CONCEPTUAL AND TECHNOLOGICAL ISSUES IN SITE PRESERVATION: RECONSTRUCTING TEL BEERSHEBA

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SUMMARY

A well-planned city of the Iron Age II was excavated by a team of Tel Aviv University archaeologists, who attempted to arrest the advanced decay of the ancient mud-brick walls. The excavators faced technological and ethical problems in doing so, and the 20-year long effort in preservation and site presentation is described and analyzed here. This lengthy project, which has resulted in the creation of a national park at Tel Beersheba, is a good case study of archaeological site management.

1. INTRODUCTION

The site of Tel Beersheba was extensively exposed between 1969 and 1976 by an expedition of Tel Aviv University headed by the late Prof. Yohanan Aharoni. Large portions of the mound were revealed, containing 14 distinct occupational strata, dating to the Iron Age I through the Early Arab periods. Although the tell was excavated in the common square system which penetrated to various levels, the well-planned city of the Iron Age II became the major objective of the project. Fully 60% of the Iron Age II town was exposed: homes, the governor's residence, the city walls and gate, storehouses, and open spaces. An entire urban fabric of a centrally planned border outpost of the Kingdom of Judah, was laid open to the delight of the excavators. Unfortunately, the city was laid open also to the elements, and began disintegrating from the moment of its exposure.

The common construction material in the Iron Age II was sun-dried mud-brick on foundations of stone. The state of preservation of these walls was understandably miserable: the ancient mud-bricks had long since lost any internal cohesion, and were incapable of standing alone.

The stone foundation walls fared better. It was clear to the excavators that within a year or two at most the remains would suffer irreversible damage.

The prevailing attitude at excavated sites in Israel in the l970's was that archaeologists and the institutions behind them take interest in the scientific aspects of the site but not in the site's potential appeal to the general public. The task of site preservation and development was assumed to belong to other authorities, such as the National Park Authority, or the local municipality. Tel Beersheba was a rare exception in that the archaeological team was strongly motivated to preserving the exposed remains. Efforts and experiments in those directions were made from the very beginning. After thirty years, some of these efforts seem a bit naive. In looking back at the excavation period and the subsequent years of park development, we can see just what was happening, and why. A review of the history of the Tel Beesheba preservation and development project is an interesting case study in the management of an excavated archaeological site.

2. CONSERVATION OF EXPOSED BRICK WALLS

The first reaction of the excavation team to the site's rapid disintegration was to protect the exposed brick walls and to arrest the decay. An attempt was made to consolidate the bricks by impregnating them from outside with a binding agent. A chemical solution was sprayed over the mud bricks. The results were predictable: within a year the consolidated outer crust of brick spalled off from the unconsolidated core, causing great damage. Today, given our familiarity with the history of consolidation attempts we would have expected this.

A truly creative approach was then undertaken: to fire the bricks *in situ*. The concept was to cause whole sections of wall to become chemically altered, kiln-hard, through the application of high temperature. A skilled potter, Doron Bar-Aadon, was recruited for the task. He surrounded a section of a wall with modern bricks and fired the old clay bricks using gas burners. Unfortunately, it was impossible under the conditions prevailing to raise the bricks' temperature enough to produce the required chemical change. In retrospect, even had it been possible to produce locally high temperatures, the bricks would have cured unevenly, causing cracking along the temperature differential.

Two additional preservation attempts were also tried. These differed substantially from the failed experiments in consolidation and burning described above. While the former attempts were designed to preserve both the building materials and their appearance, these new attempts sacrificed appearance, and tried to preserve the building materials only. In one experiment walls were simply plastered, but the result looked like theater scenery. A second variation of this blanket approach focused on maintaining the original shape of the bricks. Walls were draped with wet fiberglass and the joints between the individual bricks were emphasized. When hardened, the fiberglass coat vaguely preserved the shape of the walls: more so, at least, than did plaster. Nevertheless, the fiberglass still looked artificial. These solutions worked technically, but they produced a totally unsatisfactory visual result. They also suffered a severe flaw of internal logic: houses in antiquity were plastered right up to the roof. The plaster on the roof and on the walls protected the sun-dried clay-bricks from decomposition. Attempting to re-plaster only *part* of the original wall-height leaves the top surface either exposed and vulnerable, or unnaturally plastered at the wrong level.

3. A SHELTER COAT: TRANSITIONAL THINKING

At this juncture a new conservation approach was undertaken: to cover the original bricks with layers of new bricks. The idea was that the direct damage of weathering would be absorbed by the new bricks, thereby extending the life of the original material below. Walls in the western quarter and in the gate area were capped with new clay bricks, but when the excavators returned to the site after a rainy winter they were disappointed by what greeted them. The shelter-coat bricks were sun-dried mud-and-straw bricks in imitation of ancient bricks. The winter rain had washed out most of the clay, leaving mainly straw. The new bricks had served their purpose in protecting (at least partially) the original bricks, but it was not realistic to hope that the shelter coat could be replace every year. Clearly a more durable new brick was needed. It was decided to produce kiln-fired bricks.

This decision marked a transition point in the excavators' thinking, because it lead them, over the next few years, to move from attempting to preserve the ancient *materials* to preserving the spirit of the *site as a whole*, even if this meant replacing the original materials! Having decided that they would produce new durable bricks with modern technology, the door was opened for the more radical ideas of reconstruction, which later emerged.

4. BRICKS, BRICKS, AND MORE BRICKS

The excavators were aware of the fact that fired bricks were used only since the Hellenistic period, but they hoped that these bricks could still resemble the originals, especially since ancient cities were often destroyed by conflagration.

The first experiment in producing kiln-fired bricks was assisted by the Beer Sheva Municipality, which had a large supply of unneeded wooden school chairs and desks. Great bonfires were made under two layers of freshly prepared mud-bricks, made from the local soil and laid on sand in rectangular frames. Tel Aviv University Institute of Archaeology metallurgist Alexander Lupu supervised the work. This technique failed to reach the temperature needed for curing.

Another attempt, using burning tires, was then tried. The tires, collected from all over the city of Beer Sheva, produced much black smoke and temperatures approaching those in commercial brick kilns. Hundreds of bricks were produced and used in the Western Quarter, replacing the unbaked straw bricks. However the bricks produced were fired unevenly, with hard crusts and soft insides, they looked charred black (and not red, as desired) and they broke apart easily. They did not halt the damage to the original ancient bricks.

A more sophisticated solution was sought. The new idea was to construct a large commercial-grade kiln, fill it with hundreds of bricks, arranged in levels, and burn them using natural gas. With the help of a local natural gas company, this was done. To minimize transportation costs the kiln was erected at the edge of the tell. Thousands of bricks were produced in less than three months, using the clay-rich alluvial soils of the streambed deposits, trucked up to the site. The bricks produced in this phase were better fired and the clay turned into a red, pottery-like color. These bricks were substantially harder then the previous ones.

Having produced at long-last a durable brick, the excavators expanded the scope of the project: in addition to shelter-coating the ancient bricks they started to use the new bricks for reconstruction of wall segments that had been destroyed in antiquity. The walls of the governors' palace, the storehouses, nearby dwellings and the inner city gate were reconstructed to a modest height using these new bricks. The focus of this work was no longer preservation of *materials*, but *site* presentation. Something new was underway. In l976, the expedition leader Prof. Aharoni, died. The last season was directed by Dr. Ze'ev Herzog. After the summer of 1976 the site was abandoned 13 years.

5. RENEWED EFFORTS

In l989, the National Parks Authority requested Architect Lawrence Belkin to evaluate Tel Beersheba's development potential for tourism. By this time, there had been much further deterioration on the site. Virtually all of the ancient bricks were gone, as well as many of the reconstructed bricks, and numerous foundation walls had subsided. Deep excavation pits were silted over and filled with seasonal vegetation and desert shrubs. The site was unintelligible, depressing, dusty and windswept. Some reconstructed walls from the 1970's were still standing — a tribute to the durability of those bricks — but their contribution to the overall (dismal) surroundings was judged by the architect to be minimal. The evaluation for tourist potential recommended doing *nothing*. In spite of this report, owing to the uniqueness of the site as the only widely-exposed Iron Age city in Israel, the Parks Authority decided to invest in development with a view to opening the park to the public a year hence!

6. INSTITUTIONAL DURABILITY

Thus started the second phase of Tel Beersheba's modern history. Dr. Ze'ev Herzog returned to the site and initiated excavations in coordination with the Parks Authority. Together with the Architect and teams of workers directed by the site manager, Eliyahu Even-Haim, the work was commenced. Fallen bricks and stones were removed, deep excavation probes were filled in, and a section of the mound was excavated to allow continuity of passage in the peripheral street. The contour of the 8th century BCE city started to reappear at the site. The project was planned in two phases. At first the workers concentrated on reconstructing stone foundation walls. These were repaired and raised to the levels corresponding to the street system. The second phase consisted of adding bricks.

The mud bricks of the 1970's had weathered reasonably well, but nevertheless many of them were in a state requiring replacement. By the l990's they looked ancient, with eroded sides in the upper courses and some collapse. This was an uncomfortable situation, clearly misleading to the potential visitor, yet eminently pleasing in its effect. The restorers were spared from any agonizing internal debate regarding the legitimacy of continuing to produce these bricks, however, by an institutional decision of the National Parks Authority. To *them*, there was no question of continuing to restore using clay bricks as produced in the l970's: these relatively soft bricks were inappropriate to the maintenance-free and vandal-proof standards which the Parks Authority felt necessary to achieve. A new period of experimental brick production began.

7. NEW FORMULAS

Thus began a long period of experimenting with substitute bricks, which continues right to the present. The goal of all of these trials was clear, if not clearly expressed: to produce a stable brick identical in size, texture, and color to the original mud-bricks, and to use them in construction patterns identical to the ancient.

What turned out to be the most devilish problem in producing stable mud-bricks had already been evident in the l970's: because ancient, sun-dried bricks were so much larger than modern baked ones, heating, drying, and cooling them is very difficult. The ancient bricks measured about 50X30X15 cm, modern bricks or adobe bricks are no more than 11% of this size! The internal stresses produced in modern bricks by temperature or moisture change during curing are a small fraction of what occurs in the massive ancient mud-bricks. As a result, these larger bricks almost invariably crack. This was of no concern to the builders of Iron Age II: they were not trying to fire the bricks and the huge size was advantageous in terms of labor economy. Any cracks would be plastered over anyway.

The first experiments in producing an extremely durable brick used mixtures of local soils and cement in different proportions, within rectangular wooden forms. These bricks looked like modern building blocks. After consultation with experts from the Ben Gurion Center for the Study of the Desert commercial plasticizers, which are rubber-based additives, were added to the mix. Still the bricks suffered from the familiar problem of cracking while curing, and the search for a solution continued. Instead of the ancient straw we tried to use glass fibers as a reinforcing agent. The results were improved curing and less cracking, but the visual qualities of the bricks produced were not always satisfactory. At our initiative the Park Authority hired a local brick factory to produce an experimental run of fired clay bricks in the shape and size of ancient bricks. Despite much good will and many trial bricks, they were unable to overcome the difficulty of achieving a "hand-made" character within an assembly-line environment.

In the end, we returned to the experiments that were carried out by the manager of the Tel Beersheba Park, Eliyahu Even-Haim, a man of great dedication, patience, and resourcefulness. He was able to balance the mud-cement mix to achieve an effective color. We choose to produce bricks that looked 'eroded', as if after a period of weathering. Eliyahu developed a system of frames composed of alternating sides, each of them designed with irregular inner linings. The numerous combinations of the frame parts resulted in multiple shapes, simulating the handwork of ancient brick-making. Although the Israel Antiquities Authority cringed at seeing cement used in such great quantities in an antiquities site, there were really no preservation issues here that prohibited its use.

Walls of buildings along the town's peripheral streets were raised by as much as a meter, the outer city gate by even more, and the city walls around the ancient Water Installation to eye level or slightly higher. Inner walls of houses were raised less - usually one to three course only, with the emphasis on the radial walls which separate unit from unit. Streets (originally dirt) were covered with dark gravel for emphasis. An observation tower was erected on the site's highest point to offer the visitors a birds-eye view of the layout of the neatly planned town. This design supported the Parks' Authority strategy of creating unique themes for each National Park. For Tel Beersheeba the themes selected were 'the Planned City in Antiquity' and 'Water in the Desert'. At that stage excavations were undertaken of the ancient water

supply installations: the 70 meter-deep well and the well-preserved and elaborate plastered underground water storage system.

8. TURNING THE CLOCK BACK

The site today approaches the vision of the original excavators, although room for improvement certainly exists. What is that vision?

The intuitive concept, the vision, shared by almost everyone who worked on this site, is this: an archaeological site, excavated as a ruin, should be presented as a ruin, and yet it must be *instinctively* understood by the visitor. These two characteristics are inherently incompatible: to present a ruin, we need merely to *preserve* what we have found. To generate instinctive understanding we need to *restore.* No amount of signage, no mater how sophisticated, can truly replace restoration if one wants to generate an instinctive, automatic comprehension of a structure on the part of an observer. A house is not the same as a low wall plus a sign. On the other hand, too much restoration will inevitably erase the character of the site as a *ruin.*

The intuitive design solution to this was to *turn the clock back* -- to reconstruct the site not as it originally was, but as it was during a previous state of ruination. This concept visualizes the site on a time line beginning with the site's active past, and continuing through its gradual (or rapid) deterioration, step by step, until it reaches our own time. What we, the restorers are attempting to do is not to return the site to its active past, but to an earlier, more understandable, state of partial deterioration.

If this can be accomplished, a product may be produced which does not fundamentally alter the reality of the site (a ruin), and yet provides the visitor with a better chance of understanding what he is observing without excessive external (modern) interference. The *site* as an entity in its own right retains its original excavated character — is true to the nature of what was discovered — and yet is not burdened with excessive, obsessive attention to preserving building materials or freezing states of deterioration as if they had inherent meaning. Seeing the site on a time-line of deterioration helps us make the critical decisions in site presentation which allow the visitor to naturally comprehend what he sees, without destroying the essential nature of what is being presented.

Tel Beersheba today offers the lay visitor a lesson on ancient town planning and an emotional experience.