

THE RESTORATION OF PART OF THE EASTERN WALL AND PAPAZ KULA OF JAJCE FORTIFICATION

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A INTRODUCTION

The project of Cultural Heritage without Borders (CHwB) includes the Papaz Kula and part of the adjacent outer eastern wall as well as the crenellations on the breastwork. CHwB were asked by the local municipality (Jajce) to help with these repairs urgently because of the risk to public safety (as the wall is collapsing and stones are falling to the street below) as well as to preserve this historic structure.

As in all our projects, CHwB follows modern European restoration standards where we do not alter any parts nor change anything purely for aesthetic reasons. We only carry out interventions for reasons of technical weakness and in this case even for reasons of public safety and the imminent loss of this importalant monument.

Our intention is to start the works urgently to be able to finish them before the winter season begins. We have been studying the fortification during the past half year and have noticed a rapidly increasing deterioration which is leading to collapse in one place after another. The need for repairs is extremely urgent!

A.1 Brief Historical Information

There are numerous historical strata in the area of present-day Jajce municipality. Traces of a prehistoric, neolithic settlement have been found in the area of Varošice, at a depth of approx. 10 m. Other parts of the old town abound in Bronze Age pottery. There are traces of Roman settlements to the west, north-east and north-west of the fortress (Bare, Klimenta, Katina and Volujak), and in the late antique period, probably in the fourth Century, the temple to Mithras was built in the area of Bare.

The fortress, which is also often called the "Castle" or "Citadel", existed before the first reference to the name of Jajce in written sources (M. Ančić, 1998, 99). The first reference to Jajce in written sources dates from 1396, when Hrvoje Vukčić Hrvatinić was titled "conte di Jajcze". In his day, when the great Duke and Herzog Spljetski was a periodical resident in the town and issued charters there, in the late fourteenth and early fifteenth centuries, the town underwent remarkable political and cultural development, and later, in the last years of the Bosnian state, it became the permanent seat of the last kings of Bosnia. In Hrvoje's times, an intramural district was built on the east side of the fortress, and gradually, during the fifteenth and the early decades of the sixteenth century, the entire defence system was constructed, surviving to this day almost unaltered, despite various repairs and additions. Jajce was also the residence of the last Bosnian King Stjepan Tomašević, who was executed in 1463 near city of Ključ, in the presence of Sultan Mehmed II el Fatih. The Ottoman army set siege to the town, but held it for only six months before it was seized by the Magyars in 1464, who established the banovina of Jajce. The town became a prominent strategic stronghold until the end of 1527 when, following the battle of Mohács, it finally fell to Ottoman rule and lost its strategic importance as a forward stronghold. The battle zone moved further to the north, and from then on a military garrison headed by a dizdar was based in Jajce. In the second half of the seventeenth century there is reference to the kapetan of the Jajce kapetanija. A fire in 1658 badly damaged both the fortress and the town. That year the citizens complained to the valija (district administrator) that the city was in such a ruinous state that it was dangerous to go through the town gates and alongside the ramparts. In the eighteenth century a spy wrote that the town had not been repaired since its occupation in 1526 and that it had a small garrison with little artillery. The last kapetan of Jajce was Sulejman-Beg Kulenović

until 1832, a follower of Husein-kapetan Gradaščević. The Bosnian vizier Mahmut Hamdi-Paša brought in new "nizams" and "Arnauts" who lived here from 1832 to 1833, when, due to their negligence, the Sulejmanija mosque (the church of St. Mary with St Luke's tower) was damaged. There was fighting around the town between Krajina (frontier) rebels and Omer-Paša Latas in 1851, as well as when Bosnia was annexed by Austria-Hungary in 1878. *Source The Commission to Preserve National Monuments*.

A.1.1 Brief Site Description

The fortification walls of Jajce enclosing the Stari Grad area probably dates from the13th (Mazalic, 1952,100; Basler 1959,130; Anèlce, 1999,98) to the mid or late 14th century (M.Popovic1997, 22-23). There is a fortress at the summit of the hill in the northern corner, at an altitude of 470 meters above sea level. A beautiful view is created by the steep slope dotted with traditional houses with high pitched roofs on the hillside down to the main gates. Along the walls there are six towers remaining, two of them at the main gates. The city of Jajce was enclosed by the walls until recently and only modern constructions are built outside them. The main gates, the Travnik Gate and the Banja Luka Gate, are situated at almost the lowest part of the town. Car traffic passes through the two main gates; in addition, there is a pedestrian portal close to the catacombs at Medvjed tower and an opening in the northeast wall close to the fort, the Mracna Gate, which is large enough for car traffic.

The whole fortification was constructed over a long period of time, with additions, repairs etc.

The roof of the Travnik gate was restored in 2002, while the Banja Luka Gate with Papaz Kula and the wall adjacent to it are part of this project. This is only a small part of the total complex which was partially restored in 1966. During this restoration the crenellations were completely reconstructed.



Plan of Jajce Fortification From D Basler.



Section of the northern wall of Jajce Fortification From D Basler.

A.1.2 Building History

Chronology of events

Mid 13 th century - 1416	The oldest parts of the fortification of Jajce are probably built. The extent of the fortification (Mazalic 1952,65-66, M.Ancic 1999,98) is illustrated below, including the fortress, Medvjed Tower and Dzikovac bastion.
1416 – 1463	The Royal residence moved to Jajce and the fortification was expanded. A palace was probably built in the fortress with its portal still visible today. A Franciscan Monastery and the Church of St Catherine were built but their location is unknown.
1464 – 1527	Under Hungarian rule the fortification was strengthened and extended. The crenellations on the eastern wall are assumed to be part of this extension. The palace was altered and the gate to the fortress was changed to the one used today.

1528 – 1878	During Ottoman rule the fortification gained much of the appearance it has today. New towers were added and the fortress turned into a bastion with a gun house and a mosque was added to it. Only the gun house remains today. The dilapidation of the fortification started during Ottoman rule and it was affected by a fire in 1658.
1878 -	The fortification was in use and was dilapidated. It was constantly in need of repairs which were conducted throughout this period.
1966	Last major repair when the crenellations of the eastern wall were reconstructed with a different stone type than used previously. Some of these crenellations are now falling down or are in poor condition.
2005	The Fortification walls are collapsing in many parts and in need of urgent repair.



The parapet part of the walls is crowned with crenellations on the northern wall. We do not know from which period they date but they are visible on old photographs and panorama prints. The crenellations over Banja Luka Gate are visible on a photograph from 1910 but

are missing both from a photograph from 1940s as well the drawings by D Basler, probably dating from the 1950s. All crenellations were reconstructed with a weaker sedra stone during the restoration works in 1966.

A.1.3 Archive Drawings related to the project by D Basler:

Site plan on page 5.

Overall view of the northern wall on page 6.



Ground Plan of Banja Luka Gate



Papaz kula and walkway Plan of the Northern Wall



Section through Papaz Kula, view of Banja Luka Gate



Section through Banja Luka Gate



Inner view, from south, of Banja Luka Gate



Outer view, from north, of Banja Luka Gate

B CONSTRUCTION AND MATERIALS OF THE FORTRESS

The fortification is constructed of cavity stone walls. The perimeter is approximately 1 300 meters and covers an area of 112 000 square meters.

The thickness of the walls vary from 12 meters to 1,75 metres thick, with an average of between 2-3 meters and a height of 12 to 20 meters. In some parts there are several layers of stone walls due to defence strategies in different periods.

The crenellations are of different sizes and are about 0,8 thick.



Crenellation detail.

The following stone types are being used in the part of the fortifications included in this project:

The walls are of plivit from Divicani.

The crenellations on the parapet are of sedra stone from a reconstruction in 1966.

The Papaz Kula walls are of plivit from Divicani.

The stones at Banja Luka gate are of different kinds of plivit from Divicani, some finely cut, while other parts are of roughly hewn plivit stones.

We have not made any analysis of what types of mortar have been used but we can assume that there must be many different types from different intervention in the past. In the parts that were restored in the 1960s we find cement mortar and parts with cement plaster.

The methods of building the walls are different. Some parts are rough with coarsely hewn stones while other parts, such as the inside of Papaz Kula, are of finely cut exact blocks laid with minimal amount of mortar.



Photo at the Banja Luka Gate

C DAMAGE ANALYSIS

Old fortifications often suffer from exposure and problems with weather. The damages and found in these types of constructions. The question is to find the limit on what work should be done in order not to lose the authenticity and character of the building and still prevent further deterioration for a period of time. As long as parts are not collapsing or causing collapse, a deteriorated state can be accepted. Corrections are in rare cases done due to technical or integral reasons.



The outer part of the northeast wall of the fort has collapsed. The core is exposed.

This is most likely caused to too much humidity entering the construction and weakening the core and the mortar.

Other parts that are crumbling are on the way to collapse.



Stones are deteriorating by exfoliation probably caused by frost.



Vegetation growth with strong roots damages the walls while vegetation growth with soft roots could protect it.



Parapets-breastwork damage caused by deteriorated stone, leaking mortar or cracked constructive stones or missing clams.

D RESTORATION GUIDELINES

Our aim in this project is to use the same materials and the same construction techniques as in the surrounding parts. This may not always be possible or even the aim if there has been earlier interventions causing damage. If it is not possible to find the same material as the original, a material with similar properties and similar appearance as the original is chosen. We do not aim to correct any other parts than the ones in risk of collapse. Our aim is **not** to touch more than necessary and we are keen on preserving the authenticity of the structure. There has however, been interventions from many different historic periods up to very recent ones. When choosing type of mortar the choice was to use what has been common historically and proven good in exposed structures as this - hydraulic lime mortar. Amendments with stones were carried out with fallen local stones – anastylosis. Iron ties were inserted as in medieval time **but** of stainless steel. On the very top a thin reversible concrete protection was suggested, which eventually will be overgrown by vegetation.

E THE PROJECT

E.1 Prescription of the works

The Project was carried out by 30 September 2005 using the guidelines as well as aims described above.

The Bill of Quantity in the Bosnian version is approximate was adjusted according to verbal instructions on site 28 August 2005.

The total price did not exceed the given sum.

E.2 Material Specification

Stones

The stones were cut in pieces with the same surface treatment as the surrounding stones. The same types and sizes of stones as in the surrounding parts were used. In many parts stones are plivit lime stone from Divicani village.

Mortar

The prescribed mortar is a **lime-cement mortar** or **hydraulic lime mortar**. Since it is very difficult the get **hydraulic lime mortar** in BiH it was imported from Germany, Jura Hydraulic lime. This was used for pointing and the joints.

The hydraulic lime plaster was mixed with the following mixture:

1:1:6 dry slaked lime (powder) : hydraulic lime : sand of normal granulation for masonry. The **lime-cement mortar** will be mixed according to the following receipts: Grounding external plaster LC 2:1:9 (dry slaked lime (powder): white cement : sand by volume).

Injection mortar

Hydraulic lime was used according to the above mentioned.

Concrete

The concrete slab of ca 7 centimeters was reinforced with a metal net, Rabitz-net $\phi 2 \ge 19$ or similar possible to be found in BiH.

Concrete C30, 4% air.

Cramps of stainless steel

All clamps and metal connections was of stainless steel.

Consolidation material

Wacker-Chemie Silres BS OH 100

The consolidation material proposed for exceptional stones was *a kiselsyraester* that binds in-organic material in the same way as natural stone. This works as a glue but consists no polymers!

This is only obtainable from Germany!

E.3 Work Specification

The cleaning of the vegetation was carried out with two methods: small plants were pulled out manually but for bigger trees and bushes herbicides were used additionally. The municipality had been cleaning part of the parapet but there was much vegetation left in Papaz Kula as well as small plants over the entire surface of the northern wall. The trees and brushes at the parapets had only been sawed down and all roots were left in the structure. Herbicides were used on these already cleaned spots!

The scaffolding was erected on the outer side of the wall as well as in Papaz Kula where the walls had partly collapsed. The extent of the scaffolding was approximately 20 metres. **Stones for replacement** were, almost completely, used from the collapsed stones. These were collected and stored until being laid when the outer skin of the wall was being reerected.

The walls were laid for a maximum of 50 centimetres per day! It was protected from direct sun radiation for a day or two.

Lime-cement mortar was used in the walls and at the top of wall were hydraulic lime was not used. The lime-cement mortar was used within 4 hours after the cement was mixed in the mortar and kept wet for 3 days.

The **Jura hydraulic lime** was used for the pointing as well as the joints and in the cavity of the core wall.

The joints were built up to a maximum of 2 centimetres per day and the joints were prewatered before starting the pointing! The joints were kept wet for at least 3 days! The pointing of the joints was done in the same manner and extent as the surrounding wall. **The concrete** was well compacted and kept wet for 3 days!

The top of the concrete slab should be somewhat uneven to allow vegetation to grow on it. It should be covered with turf as a base for future vegetation.

Carved or profiled stones of special value were **consolidated**. This did not concern any simple stones. Those were replaced if they were broken or too much deteriorated. If such special stones had been found this consolidation work would have been a matter for another contract using a sub-contractor for this work according to the following; The consolidation material must be laid on dry stone. (As little mortar as possible should be used.) The stone that is to be consolidated must be dry. The consolidation material shall be applied 'wet over wet' several times by dropping or brushing until saturation. During and a couple of days after the consolidation the temperature must stay above +10C. During this period the stone may not be exposed to direct sun light. Further instructions are given by the supplier of the consolidation material. The consolidation must be conducted by experienced staff under supervision of an experienced supervisor.

E.4 Plan of Action

The drawings show the extent and place of repair as well as the details of methodology.

Plan of intervention

- 1. Cleaning of vegetation. This part was discussed and agreed with the municipality and is to be done by them. This should be done urgently and can be done parallel with works on other parts. There is a lot of garbage behind the houses adjacent to the eastern wall. This garbage must be removed immediately!
- 2. Collecting and cleaning stones that has collapsed and shall be re-used.
- 3. Erecting the scaffolding on the outer side of the northeast wall. The extent according to instructions on site 28 August 2005.
- 4. Starting the re-erection of the wall.
- 5. Crenellations on the parapet according to drawings and instructions on site.



with a flat stainless steel bar of 5x50 mm, fastened on the sides.



Vegetation must be removed and missing stones

installed. Pointing must be carried out in the cavities between the stones. Three crenellations were missing and brought back on place!

- 6. Concrete slab over walls of Papaz Kula
- 7. Finally stone slabs with cement lime mortar replaced the suggested concrete. This solution had been used here already in the 60's.

E.5 Drawings

Project of the Restoration of the Eastern Wall and Papaz Kula Drawings included:



Northern Wall and Papaz Kula Plan

A-04-01





Section through the Banja Luka Gate



Inner view of Papaz Kula and Banja Luka Gate

A-04-04







Detail of repairs of the crenellation

A-04-06



Detail of the crenellation and the concrete covering of the top of the wall



