAL TRAINING WORKSHOP

PREVENTIVE CONSERVATION OF EARTHEN STRUCTURES IN CENTRAL ASIA AND AFGHANISTAN

Ayaz Kala, Uzbekistan
11-17 September 2006

PROVISIONAL PROGRAMME

MONDAY, 11 SEPTEMBER

Arrival of participants to Tashkent (in accordance with air schedule), transfer to hotel, accommodation in “Grand Orzy” hotel

Departure of participants for Ayaz kala (by bus)

Departure of participants by flight “Uzbekistan airways” Tashkent-Nukus

Arrival to Nukus (by flight), transfer to Ayaz kala by bus

Arrival to Ayaz kala (by bus), accommodation at Ayaz kala yurt camp

TUESDAY, 12 SEPTEMBER

08:00- 09:00 Breakfast

09:00- 09:30 Registration of the participants (venue: Ayaz Kala yurt camp)

Session I
Opening Ceremony
Moderator: Mr. Abdusafi Rakhmonov, Deputy Head, Board of Monuments of Ministry of Culture and Sport of the Republic of Uzbekistan

09:30- 10:00 Welcome speech by Mayor of Elik-kala region
Opening speech by Mr. Michael Barry Lane, Head of UNESCO Tashkent Office And by Mayor of Khiva and Beruni city

10:00- 10:15 Introduction of participants

10:15- 10:45 General presentation of the training workshop programme
By Mr. Mahmoud Bendakir, CRATerre

10:45-11:00 Coffee/tea break

11:00- 13:00 Country papers: Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Afghanistan
Each state party delivers a presentation of 15 minutes regarding conservation issues and their experience in this field.

13:00-14:00 Lunch

Session II
Introduction
Chairperson: Mr. Michael Barry Lane, Head of UNESCO Tashkent Office

14:00-16:00 - Problematic and methodology of the conservation of earthen structure (Case study and examples: Uzbekistan, Turkmenistan, Syria, Iran, etc.)

- Preventive conservation: Principals, Ethics and Practices
By Mr. Mahmoud Bendakir, CRATerre
Mr. David Gandreau, CRATerre

16:00-16:15 Coffee/tea break

Preventive conservation programme of Ayaz Kala site:
Historical background of the Ancient Khorezm
By Mr. Vadim Yagodin, Director, Karakalpakistan Institute of Archaeology, Academy of Sciences of the Republic of Uzbekistan

16:15-16:45 Brief presentation of the site of Ayaz Kala
By Mr. Abdusafi Rakhmonov, Deputy Head, Board of Monuments of Ministry of Culture and Sport of the Republic of Uzbekistan

	Site conditions, major problems, threats and techniques of preventive conservation
	- Factors of erosion
	- Decay processes
16:45-17:30	- Major threats
	- List of preventive conservation techniques
	<i>Mr. Mahmoud Bendakir, CRATerre</i>
	<i>Mr. David Gandreau, CRATerre</i>
17:30-18:00	Discussion
19:00	Reception on behalf of the Mayor of Elik-kala region

WEDNESDAY, 13 SEPTEMBER

08:00- 09:00 Breakfast

Session III	Observation, study, techniques of diagnosis and monitoring <i>Chairperson: Mrs. Mahmoud Bendakir & David Gandreau, CRATerra</i>
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09:00-11:00 On site training: Ayaz kala I

- Observation
- Analysis of major threats and decay processes
- Discussion on proposed conservation techniques

11:00-11:15 Coffee/tea break

11:15-13:00 Continuation: Ayaz Kala II and Zoroastrian Temple

- Analysis of major threats and decay processes
- Discussion on proposed conservation techniques

13:00-14:00 Lunch

Session IV	Group Work: How to prepare and propose a conservation strategy <i>Chairperson: Mr. Abdusafi Rakhmonov, Deputy Head, Board of Monuments of Ministry of Culture and Sport of the Republic of Uzbekistan</i>
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14:00-16:00 The participants will be divided into 3 groups to prepare proposals of conservations methods (Venue: Ayaz Khala Yourt camp)

- Essential steps of intervention
- Techniques of preventive conservation
- Preservation, restoration, partial restitution, presentation of the site
- Discussions on preventive conservation plan

16:00-16:15 Coffee/tea break

16:15-18:00 Presentation of the conclusions of the group work

THURSDAY, 14 SEPTEMBER

08:00- 09:00 Breakfast

Session V	In-situ training workshop. Demonstration works. Implementation of sample works at Ayaz kala <i>Chairperson: Mrs. Mahmoud Bendakir & David Gandreau, CRATerre</i>
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09:00- 11:00	1. Local building materials sources and local know how (identification) 2. Testing of conservation materials
11:00-11:15	Coffee/tea break
11:15-13:00	3. Documentation 4. Archaeological cleaning 5. Techniques of drainage 4. Cleanings and removal of plants
13:00-14:00	Lunch
14:00-16:00	Continuation: 5. Treatment of the ground surface (superficial drainage and stagnation zones)
16:00-16:15	Coffee/tea break
16:15-18:00	7. Treatment of the structure (standing elements: walls, platform, arches, vaults, etc.) 8. Techniques of structural reinforcement and consolidation

FRIDAY, 15 SEPTEMBER

08:00- 09:00 Breakfast

Session V	In-situ training workshop. Demonstration works. Implementation of sample works at Ayaz kala <i>Chairperson: Mrs. Mahmoud Bendakir & David Gandreau, CRA Terre</i>
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09:00- 13:00 Continuation

11:00-11:15 Coffee/tea break

11:15-13:00 Continuation

13:00-14:00 Lunch

14:00-16:00 Continuation

16:00-16:15 Coffee/tea break

16:15-18:00 Continuation

SATURDAY, 16 SEPTEMBER

06:00- 07:00 Breakfast

Session VII	On site visits in the region of Elik Kala. <i>Chairperson: Mrs. Gairatdin Khozhaniyazov, archaeologist, Abdusafi Rakhmonov, Mahmoud Bendakir & David Gandreau</i>
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07:00- 13:00 Visit to similar sites: Kasakl'i-yatkan, Toprak-Kala, Kz'il-Kala, Tash-K'irman-Tepe,

13:00-14:00 Lunch

Session VIII	Final Session <i>Chairperson: Mr. Abdusafi Rakhmonov</i>
14:00-17:30	Adoption of the Recommendations (venue: Ayaz kala yurt camp)
17:30-18:00	Closing ceremony

Sunday, 17 September

07:00- 07:30 Breakfast

Excursion to Khiva	
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09:30- 13:00	Arrival to Khiva Visit to Ichan kala
13:00-14:00	Lunch
14:00- 17:00	Visit to Dishan kala
17:00-18:30	Reception on behalf of Mayor of Khiva city
20:20	Regular flight by “Uzbekistan airways” Urgench-Tashkent Arrival to Tashkent (by flight) Accommodation in “Grand Orzy” hotel

**PRACTICAL TRAINING WORKSHOP ON CONSERVATION
OF EARTHEN STRUCTURES
IN CENTRAL ASIA AND AFGHANISTAN**
(*Ayaz Kala, Uzbekistan, 11-17 August 2006*)

LIST OF PARTICIPANTS

Name	Organisation / Institution	Contact Details
AFGHANISTAN		
Mr. Abbasy Abdul Ahad	Deputy Director/ Institute of Archaeology, Ministry of Culture and Youth	Tel: 070214628/20-2202651
Mr. Zakir MirAbdul Rawof	Director/ Department of Preservation and Restoration of Historical Monuments	Tel: 2103287 Cell: 070295150
Mr. Emal Rasuli	Unesco Kabul Office	
KAZAKHSTAN		
Mrs. Irina Yemelina	RGP "Kazrestoration"	Tel: (+73272) 917136 / 939354 Fax: (+73272) 916847 E-mail: nipf-rgpkr@mail.ru
KYRGYZSTAN		
Mrs. Merkulova Svetlana	Architect/ Kyrgyz University of Construction, Transportation and Architecture	Tel: (+996 312) 54 57 91/ 62 10 73 (w) Fax: (+996 312) 62 10 73 (w) e-mail: iman_jum@mail.ru
TAJIKISTAN		
Mr. Abdurauf Razzakov	Director/ "Sarazm" Historical Archeological reserve	Tel: (+992 92) 774 75 38 Fax: (+ 992 372) 21 02 59 e-mail: rauf_razzokov@mail.ru
Mr. Sherali Khojaev	Director/ "Khulbuk" Historical Archeological reserve	Tel: (+992 918) 66 82 16 Fax: (+ 992 372) 21 02 59 e-mail: sherali@mail.ru
UZBEKISTAN		
Mr. Abdusafikhon Rakhmonov	Deputy Head/ Board of Monuments, Ministry of culture and Sports of the Republic of Uzbekistan	Tel: (998 71) 144 64 73/ 144 38 94 (w) Fax: (998 71) 144 22 14
Mr. Rakhmatilla Salikhov	Architect/ Institute of Restoration	Tel: (998 71) 395 24 98
Mr. Shukhrat Khamidbaev	Director/ OOO "Fayaz-Tepa, Termez"	Cell: (998 76) 225 77 85
Mr. Rozimboy Khudayberganov	Director/ OOO "Elik kala ta'mir"	Cell: (998 61) 353 61 07

Name	Organisation / Institution	Contact Details
Mr. Kuvonch Sharipov	Head/ Board of Monuments, Karakalpakstan	Cell: (998 76) 225 77 85
Mr. Vadim Yagodin	Director/ Karakalpak department of the Institute of History, Archaeology and Ethnography, Academy of Sciences of the Republic of Uzbekistan	
Abdulha Mamatkulov	OOO “Fayaz-Tepa, Termez”	Cell: (998 76) 227 27 56
UNESCO STAFF		
Mr. Michael Barry Lane	Head/ UNESCO Tashkent Office	Tel: (+998 71) 133 80 10/ 120 71 16 Fax: (+ 998 71) 132 13 82 e-mail: b.lane@unesco.org.uz
Mr. Sanjar Allayarov	Culture Programme Officer/ UNESCO Tashkent Office	Tel: (+998 71) 133 80 10/ 120 71 16 Fax: (+ 998 71) 132 13 82 e-mail: s.allayarov@unesco.org.uz
INTERNATIONAL		
Mr. Makhmoud Bendakir	Architect/ CRATerre -ENSAG	Tel: 33476406625 Fax: 334764401439 e-mail: m.bendakir@voila.fr
Mr. David Gandreau	Architect/ CRATerre - ENSAG	Tel: 33476406625 Fax: 334764401439 e-mail: gandreaudavid@hotmail.com

List of people involved in the preventive conservation activities

The working team gathered for these activities was composed of 5 works foremen and 23 workers from the local community.

During 28 days, they have worked in rotation with a minimum of 15 people present every day, under the supervision of Mr. Khudaiberganov Rozimboy Atajanovitch, Head of restoration dpt., Ellikala District, Mr. Abdulah Mamatkulov, national expert, and the experts from CRATerre-ENSAG, Mr. Mahmoud Bendakir (15 days), Mr. David Gandreau (28 days)

Works foremen

- Mr. Rakhimov Sheripboy 28 days
- Mr. Seydulaev Kuroi 8 days
- Mr. Sultanov Mokhsed 26 days
- Mr. Ibodulaev Umid 26 days
- Mr. Atadjanov Outcom 22 days

Workmen

- Mr. Zaripov Yuldash 27 days
- Mr. Darmenov Sarsenboy 27 days
- Mr. Masharipov Kudrat 27 days
- Mr. Eshmuratov Kamaraddin 13 days
- Mr. Niazimbetov Nodirbeck 27 days
- Mr. Tangirbergenov Sroch 8 days
- Mr. Janaliev Khamid 21 days
- Mr. Abdukarimov Aziz 27 days
- Mr. Turumbetov Farkhad 27 days
- Mr. Matniazov Jasur 8 days
- Mr. Latipov Kutlumurad 28 days
- Mr. Saburov Beckzod 23 days
- Mr. Ischanov Sardor 8 days
- Mr. Niazimbetov Noder 27 days
- Mr. Boboiev Makhsatden 22 days
- Mr. Babaiev Khasamboy 19 days
- Mr. Ibodulaev Kulol 19 days
- Mr. Reimov Koziboy 19 days
- Mr. Khaidbaiev Aibek 18 days
- Mr. Sherimbietov Andvar 18 days
- Mr. Ataniazov Khamid 5 days
- Mr. Jumanov Jassur 3 days
- Mr. Utepov Rasul 3 days



List of material, tools, equipment

- Materials

- Selected soils for conservation: 6 trucks of brown soil, 6 trucks of green soil
- Soil to repair the access road: 31 trucks
- Stone for masonry: collected on site
- Mud bricks: 1000 of square thin bricks (24 x 24 x 5 cm) and 850 rectangular bricks
- Desert sand: collected on site
- Gravel: 1 truck
- Straw: 1 truck
- Water: 10 tanks delivered with tractor
- Geotextile

- Equipment & Tools

- Scaffoldings (3)
- Ladder (2)
- Plank for masonry
- Moulds for adobe (2)
- barrows / “nasielka” (5)
- Wheelbarrows (2)
- Shovel (14)
- Rake (3)
- Pickaxe (5)
- Little pickaxe (5)
- Axe (2)
- Hammer (2)
- Rammer (2)
- Nails (different dimension)
- Trowels (6)
- Bucket (5)
- Levels (2, including one water pipe)
- Broom & Brush (6)
- Meter (6)
- Plumb line (3)
- Sieve (2, different dimension)
- Hand tools ...

- Equipment for the training

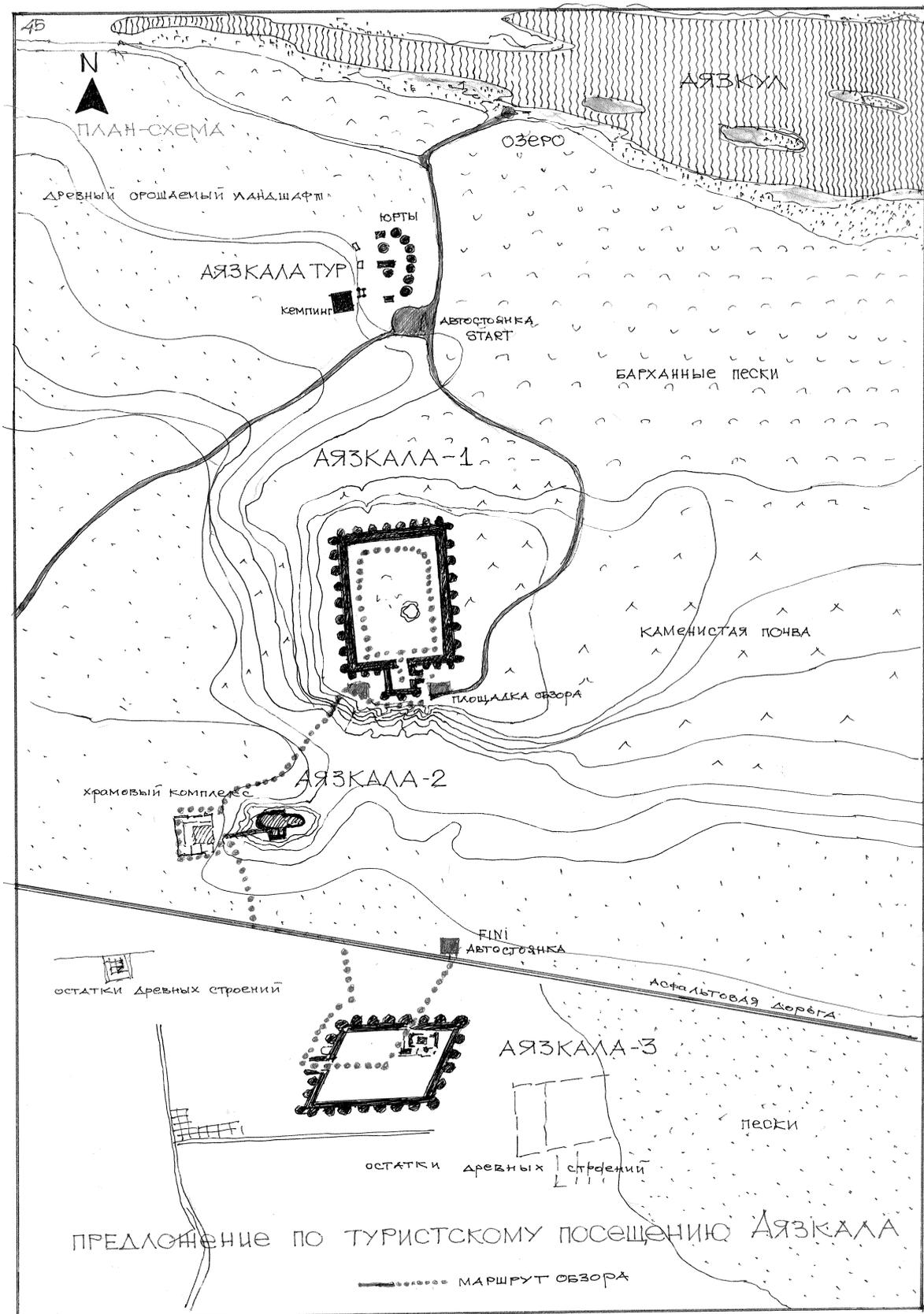
- Multimedia projector
- Printer
- Paper
- Drawing material

Mission schedule

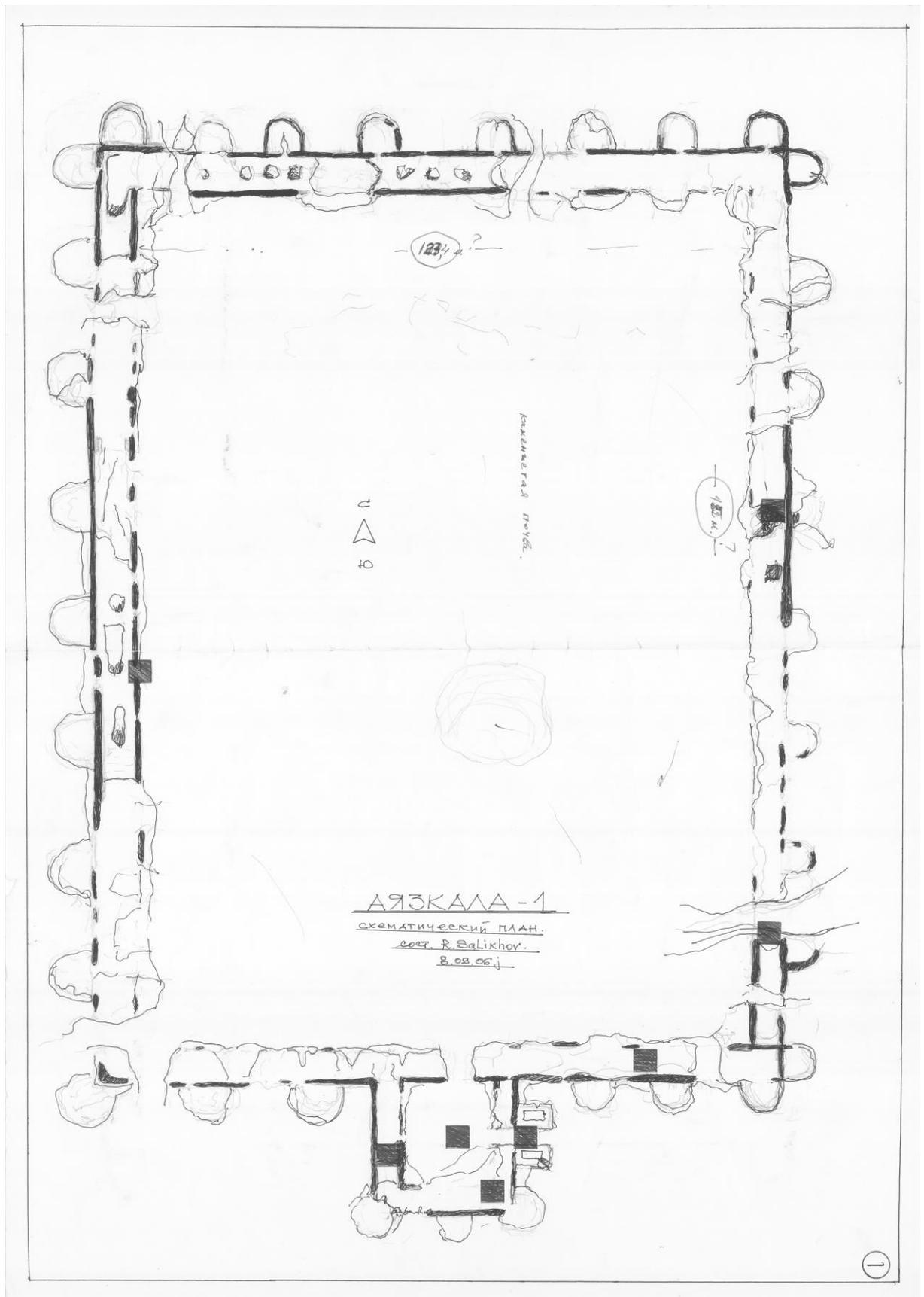
Saturday 2	<ul style="list-style-type: none">- Arrival of Mr. Mahmoud Bendakir- Meeting with Mr. Sanjar Allayarov to fine tune the mission programme at Unesco Tashkent office- Meeting with Guzal Bakhrambaeva, Administration Officer (Unesco Office)- Departure from Tashkent at 18 00, arrival in Urgench at 19 30- Immediate transfer to Ayaz Kala
Sunday 3	<ul style="list-style-type: none">- First overall visit of the sites
Monday 4	<ul style="list-style-type: none">- Discussion on the activities with Unesco national authorities- Selection of intervention zones
Tuesday 5	<ul style="list-style-type: none">- Assessment and preparation of urgent needs for the mission in terms of capacity building, workers, equipment, tools and building material
Wednesday 6	<ul style="list-style-type: none">- Arrival of Mr. David Gandreau- Meeting with Mr. Sanjar Allayarov, Project Assistant and Mr. Arthur Ambartzumyan, Translator, at Unesco Tashkent office- Meeting with Guzal Bakhrambaeva, Administration Officer (UNESCO Office)- Departure from Tashkent at 18 00, arrival in Urgench at 19 30- Immediate transfer to Ayaz Kala- Archaeological cleaning on Ayaz Kala 1 main gate, south courtyard
Thursday 7	<ul style="list-style-type: none">- Archaeological cleaning on Ayaz Kala 1 main gate, south courtyard
Friday 8	<ul style="list-style-type: none">- Superficial drainage with adjustments of the ground surface- Identification of local building materials sources/quarries: soil, stones, gravels
Saturday 9	<ul style="list-style-type: none">- Visit to Khiva and Ishan Kala. Presence of Mr. Koïchiro Matsuura, Unesco Director General and Mr. Barry lane for the opening of the first cultural festival of Khorezm
Sunday 10	<ul style="list-style-type: none">- Preparation of the seminar
Monday 11	<ul style="list-style-type: none">- Tests on plastering with samples of white soil- Preparation of an exhibition of the local materials at Ayaz Kala 1- Archaeological cleaning
Tuesday 12	<ul style="list-style-type: none">- Seminar. Opening ceremony and theoretical session- Treatment of one exit zones of the water flows at Ayaz Kala 1
Wednesday 13	<ul style="list-style-type: none">- Theoretical sessions
Thursday 14	<ul style="list-style-type: none">- Practical session
Friday 15	<ul style="list-style-type: none">- Practical session
Saturday 16	<ul style="list-style-type: none">- Site visits
Sunday 17	<ul style="list-style-type: none">- Travel of Mr. M. Bendakir from Urgench to Tashkent
Monday 18	<ul style="list-style-type: none">- Travel of Mr. M. Bendakir from Tashkent to Termez- Treatment of the vault top of the western corridor, south courtyard- Masonry of the southern side of the main gate
Tuesday 19	<ul style="list-style-type: none">- Testing of materials to be used for conservation (rammed earth)
Wednesday 20	<ul style="list-style-type: none">- Meeting of Mr. M. Bendakir with Mrs. Guzal Bakhrambaeva, Administration Officer (Unesco Office)
Thursday 21	<ul style="list-style-type: none">- Departure of Mr. M. Bendakir to Grenoble- Testing of materials to be used for conservation (plaster)- Masonry of the southern side of the main gate- Preparation of buiding material- Visit of Toprak Kala
Friday 22	<ul style="list-style-type: none">- Backfilling of the north tower, main gate, Ayaz Kala 1- Testing of material to be used for conservation (plaster)- Preparation of building material

- Saturday 23 - Treatment of the tower top with one layer of gravel and one layer of rammed earth
- Sunday 24 - Treatment of one major gully on the northern side of the main gate
- Monday 25 - Treatment of one major gully on the northern side of the main gate
- Tuesday 26 - Preventive conservation of the main gate
- Wednesday 27 - Preventive conservation of the main gate
- Thursday 28 - Preventive conservation of the main gate
- Friday 29 - Superficial drainage with adjustments of the ground surface (treatment of water stagnation zones and canalisation of flow at main water exits)
- Saturday 30 - Superficial drainage with adjustments of the ground surface (treatment of water stagnation zones and canalisation of flow at main water exits)
- Sunday 01 - removal of plants and trees growing within the remains of the temple and preventive conservation works
- Monday 02 - removal of plants and trees growing within the remains of the temple and preventive conservation works
- Tuesday 03 - Travel of Mr. D. Gandreau from Urgench to Tashkent
- Meeting with Mr. Sanjar Allayorov
- Meeting of Mr. David Gandreau with Mr. , French ambassador in Uzbekistan at the French Embassy in Tashkent
- Wednesday 04 - Meeting with Guzal Bakhrambaeva, Administration Officer (Unesco Office)
- Meeting with Mr. Barry Lane
- Thursday 05 - Departure of Mr. D. Gandreau to Lyon

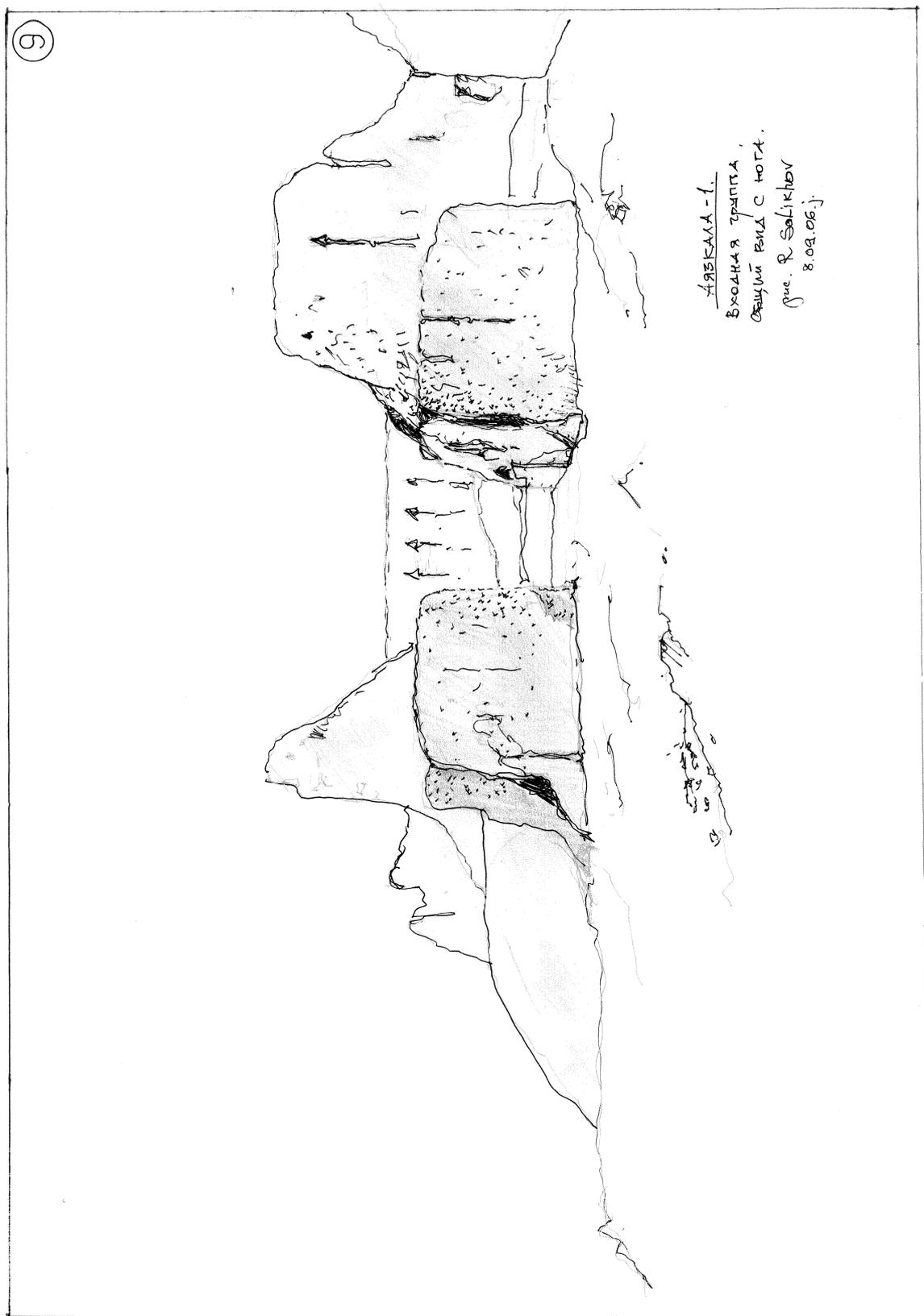
Plans and drawings

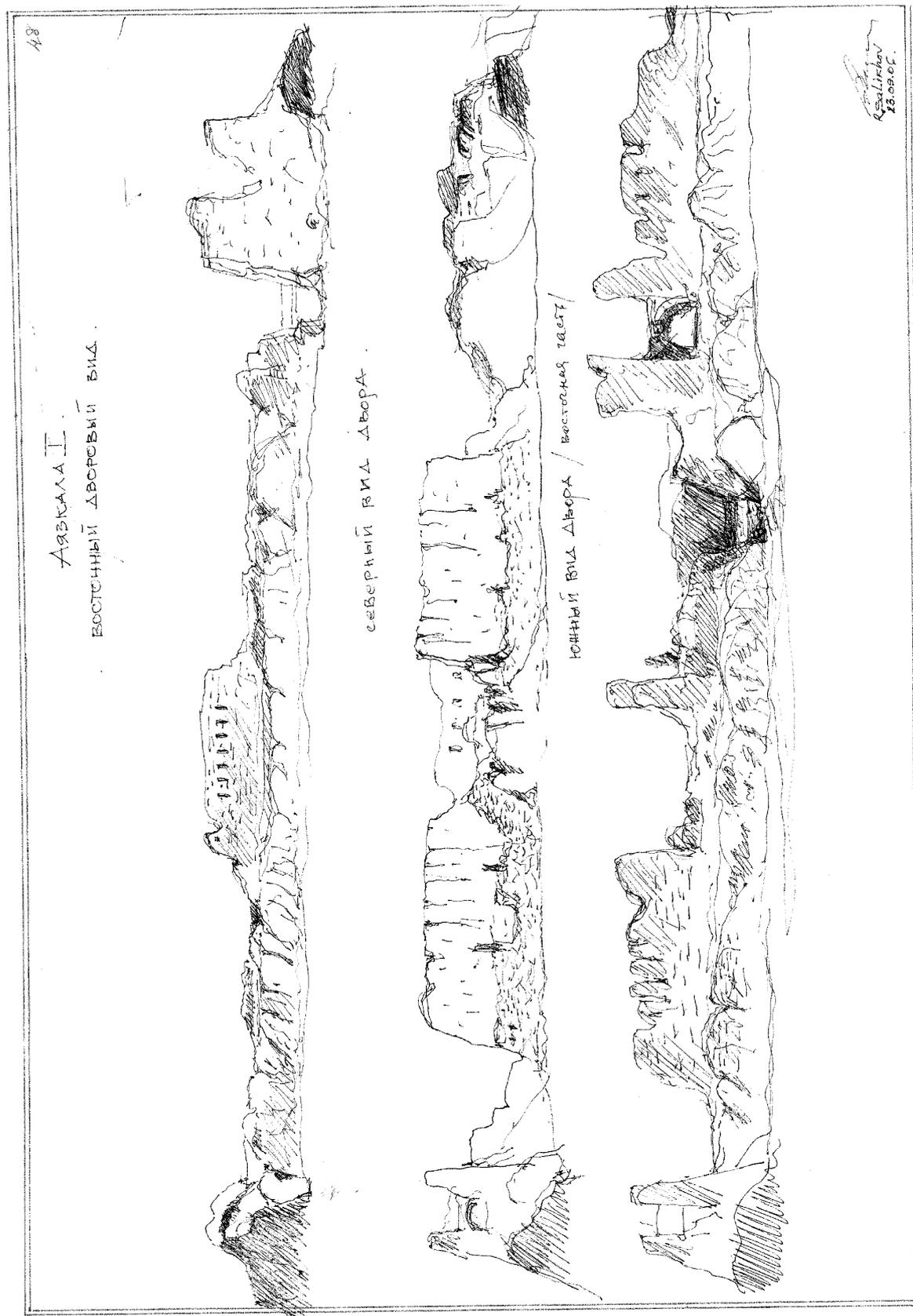


Plans and drawings

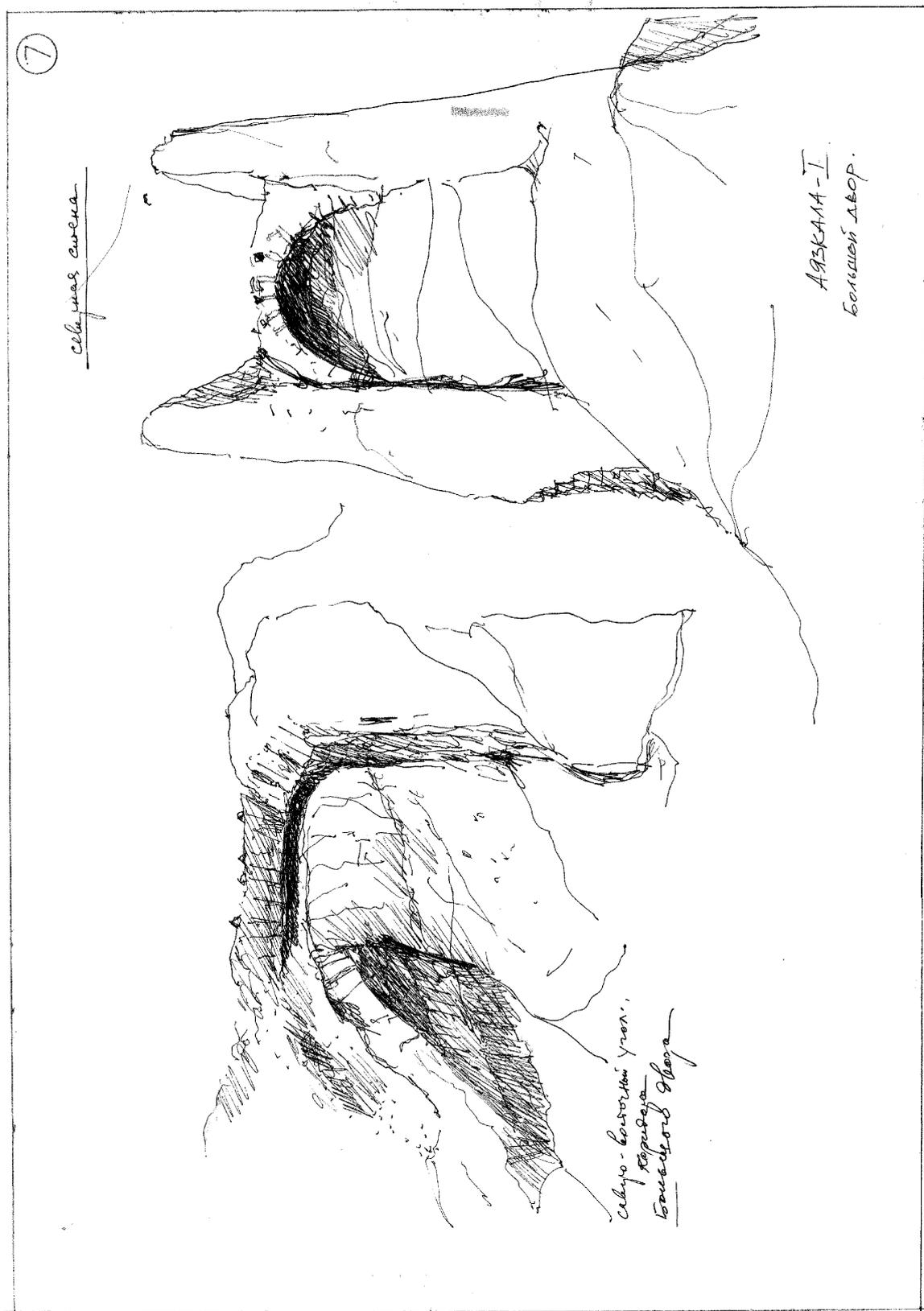


Plans and drawings

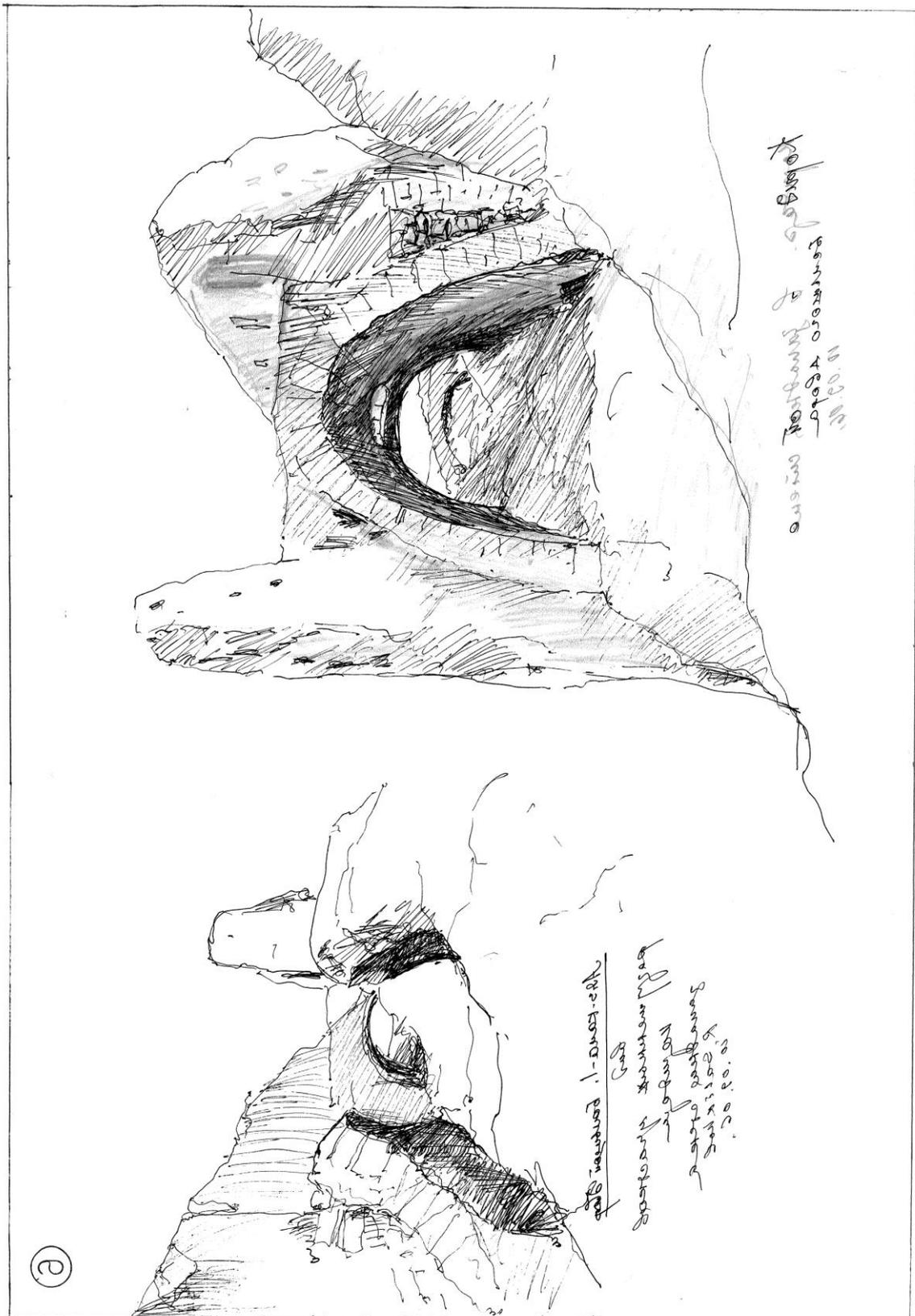




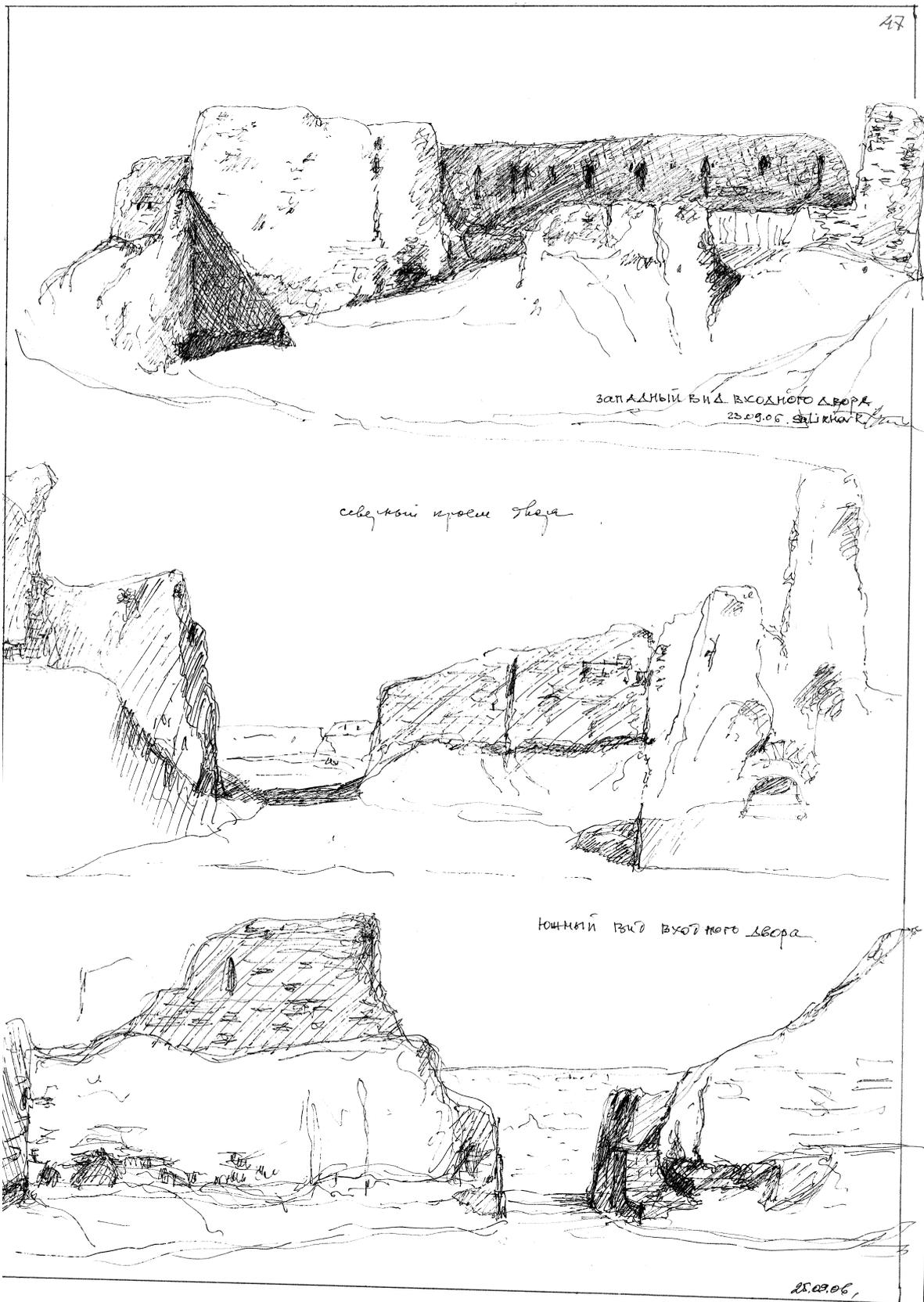
Plans and drawings



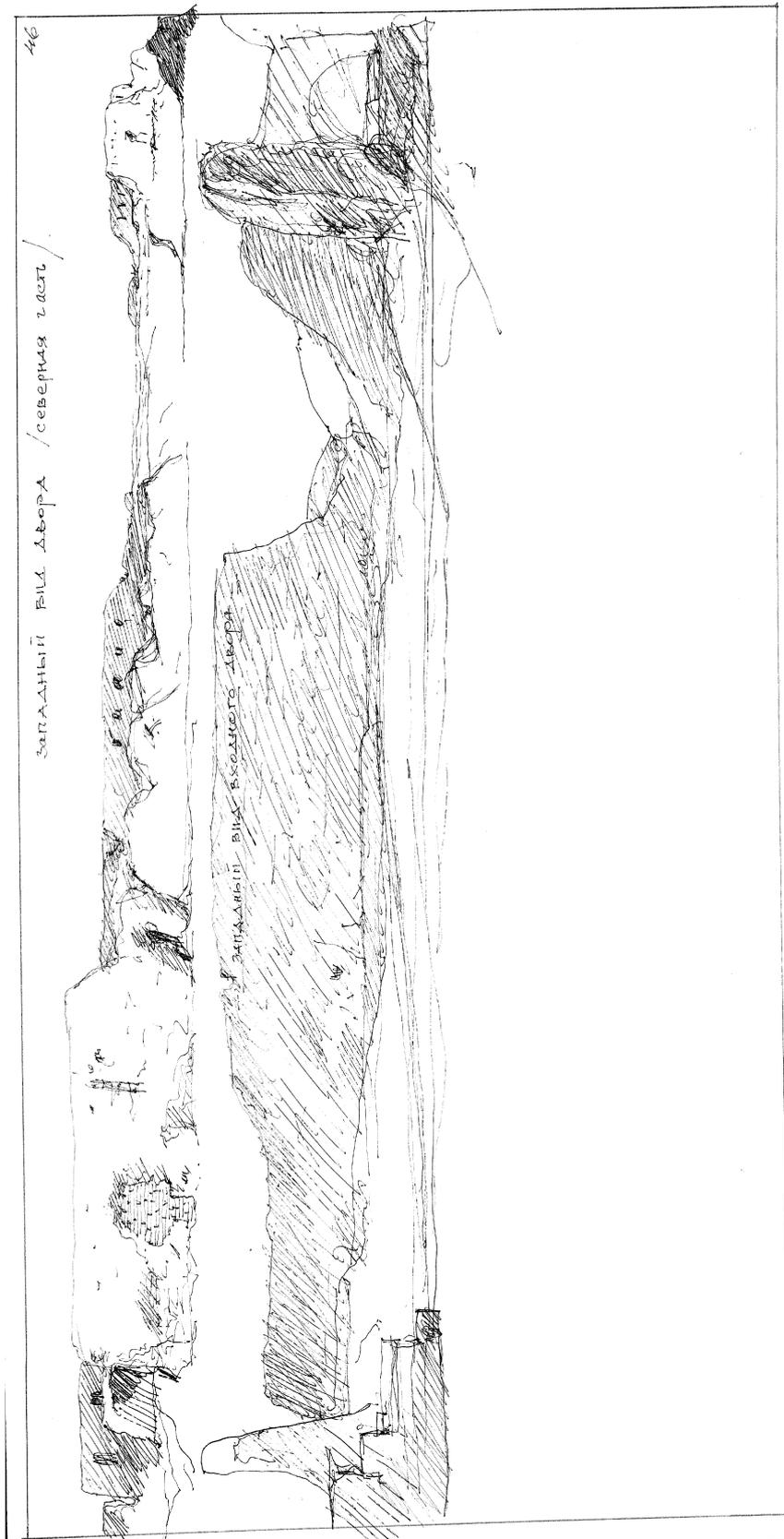
Plans and drawings



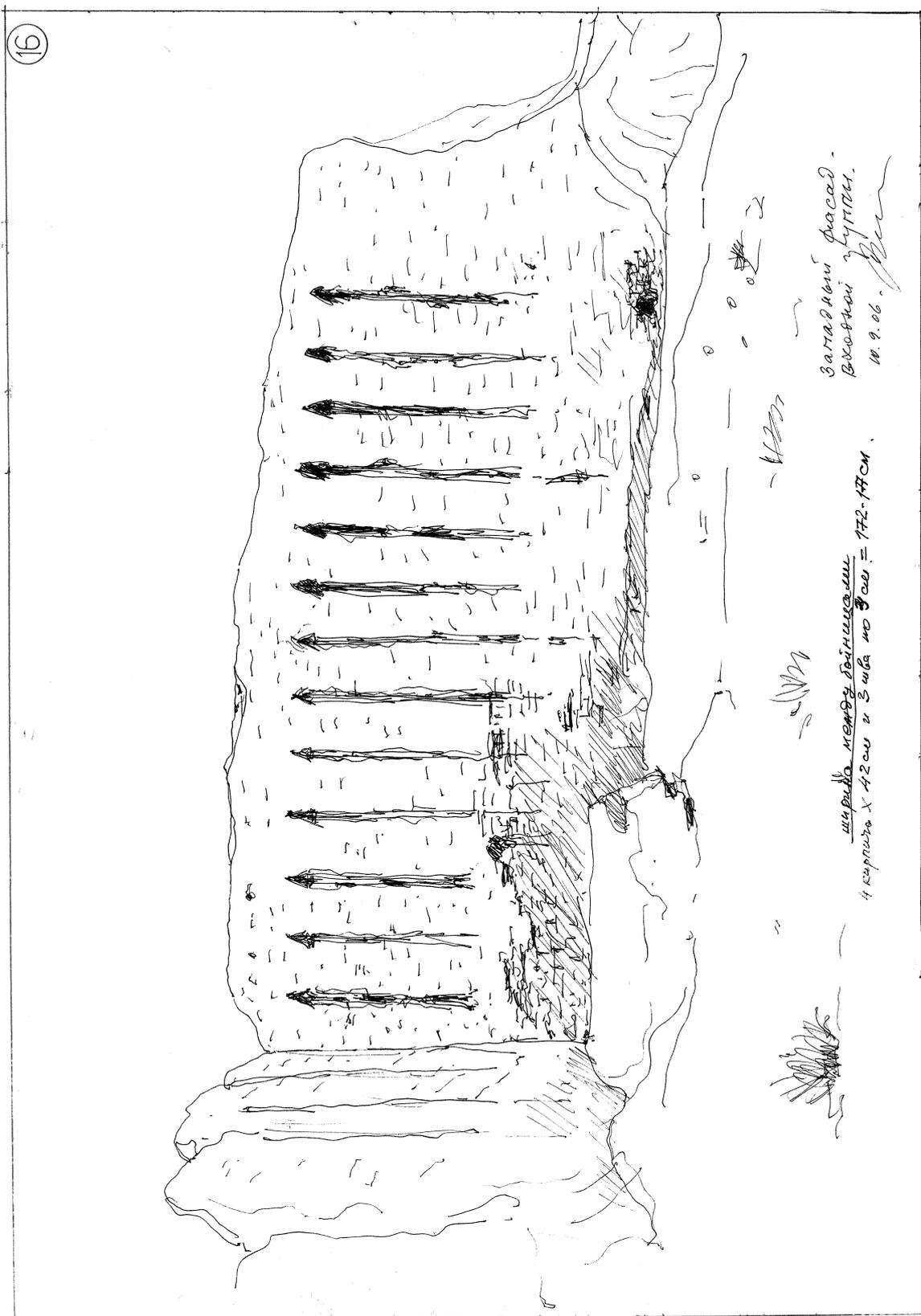
Plans and drawings



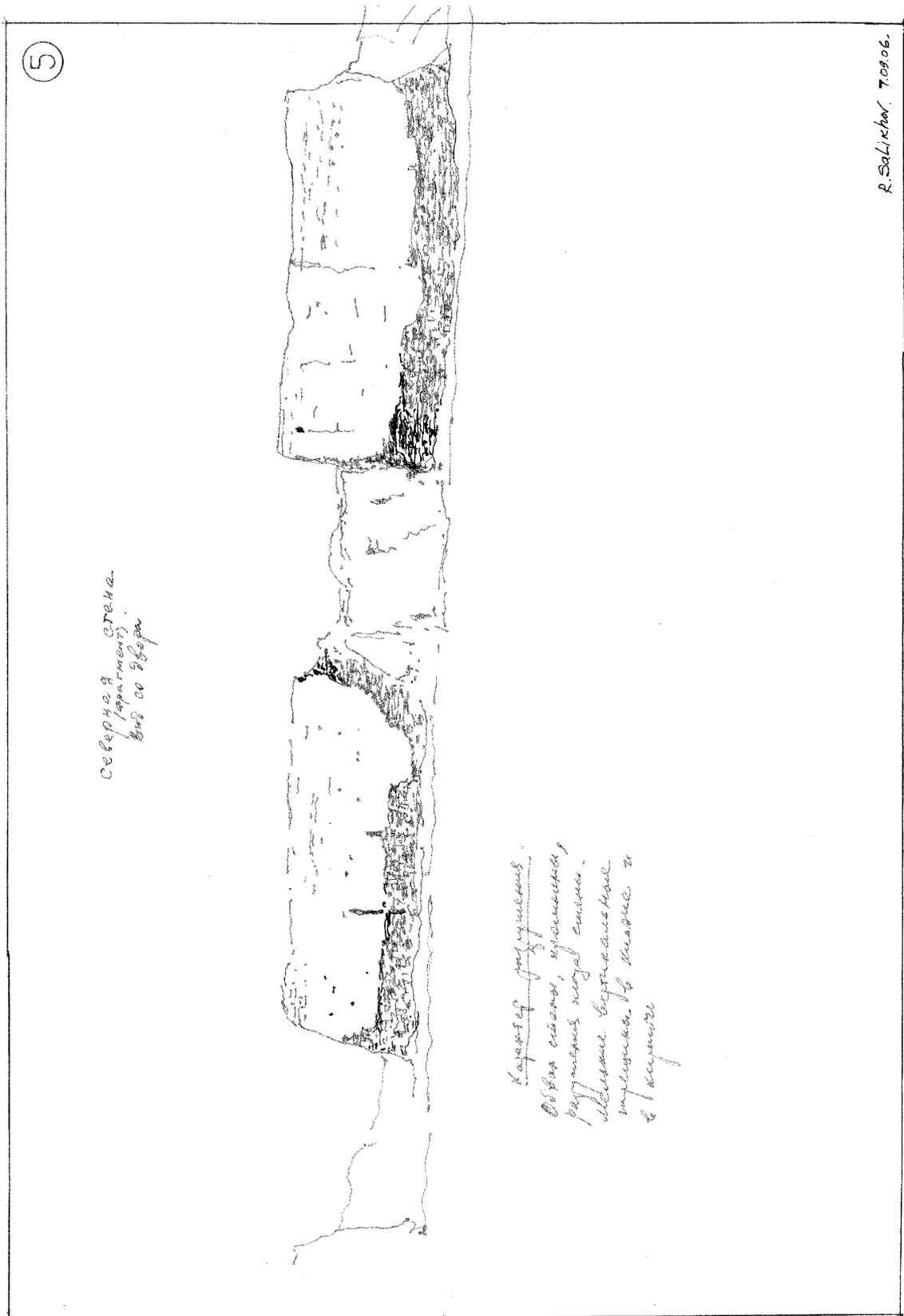
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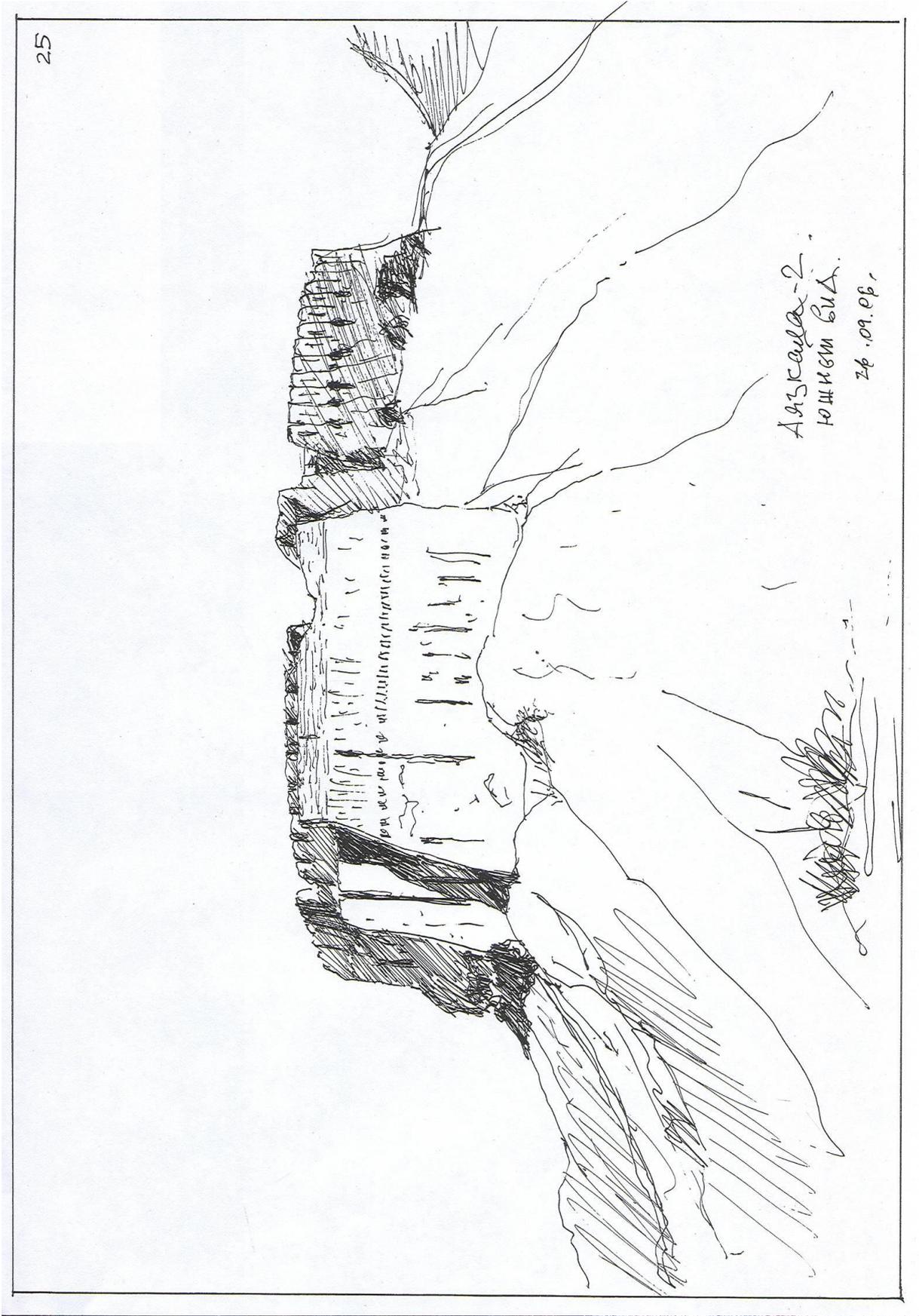
Plans and drawings



Plans and drawings



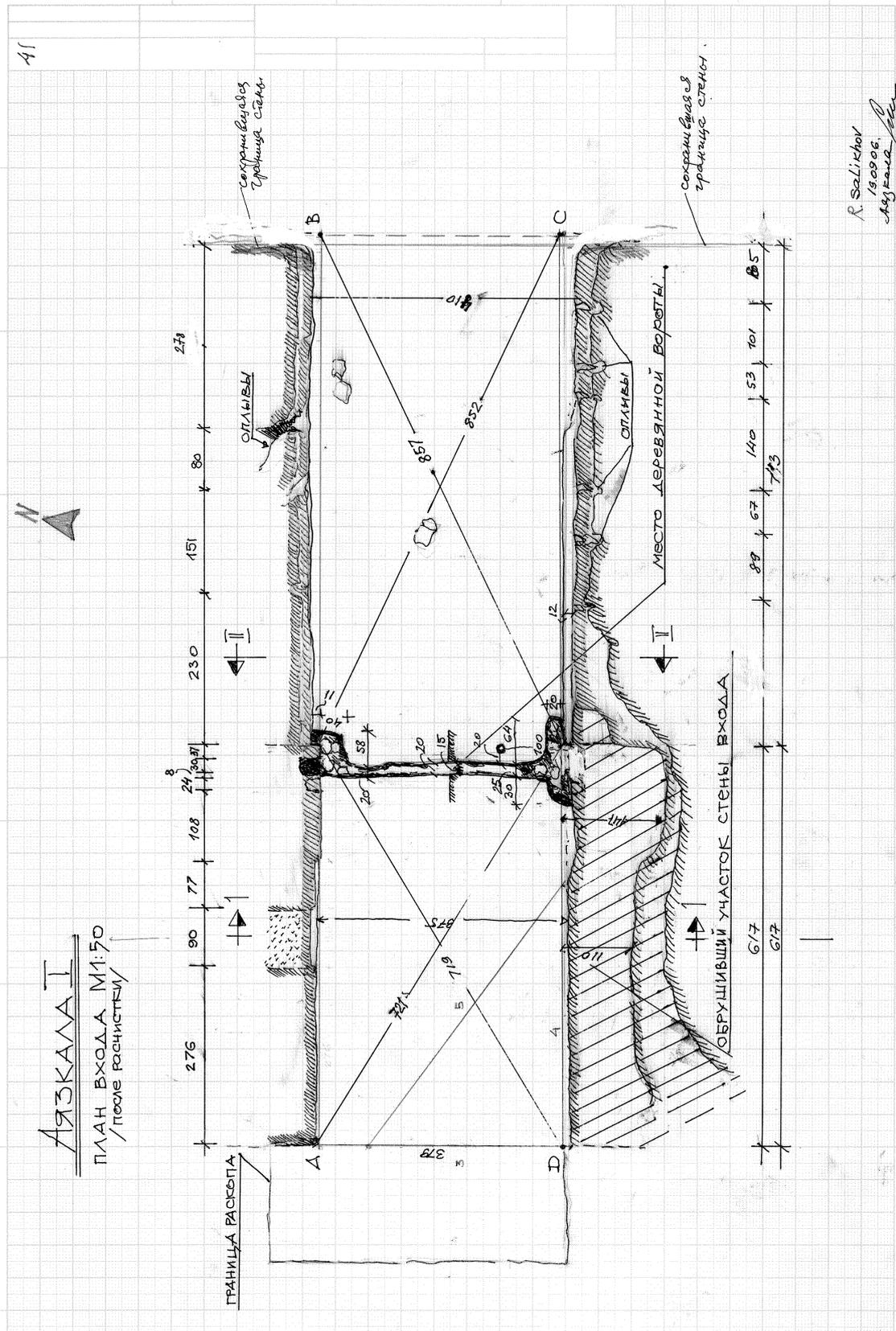
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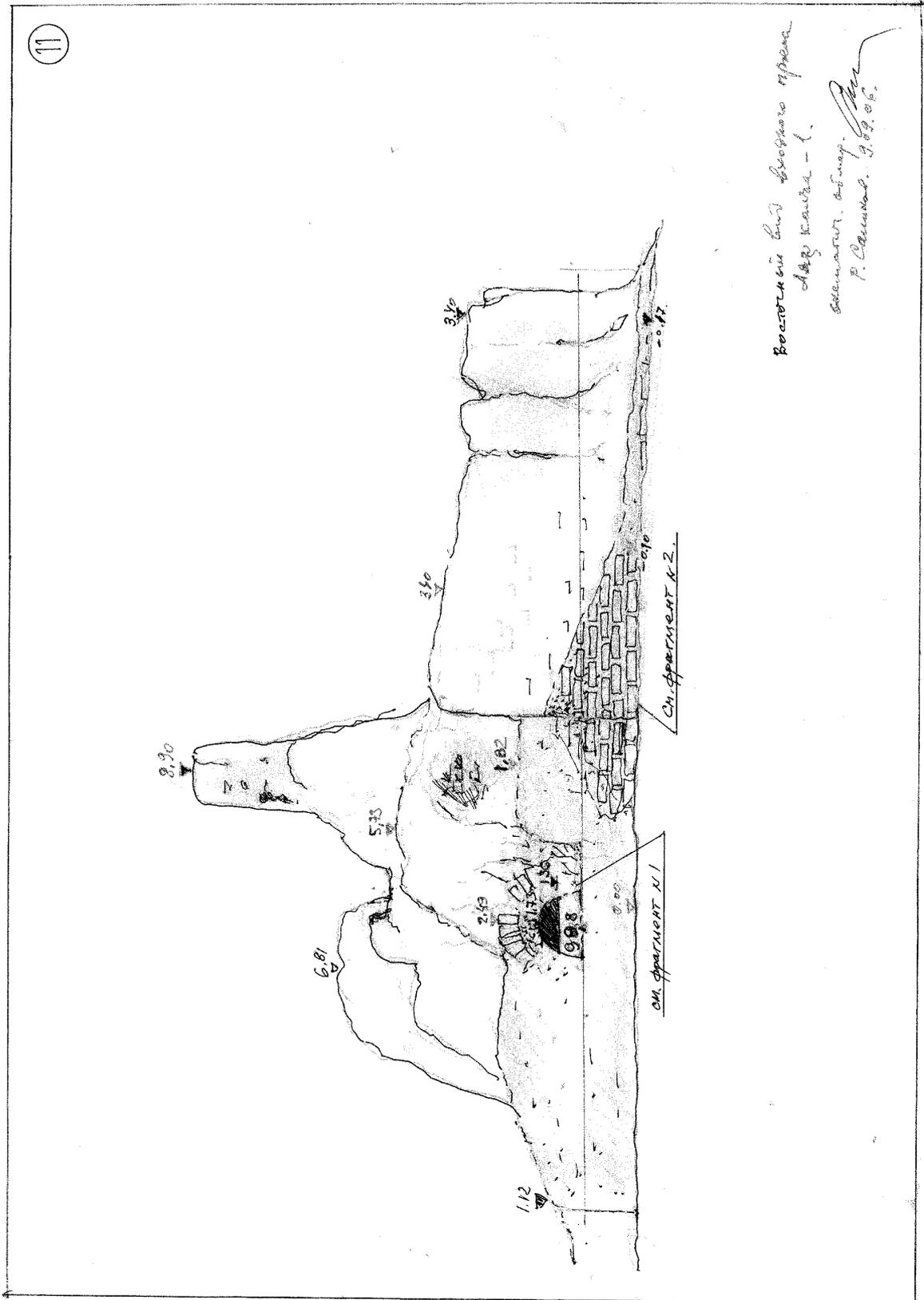
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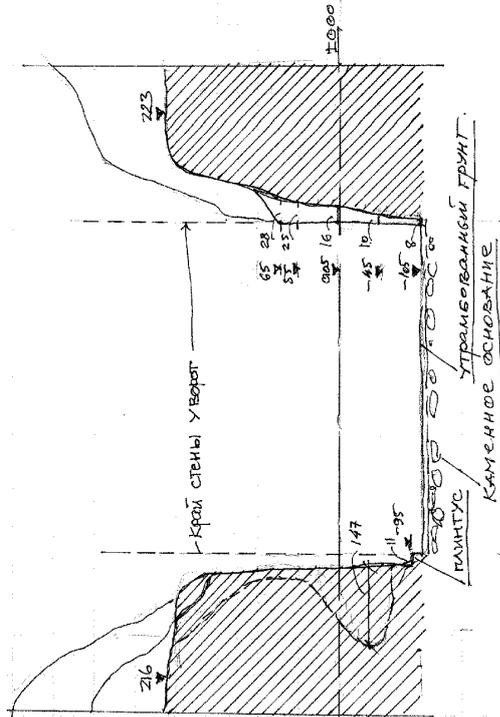
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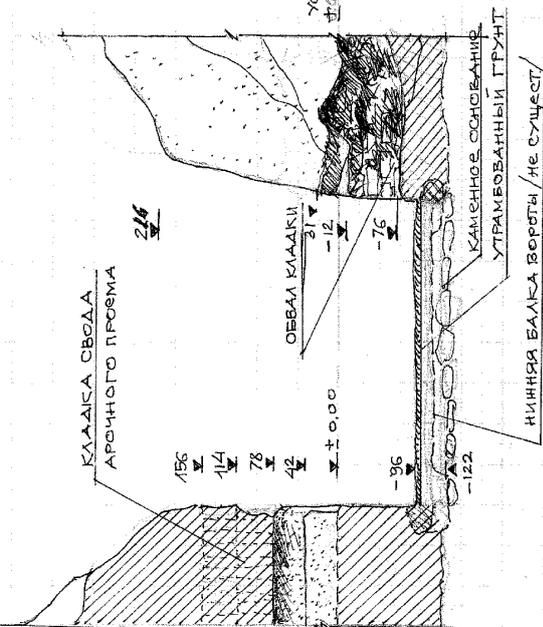
Plans and drawings



РАЗРЕЗ II-II

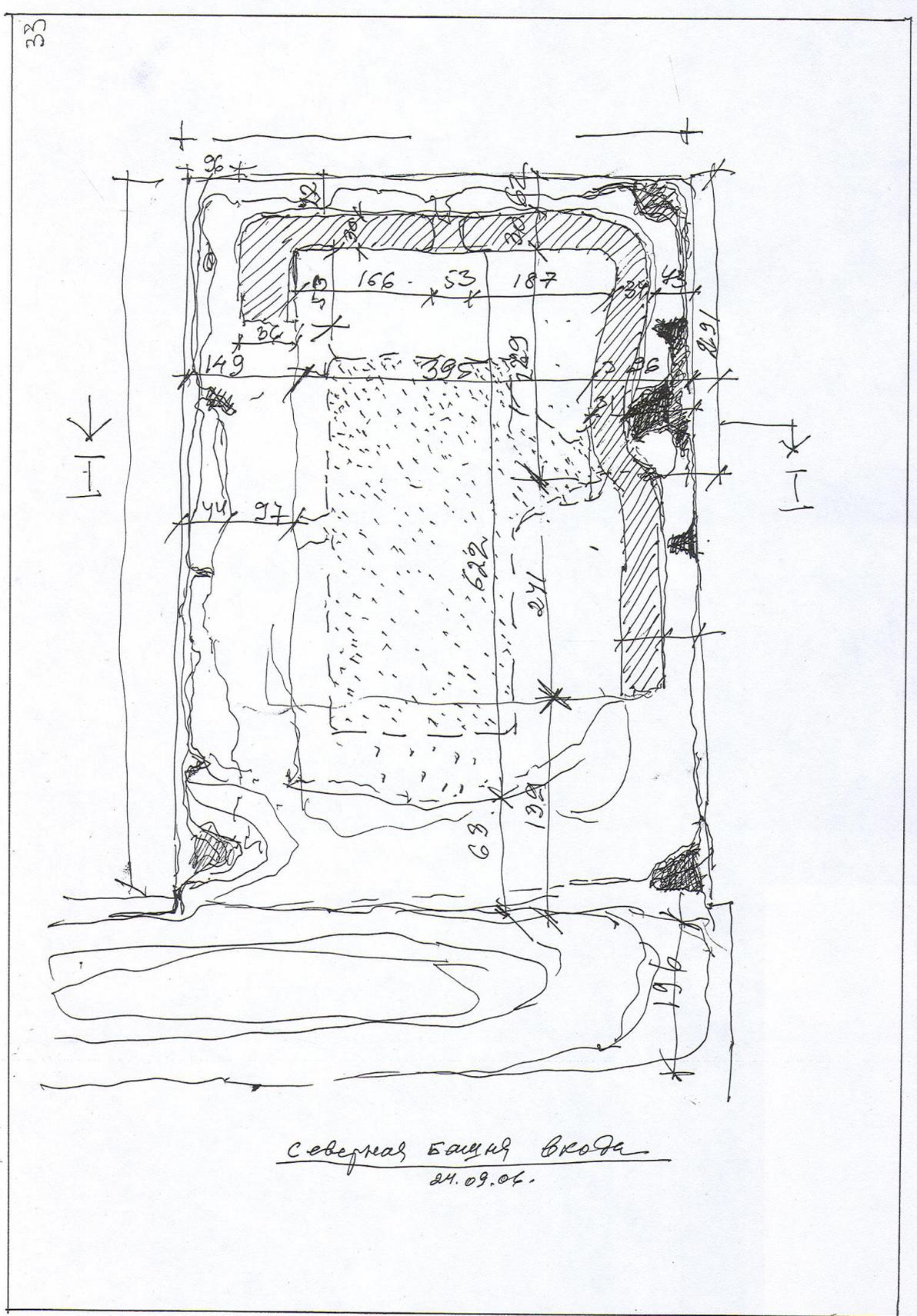


РАЗРЕЗ I-I



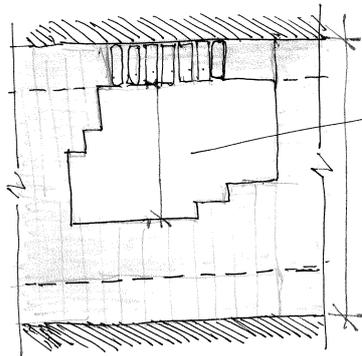
АРКА ИА I
 М 1:50.
 ВХОД ВО ДВОР.
 СТЕННЫЙ КИСТ СМ СОВМЕСТНО
 С ЛИСТАМИ ПЛАНА И
 ФАСАДОВ. Р. Салиев

Plans and drawings



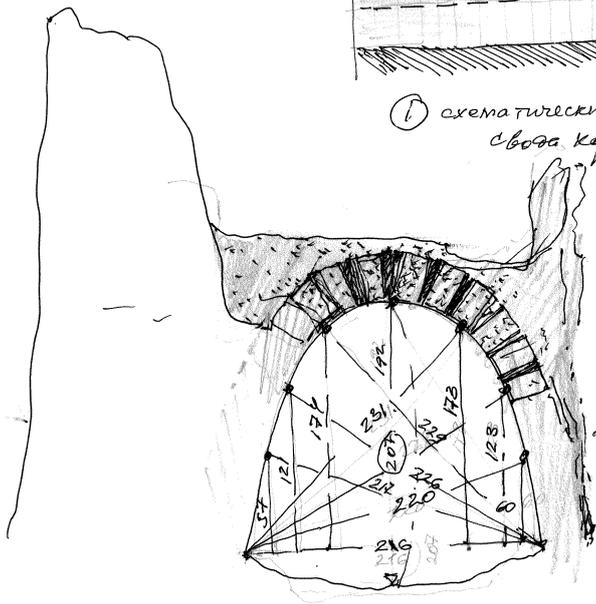
Plans and drawings

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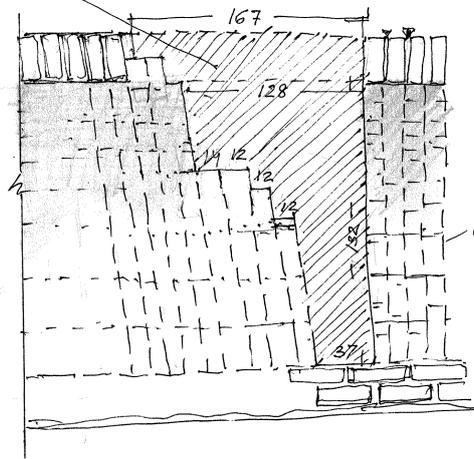
место разрушения

1) схематический план свода коридора



2) схема построения арки

Зона восстановления 3) Продольный разрез свода коридора /фрагмент/



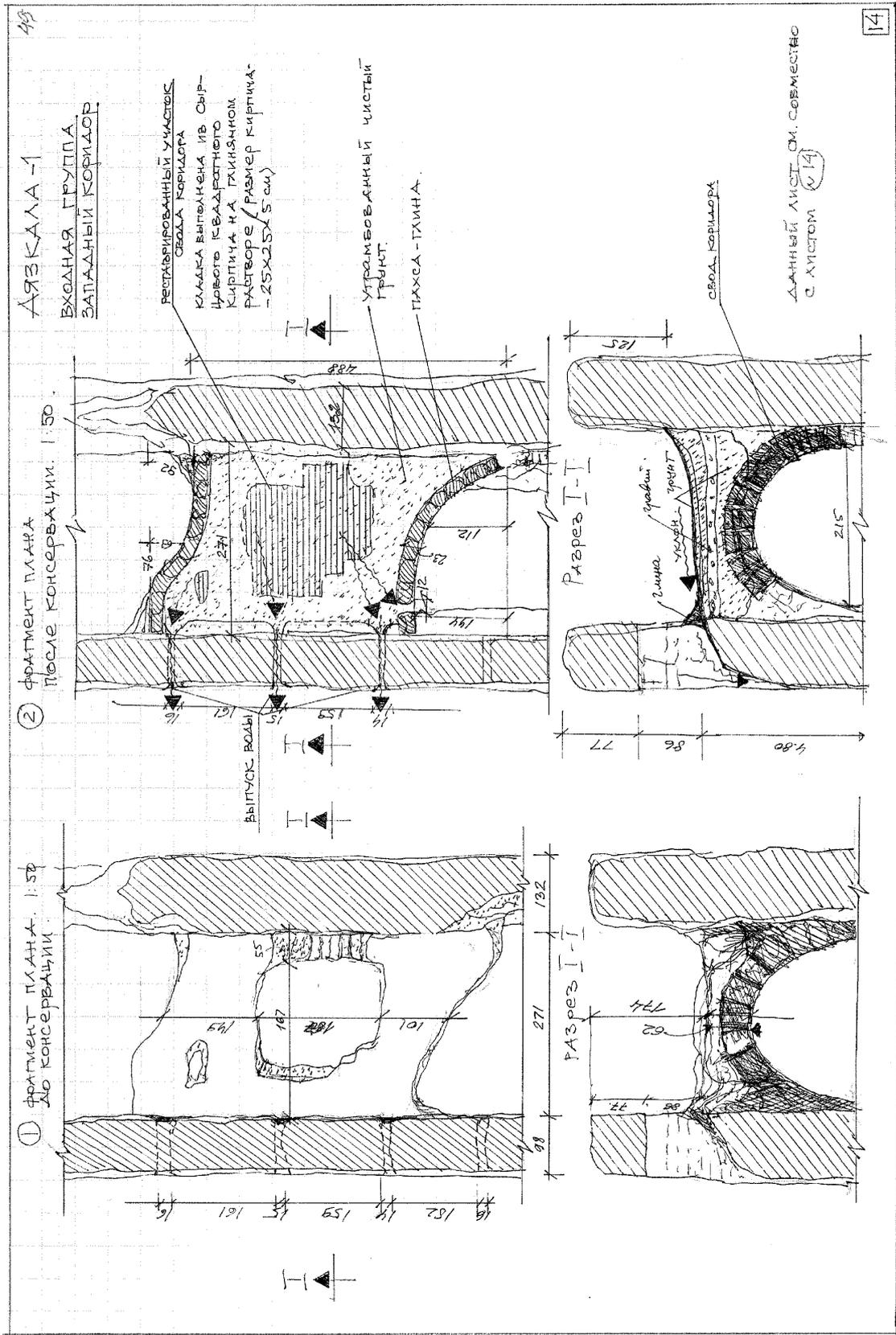
вертикаль

Характер кладки

горизонталь

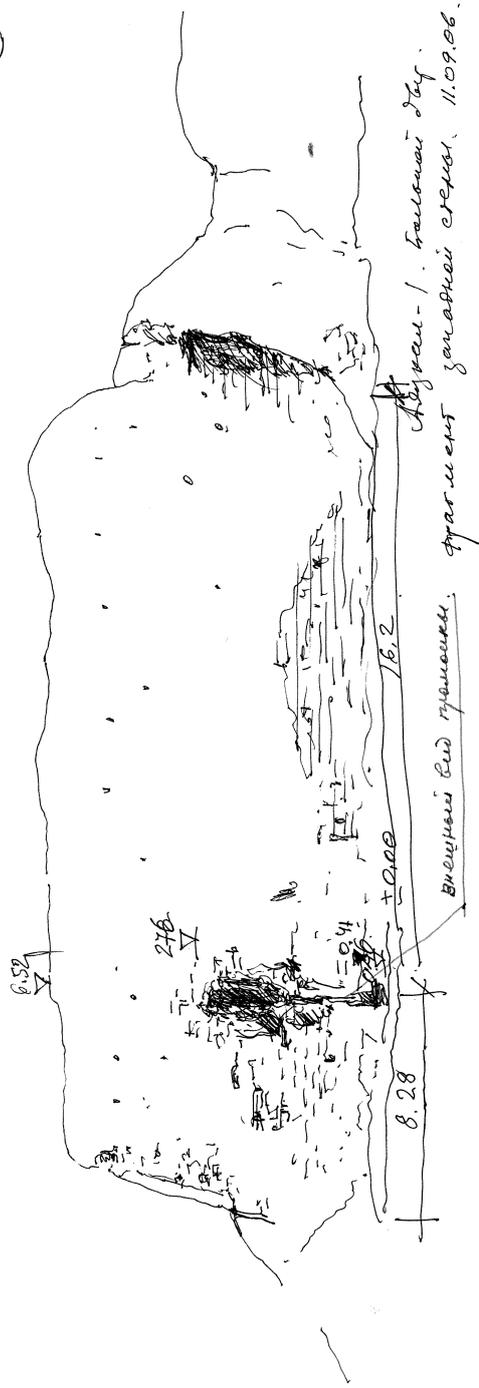
входная группа
Азбука-1.
3.09.06.

Plans and drawings



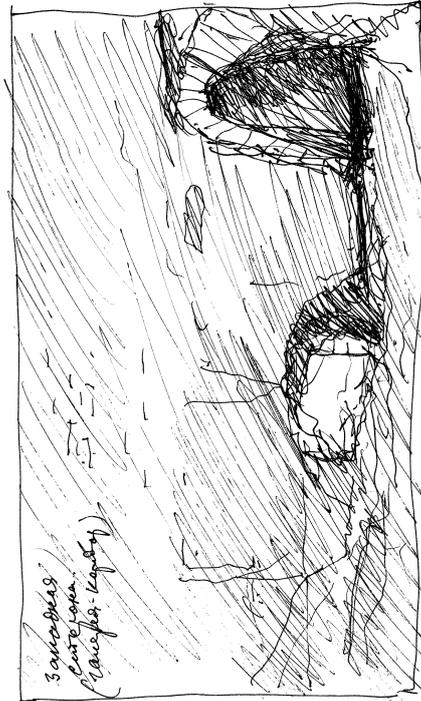
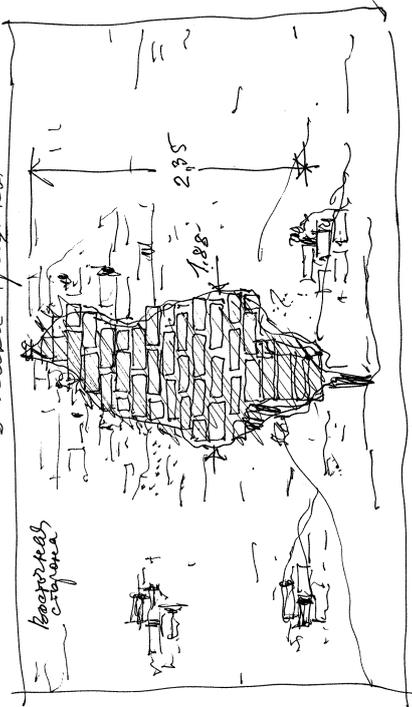
Plans and drawings

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Предварительное обследование.

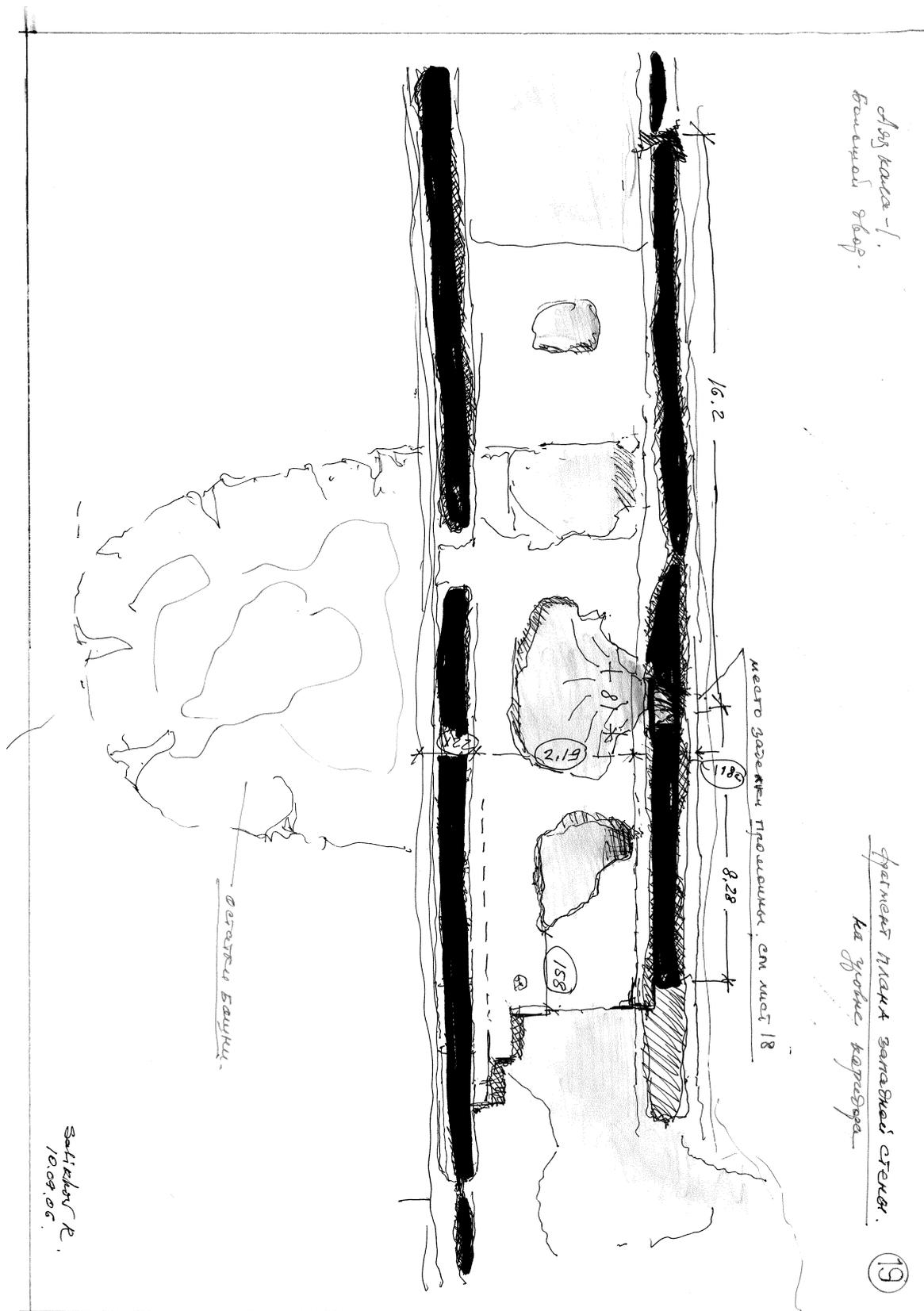
Завселия Трусыны



Внутренний вид границ
изнутри

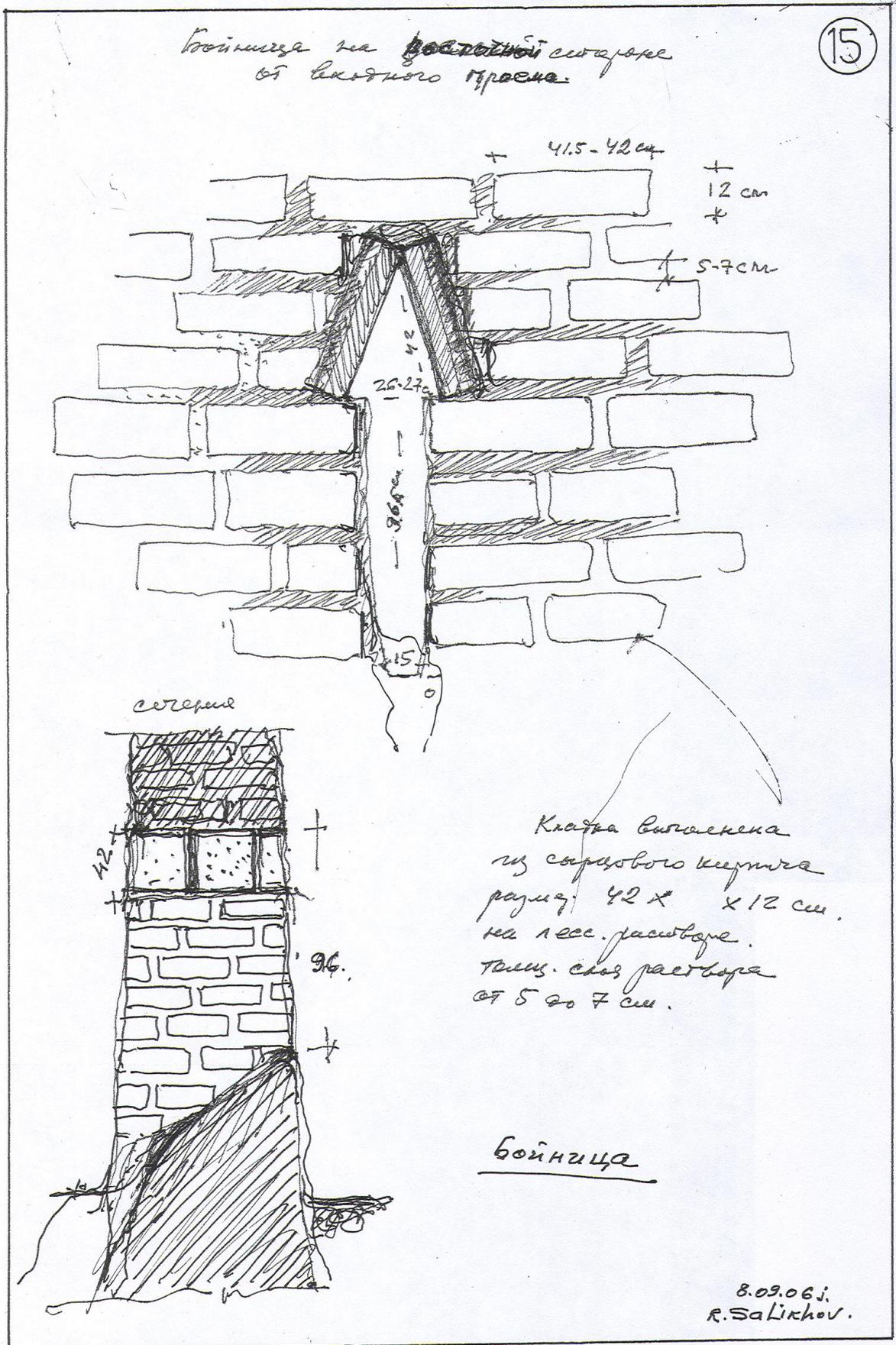
R. Saikrov

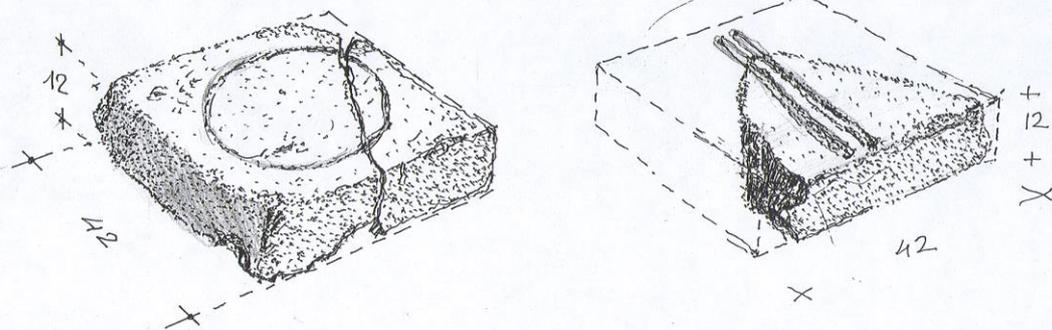
Plans and drawings



доска -1.
Бревенчатый ступ.

ФЕРМЕНТ НАКЛ ЗАНАШКОИ СТЕКА.
ка гюфине карувага

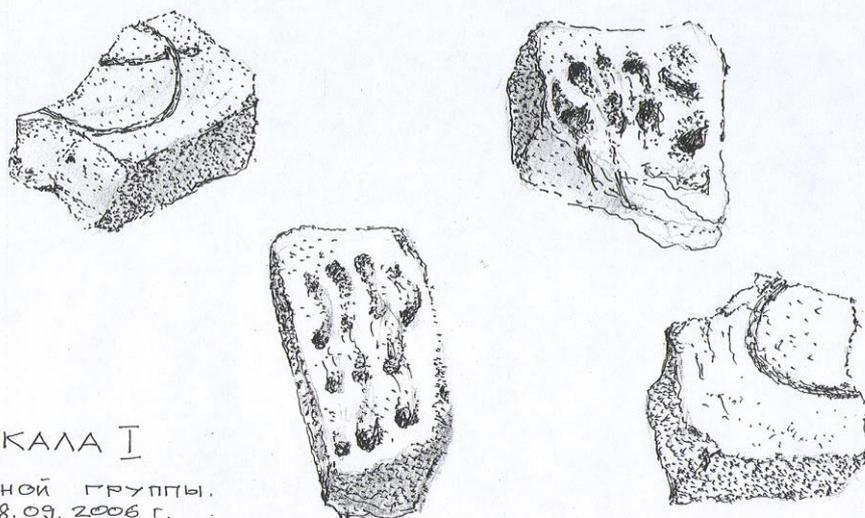




СЫРЦОВЫЕ КИРПИЧИ

АЯЗКАЛА-I
Из входной группы
18.09.2006 г.

фрагменты сырцовых кирпичей



АЯЗКАЛА I
Из входной группы.
18.09.2006 г.