ROBBEN ISLAND BLUESTONE QUARRY WALL RESTORATION PROJECT

REPORT ON OUTCOMES OF EXPERIMENTAL RECONSTRUCTION OF THE BLUESTONE QUARRY WALL

(AHSA) Archaeological and Heritage Services Africa (Pty) Ltd

Reg. No. 2016/281687/07

48 Jacqueline Street, The Reeds, 0157, Centurion, Pretoria

Email: e.matenga598@gmail.com.

Cell: +27 73 981 0637 / +2784 073 7774

Website: www.archaeologicalheritage.co.za

CONTENTS

1. BACKGROUND

The construction of an experimental wall at the BSQ is one of the key milestones of the Implementation Plan for the restoration project of the BSQW. The experiment was performed on a section of the collapsed wall 5m long and 7m wide. The experiment was a trial and error phase in which mistakes could be made and corrected; the expected outcome was learning. This approach allowed as many experiments as were possible during which no harm was expected to be caused to the heritage resource. The experiment was a training programme. This report is a summary of the outcomes of the experimentation. In the same report the Implementation Plan and Method Statements are updated in light of the lessons learnt.

2. PRECONSTRUCTION ARCHAEOLOGICAL SCREENING

Pre-construction archaeological screening proved essential as it led to the discovery of foundation courses of the wall. In order to plot the approximate position and course of the wall under the rubble two 10mm gauge tie ropes were laid out to approximate the curve of the wall between the two standing sections of the broken wall (Figure 1). The team worked through the debris with meticulous observation to pick out stone arrangements that were likely to be *in situ* and those that had been washed out of position by the waves. In the process, foundation courses of the wall, at least 2 courses 25 cm high, were exposed (Figures 2- 4). As debris and sand were cleared, brick laying and coursing techniques employed by the prisoners could be studied.

2.1. Observations and Recommendations

Archaeological screening to locate foundation courses of the wall is a process which demands meticulous investigation and observation. It tends to be a time demanding task and we have observed that more time must be allocated. Preservation of existing foundation courses and reconstructing the wall from this foundation is in accordance with best practices, which call for respect for the existing fabric of the of a heritage structure.

Figure 1: Two tie ropes, A & B, were laid parallel to each other along the collapsed section of the BSQW. They were used to guide the search for the foundation of the wall. Foundation courses were found 30cm to right of cord A.

Figure 2: Foundation courses were exposed during pre-construction archaeological screening of the site (view from the south).

Figure 3. Foundation courses, view from the north.

Figure 4: Foundation courses of the wall. View north shows a standing section of the wall with a sand deposit in the core of wall below a concrete cube**.**

3. BUILDING TECHNIQUES AND STABILISATION OF THE WALL

3.1. Structure of the façade

Two important observations were made:

(i) In the foundation courses exposed, most stones are laid with the long side laid transverse to the course of the wall. That was sound engineering; the foundation stones must imbed well into the core to increase the bonding between the façade stones and the rest of the structure (Figure 5).

(ii) On the basis of photographs taken in 2004 this technique was varied as they continued to stack the stones. The builders laid many façade stones with the longer dimension aligned with the course of the wall. This in turn tended to create a weak bond between the face stones and the core. But preference to this technique possibly suggests that there was a general shortage of face stones, and the decision to change the orientation of the longer faces would have been an attempt to compensate for shortage (Figure 6).

Figure 5: Foundation courses in the collapsed section of the BSQW exposed before the construction of the experimental wall. The longer side of the foundation stones are laid transverse to the course of the wall.

Figure 6: This wall was standing in 2004 in the section that was washed away in 2011. It shows the frequent use of façade stones with long faces. There is poor structural coherence, i.e. bonding between the façade and the core (Matenga 2004, page ix).

3.2. Recommendations

The preferred building technique is one that lends a good structural bond between the façade stones and the core. This entails mixing short and long face stones in ratios in which there are more short faces than long faces. Our assessment informed by the experimentation is that there is a shortage of face stones, and these have to be supplied from an external source.

3.3. Structure of the core

From the available documentary evidence the core of the wall consisted of heterogeneous material of different sizes including sand, gravel waste from the dressing of the mined bluestone, other stones and seashells. This shows the limitations the prisoners experienced with regard to material procurement and selection. The material of sharply varying sizes deviated far from the optimal graph required to achieve reasonable structural stability.

Figure 7: Sand load placed in the core of the wall can be seen below the concrete cube in the background. The recommended packing of the core excluding the sand can between two concrete cubes in the foreground.

3.4. Recommendations

All stones from the debris other than those selected for the construction of the façade, or are very large, will be packed in the core of the wall, making sure that the core stones interlock well with the façade. Long stones will be laid in the core in transverse orientation to provide additional bonding.

3.5. Construction of a defensive "skin" on the sea facing side of the wall

After careful study of the wall and its location on the shoreline, we have come to the conclusion that the first line of defence is to provide additional strength on the side facing the sea so that it can withstand the impact of the waves.

3.6. Recommendations

The plan entails introducing large stones with incremental size from the centre of the breadth of the wall towards the sea. In other words the size of the stones to be packed increases in size with increasing distance towards the sea from the centre of the core. There are very few large stones in the debris (Figure 9).

The weight of the individual stones required for the purpose is yet to be determined in terms of minimum and maximum sizes. The stones will be laid in such a manner as to integrate well in the wall so as to maintain visual integrity and avoid obtrusion.

It has been noted that mechanical equipment will be required:

(i) Mechanical power to break the stones: the team has attempted without satisfactory results to break the raw material stones brought to the site using a 14 pounds hammer. A machine with more compressive power is required.

(ii) Machinery will be required to lift the stones from the temporary stockpile and stack them on the seaside of the wall. Stonemasons will be trained to direct the machine operator to place the stones in the right positions.

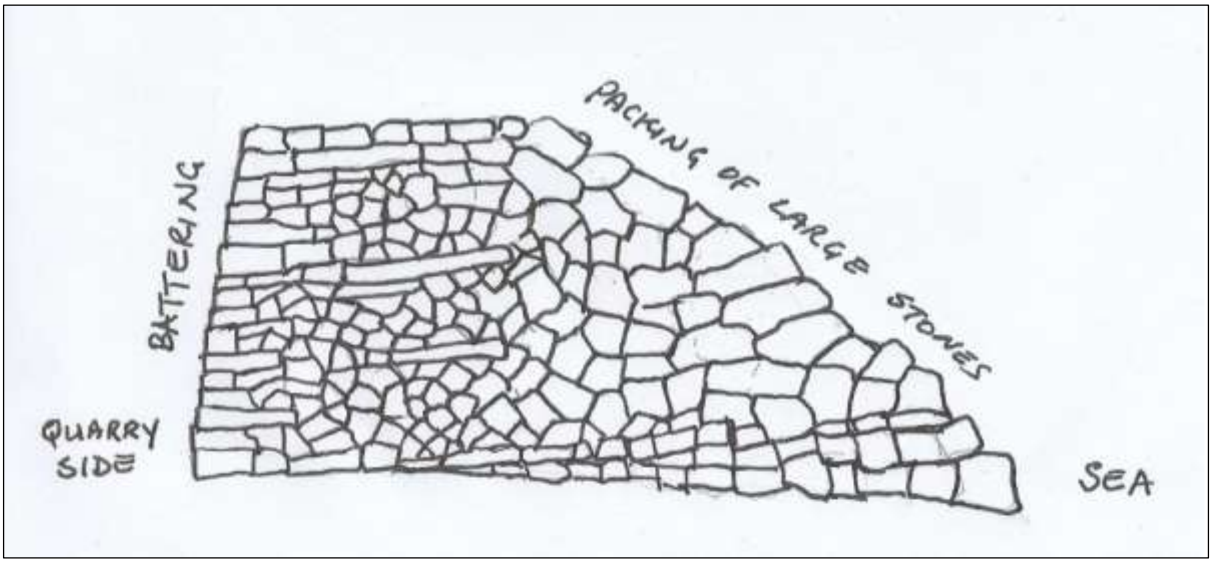

Figure 8: Cross-sectional drawing shows the proposed structural design of the wall with (i) carefully stacked stones that makes the façade facing the quarry, (ii) core of the wall with occasional transversely laid tie stones (iii) defensive skin of the wall with the size of blocks laid increasing from the centre of the wall towards the sea façade.

Figure 9: Stockpile of raw stone to be broken and used for the construction of the BSQW.

4. CONCLUSIONS

The amended method statement requires extension of time and deployment of mechanical equipment. Lifting equipment is required. A jack hammer will be required to custom -break up stones to produce the required volume of face stones. Alternatively suitable stones may be sourced from a supplier that has been identified on the mainland. The above findings and recommendations have budgetary implications, yet these requirements could not have been predicted before the experimental work.