

INCA STORAGE AND ACCOUNTING FACILITIES AT PACHACAMAC

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... Our best data on Inca storage come from the Peruvian Central Highlands where, as it seems clear, storage was unusually important. However, we need more intensive work in other areas in order for a more complete and comparative perspective to emerge (Morris 1992a: xiii).

INTRODUCTION

The work of Craig Morris on the Incas' economy and storage system represents an important stage in our understanding of their great Andean empire (Morris 1967, 1986, 1992b; Morris and Santillana 1978; Morris and Thompson 1985; among others). Morris's thought and approaches do not apply only to the sites and regions where he, himself, worked, but also to other sites, as he stressed. Specifically, his insights are relevant to the Andean coast where the evidence for storage is very different from that found in the highlands. There are a few published studies of Inca storage at sites on the Pacific coast, including Farfán in the Jequetepeque Valley (Mackey 2006), Chiquitoy Viejo in the Chicama Valley (Conrad 1977), Incawasi in the Cañete Valley (Hyslop 1985), La Centinela in the Chíncha Valley (Morris and Santillana 2007), and Tambo Colorado in the Pisco Valley (Hyslop 1984:108-11), but there is nothing comparable to the work on the subject accomplished at highland sites like Huánuco Pampa (Morris and Thompson 1985), Hatun Xauxa (D'Altroy 1992; D'Altroy and Hastorf 1984), and Pumpu (Matos 1994), among others (LeVine, editor 1992).

In this article I present information on the finds and contexts of quipus and *collicas* (Quechua for storehouses, also spelled *qollqas*) at the site of Pachacamac, on Peru's central coast. First I describe a series of *collicas*, focusing on the differences between the coast and the highlands in the design of storehouses, their number, and capacity. Work in the northern portion of the site has led to the discovery of a probable Inca storage system, a building designated Structure E8, described in this article. Several quipus have been found in this building, as they have been in other contexts at the site. My interpretation of these finds in light of the general framework of Inca imperial political and economic organization suggests that Pachacamac was controlled indirectly by the Incas, who used the site not as a state administrative center, but as a local one. They concentrated their efforts on developing facilities related to the god for whom the site is named, and for large scale pilgrimage.

Pachacamac, at the mouth of the Lurín River, was one of the most important sites of the Inca empire (D'Altroy 2002; Eeckhout 1998, 1999:410-417, 469-474, 2004a; Hyslop 1990:255-61; Moseley 1992:185; Rowe 1946: 191, 1963; Uhle 1903). It is, thus, interesting to see how storage was managed there, but, somewhat surprisingly, up to now there has been no work focused specifically on that subject. Nevertheless, one can see Inca traces in, among other things, the presence of storehouse complexes, as well as of artifacts related to accounting and recording (quipus or *kipus* and *yupanas*). In this article I put down on paper data and thoughts

relevant to the role of storage and accounting facilities in the Inca imperial economic organization as seen in the light of the general achievements and specific finds made by the Ychsma Project.¹

Evidence of quipus has been found during several field seasons at Pachacamac, and we can now identify a series of *collcas* whose number, design, and location allow us to understand the ways the Incas controlled the site. The data, although preliminary, suggest that in the eyes of the Inca, Pachacamac was a major site both symbolically and in strategic terms, but one that was not as important, perhaps, in economic terms.

STORAGE IN THE INCA IMPERIAL ECONOMIC ORGANIZATION

The *collcas* served to warehouse various kinds of goods (c.f. D'Altroy 2002:284; Huaycochea 1994; LeVine, editor 1992). These goods supported various goals, including maintenance of imperial armies on the march, maintenance of workers serving in the mit'a, redistribution to local residents during banquets and fiestas, and provision for difficult times such as after bad harvests. According to Timothy Earle (1992: 333), the possible, mutually non-exclusive, functions of Inca storage were to support subsistence maintenance, to serve as distribution facilities, and to be instruments of institutional finance. D'Altroy and Earle (1985) argue that this latter aspect is the most important one for understanding imperial organization, which needed resources to maintain itself and develop, but which did not have an advanced market system. The mobilization by the state of a por-

tion of basic products extracted from the local economy allowed it to sustain those who worked for the state (Earle 1992:334). Naturally, this system required adequate logistics, including storage facilities on a large scale, as well as widespread economic control (*ibid.*).

Craig Morris, after studying the *collcas* of Huánuco Pampa, concluded that their form (circular or rectilinear in plan) may have had a relationship to their contents.² Above all, he demonstrated the high degree of elaboration of these storehouses, which were equipped with ventilation systems and other features to ensure the best possible preservation of the perishable products they contained (Morris and Thompson 1985:97-107). He also emphasized that a crucial factor for effective storage was the location of *collcas* in high places with relatively low temperatures and constant winds (Morris 1992b: 254-256). This later consideration explains why the sites with the largest number of *collcas* are found above 3300 m.a.s.l.

The Inca state incentivized the movement of products to concentrate them at specific sites. For example, at the site of Cotapachi, in the Cochabamba Valleys of Bolivia, *collcas* occupied approximately 140 hectares. They stood in rows and added up to about three thousand units for the stockpiling of maize produced in the area (Pereira 2011). Nevertheless, this site is not associated with other facilities except for domestic ones, and is integrated into the Qapaq Ñan, the Inca highway system, via a secondary road (Snead 1992:92). Sometimes *collca* complexes are dozens of kilometers away from the most productive agricultural zones, as is the case with Huánuco Pampa (Earle 1992:332).

These aspects of the Inca economy have been understood since the beginning of the

¹ El Proyecto Ychsma (Université Libre de Bruxelles, Belgium and Instituto Nacional de Cultura del Perú, now the Ministerio de Cultura) began in 1999 in order to clarify the function, development, and influence of the site of Pachacamac during the Late Intermediate Period and the Late Horizon.

² This suggestion has not been confirmed at Hatun Jauja by D'Altroy (2002:284).

Spanish conquest. In the case of Pachacamac, the earliest accounts mention its economic and political arrangements. In January 1533, Hernando Pizarro arrived in the area and revealed that “In all the plains and beyond, tribute is not paid to Cusco, but to the mosque”³ (Pizarro 1872 [1533]:123). This quotation reflects the decentralized organization of the Inca empire as described above. As various authors have emphasized, Cusco, in contrast to other ancient imperial capitals such as Rome, did not have a large population (Pärssinen 2003:131-139). Therefore, it was not necessary to bring vast quantities of goods from the various parts of the empire, but only that which was sufficient for a few thousand Cusqueños, who also obtained many of their resources in the nuclear area (Bauer 2004). In summary, the Incas developed an economic policy based on the control of a portion of the resources and labor of the diverse parts of their territory (D’Altroy 2002:268-286). This is evident from the presence of the famous tambos and administrative centers, as well as from transformations imposed on pre-existing sites. These latter settlements reveal three traits directly related to the imperial economy and logistics: storehouses, the presence of official functionaries, and access to the Qapaq Ñan. As we will see, all three traits are found at Pachacamac.

FIELD DATA ON STORAGE FACILITIES AT PACHACAMAC

The studies on storage by Morris, and others, focus mostly on the highland *collcas* which are formally different from the storehouses found at sites on the coast, and in the lower portions of the coastal valleys. It is sufficient to mention the example of Chan Chan, whose storehouses are

found within its Chimu *ciudadelas* (large royal palaces) and upper elite compounds (Kolata 1990), and not outside the city, as with numerous highland examples. The coastal storehouses differ in their access system, which is not via low doors, as in the mountains, but via their roofs, using stairs or ladders.⁴ Coastal storehouse dimensions vary greatly, and, in general, the individual coastal storage systems are larger than examples from the sierra. This is true of Pachacamac, where we have several examples of storehouses pertaining to the Late Intermediate Period and the Late Horizon (Table 1).

Building	Period	Nº of collcas	Estimated m ²	Estimated storage capacity m ³ *
P1	LIP	26	650	1300
P2	LIP	21	725	1450
P3A	LIP	4	120	240
P3B	LIP	4	90	180
P4	LIP	12	300	600
P5	LIP	10	115	230
P6	LIP	17	1225	2450
P7	LIP	5	500	1000
P8	LIP	/		
P9	LIP	4	200	400
P10-TC	LH	12	600	1200
P11	LIP	3	20	40
P12A	LIP	16	625	1250
P12B	LIP	6	455	910
P13	LH	4	200	400
P14	LIP	4	180	360
P15	LIP	6	80	160
P16	/	5	100	200
ToS	LH	15	765	1530
Acllawasi	LH	12	225	450
A1-A2	LH	35	2100	4200
E8	LH	20	625	1250
Totals				

*Volumes are structure volumes to roofline, based on an estimated average height of two meters as determined by excavation. Structure volumes do not take into account accommodations for packaging.

Table 1. Storage facilities at Pachacamac

Storehouses dating from the Late Intermediate Period are systematically associated with larger buildings, such as the pyramids with ramp (Figures 1, 2). In formal terms, all are orthogonal, generally square in plan, sunken, and closely

³ In the early sixteenth century many Spanish writers referred to important Amerindian religious structures as mosques (*mezquitas*), conflating Islam with other non-Christian religions.

⁴ At Chan Chan access to storehouses is through a central door at floor level (c.f. Moseley and Mackey 1974).

associated with private sections of their sites. That is, access was controlled by the chief inhabitants of the pyramids, as is demonstrated by the buildings' internal systems of movement (Eeckhout 2003). This differs a great deal from the Inca pattern, in which the storehouses stood beyond their sites' centers, usually on a height with fresh air. Highland *collcas* do not exhibit evidence of access as restricted as that of coastal ones. The capacity of the Pachacamac storage system is relatively restricted. At any rate, it does not compare with the hundreds of *collcas* at Huánuco Pampa, for example, even though both sites are comparable in size and importance (compare Snead 1992:68, table 3-2).⁵

These two specific characteristics, the lower number of storehouses, and the restricted access, suggest that storage at Pachacamac represented a select portion of goods intended for consumption, possibly reserved for a specific segment of the population, who took precautions in looking after it. This model fits a general pre-Inca pattern, marked by a concentration of staple products in the domestic unit, while storehouses proper were reserved for luxury objects, associated with elite structures (Earle 1992:340). This pattern at Pachacamac also shows that the management of storehouses was not in the hands of a force extending over the entire site, but, instead, was divided among different groups, each based at one of the several pyramids with ramp (Eeckhout 2004b). The data presented in

Table 1 reveals that, during the Late Intermediate Period, each pyramid had its own stores, which varied a great deal in terms of number and capacity. These depended on the form of political and economic control exerted by the Ychsma chiefdom. According to the model I propose on the basis of field-work data, the pyramids are the palaces of *curacas*, the local leaders, who divided surplus production and took part of it for their own benefit, storing it in their pyramids. Not all the pyramids functioned at the same time. Instead, each one was occupied for one or two generations between the fourteenth and fifteenth centuries C.E. by an elite hierarchy reflected in the sizes of the buildings, and defined through excavation and radio-carbon dates as ongoing research from the Ychsma Project suggests.

What did the storehouses contain? It must be emphasized that for Pachacamac Pyramid 3, the most complete example studied by the Ychsma Project, excavations confirmed that the premises had been completely emptied (Eeckhout 1999:128-192, 2004b). Nevertheless, in one of the buried areas in Plaza 2 we found corn-cobs offered as *conopas*,⁶ which may suggest the way the area was used (Eeckhout and Farfán 2001). Régulo Franco Jordán has had more success, encountering corn-cobs, gourds, and chilli peppers in the main storerooms of Pyramid 2. It appears that these were roofed to protect them from wind and insects (Franco 1993:17-18). The stratigraphy of the contents shows that the storehouses were not always used to keep the same type of product, and it is probable that they served totally different ends. For example, there was a layer of *camelid* excrement in a buried peripheral area (*ibid*: 72) and there were scratch marks made by dog claws on the walls of one of the structures near the platform (Paredes

⁵ In the highlands, many fields produce only one crop a year (*c.f.* Mitchell 1991:71-73) and many must be left fallow for long periods. This makes storage a greater necessity in the highlands than it is on the coast. On the coast, in Inca and early colonial times, most fields could be planted twice a year with maize and other cultivars (Cieza 1962 [1553]: Chapter 66, p. 193), as they are at present. On the coast it is easier than in the highlands to fertilize using fish and/or guano, and fish and shellfish are generally available all year for human consumption. Another crop and another supply of protein are always available soon (Monica Barnes, personal communication, August 2011).

⁶ These are special natural items chosen for their unusual size or form. They were considered to be sacred and used as propitiatory offerings.

1988:50), allowing us to think that these structures served to confine animals. Paredes (*ibid.*: 54) concludes, nevertheless, that Pyramid 2 appears to have been dedicated mainly to the storing of chilli, present in several deposits associated with the building.

It is certain that Pachacamac has been intensively robbed since the beginning of the Spanish conquest and it is most probable that only minimal traces remain of the produce its storehouses may once have contained. This is without considering the valuable goods (textiles, various artifacts, etc.) that were probably also kept in them. Furthermore, given that almost all the pyramids were abandoned over the course of the Late Intermediate Period, it is logical that one no longer encounters anything in the storehouses. In reality we are confronting a situation like that of the palaces of Chan Chan, whose storehouses were also all found to be empty (Day 1982:60). The Lurín Valley has also suffered from plundering, but on a smaller scale.

Certain local palaces functioned under Inca authority, therefore forming the second hierarchical level in the chiefdom, and, thus, probably retained a good part of their privileges (Eeckhout 2008a). Likewise, excavation of a pyramid with ramp at the site of Pampa de las Flores in the lower Lurín Valley confirms indisputably the role of storage attributed to buried structures, because maize was encountered *in situ* (Eeckhout 1999:289-90). At the nearby site of Tijerales B, Bonavia (1965:91-92) found raw cotton in a roofed storehouse of the South Pyramid. This evidence suggests that perishable goods (such as food products) were stored, but, perhaps, so were other consumable goods (such as wool, cotton, and ordinary ceramics), prestige goods (fine clothing, imported products, decorated ceramics, etc.) and/or products of ritual value (coca, chicha, etc.). In summary, everything was stored that was necessary for the daily life of *curacas*, for their office, for the exercise of

their authority, and for the maintenance of their personnel.

For the Late Horizon one clearly observes that there was a drastic change in the distribution of storehouses at Pachacamac. During this time none of the pyramids with ramp was being used as the residences of the local elite, with two exceptions, P10 (Tauri Chumpi) and P13. I will return to those below. The other pyramids served as campsites for pilgrims, and they were quickly reused as burial chambers (Eeckhout 2010a). When the site was conquered by the Incas, Topa Inka Yupanqui undertook many transformations there (Patterson 1983). These changes were motivated, among other reasons, by the desire to make the site a pilgrimage center at the imperial level (Eeckhout 2008b). The Plaza of the Pilgrims (Plaza de los Peregrinos), the Temple of the Sun (Templo del Sol), and the House of the Chosen Women (Casa de las Mamaconas or Acllawasi) were built in areas previously occupied by local constructions. As for storehouses, a series of structures exists on the platforms of the Temple of the Sun that, from their design, could have served as *collicas*, but their present state of conservation does not permit much to be said about this (Franco 1996). There are, as well, some probable storehouses associated with the Acllawasi (Tello 2009), but, according to our observations, the Inca storage systems observable today are concentrated in two places: the vicinity of the Plaza of the Pilgrims, especially at structures A1-A2, and in the northern sector of the site, where we identified a very unusual structure, designated E8.

The A1 compound is north of the Plaza of the Pilgrims, and consists of a series of plazas, patios, rooms, and sunken structures standing on several levels (Figure 3). It is an important building complex probably related to the conduct of ceremonial activities and to offerings brought by pilgrims. This part of Pachacamac

has not been excavated, but surface clearance revealed architectural evidence suggesting storage functions, such as rows of sunken rooms with means of access control. The absence of excavation data from this compound makes it difficult to assign it a chronological position. Nevertheless, there is evidence relating it to the Late Horizon, for example, an aryballos found in the corner of one of the compound's rooms (Figure 4). In addition, both the A1 compound and its neighbor A2 are clearly associated with the Plaza of the Pilgrims, which excavation has demonstrated to have been constructed in Inca times (Eeckhout and Farfán 2003; Shimada *et al.* 2004; Uhle 1903).

Structure E8 is in the E section (*barrio*) of Pachacamac, that is, at the extreme north of the site (Figure 5). It is an isolated structure, but one that is associated with circulation routes of which only traces remain, including a wall to the east topped with a path, and a trace of a street or passage to the west. Although partially destroyed by the old Panamerican Highway and the present concrete wall that delimits the monumental portion of the site, the principal components of E8 are preserved, and its general form can be reconstructed, as is illustrated by the isometric plan we made on the basis of field data. It has a generally rectilinear form and appears to have been completely surrounded by a two meter wide wall, with access in the southwest. It consists basically of two parts: a large patio, eighty by sixty meters, associated with a series of buried chambers with square plans, laid out in two parallel rows of ten units each along the south wall of the patio. A room to the front and center of the units can also be observed. We will return to this later. The two rows of buried structures are arranged in steps. That is, the row nearer the patio is lower than the other. According to the observable evidence, access to these rooms was achieved via paths atop walls. The form and design of the rooms is very similar to coastal type storehouses. We have not yet had

an opportunity to excavate the rows of rooms to check our hypothesis, but we have been able to excavate the front room at the edge of the patio, although not as carefully as we would have liked. However, during the course of cleaning the room in front of the rows of chambers, we encountered a series of finds that I will describe below.

The front room is small and rectangular with a single entrance opening upon the patio (Figure 6). One notices upon entering a division of the internal space into two parts, perhaps a vestibule with a small adjacent portion fitted with a lateral platform or bench. Although it was already plundered, cleaning the room to Floor 1 revealed some very instructive finds. The first is a small wooden cup finely decorated with an incised maize plant motif, a very frequent design in Inca iconography (Figure 7). This design suggests that the object probably served for drinking *chicha*, a practice related to fiestas and ceremonies for the majority of people, and to daily consumption for certain privileged classes such as *curacas* and high state functionaries (Bray 2003).

Second, we encountered lying on the floor and broken into several dozen pieces, a ceramic object that we reconstructed. The process of restoration was somewhat difficult because the object weighs about ten kilograms and has a most unusual form. It is basically a cube with several appendages and a round central hole (Figure 8). Two of the appendages show four small holes, perhaps designed to suspend or attach thin cords while quipu knots were being tied (see below). Its dark orange paste is very homogeneous. The piece is painted white and does not show marks of burning, nor traces of any contents. We do not know its purpose. Perhaps it served as some sort of model. Another possibility is that it was used to keep quipus (compare Flores *et al.* 2007:243, figure 34), something suggested by the find I describe next.

FIELD DATA ON ACCOUNTING FACILITIES AT PACHACAMAC

The third remarkable find from the preliminary excavations of the front room of Structure E8 is a collection of quipus found lying on the floor, spread over the platform, and on the broken floor between the room and the entrance. Unfortunately, the several masses of quipu have decomposed, possibly because of rain or because of some other liquid thrown over them (Figure 9). Together with Kusi Colonna-Preti, the conservator of the Ychsma Project, I am studying the possibility of restoring them, or, at least, separating them, but this would be a very delicate operation. Nevertheless, we hope to recover significant objective data (number, position, and type of knots) so that these quipus can be used for scientific purposes. On the basis of field observations, we can already say that we found at least nine quipus, apparently all of fine cotton cords, the majority a natural white color. We cannot discount the possibility that there are more quipus, because some bundles of cords might incorporate more examples. Some of the quipus, at least, have colored knots.

Quipu H24A, found on the surface of the platform, is one of the most deteriorated. Nevertheless it has headers and cords of different colors, beige, violet, and possibly brown (the latter perhaps due to the liquid that caused its decomposition). **Quipu H24I** was found rolled up like a hank of yarn, has white cords, and is associated with a cane and remains of a plain-weave textile with some selvage visible. **Quipu H24J** is another quipu in bad condition, also rolled like a hank of yarn. It is brown, blue, and violet. **Quipu H24K** is another packet of decomposing, dark brown quipus with knots. This was found in the central part of the structure between the west wall and the bench. These artifacts are, themselves, associated with the bench and Floor 1.

The doubled and wrapped quipus resemble the manner in which *quipucamayokuna* (keepers of quipu records) retained their quipus (Ascher and Ascher 1981:33). The quipus previously found at Pachacamac by Alberto Bueno in Structure B7 are famous, and he gave the building the name “House of the Quipus” (Casa de los Quipus; Bueno 1990). Nevertheless, the context seems different from that which I have just described, because the quipus discovered by Bueno were hidden in a pit lined by adobes and covered with layers of earth, sand, and late archaeological debris. Bueno (*ibid.*: 100) explains that the 34 quipus, enclosed in a packet formed by the hide of a young deer “were completely mixed up, tangled, and without order. It would appear that everything was very rapid, the placement within the hide, securing the packet, depositing it to hide it, and so on.”⁷ We can assume that the owners of the quipus in Structure B7 did not want their precious objects to suffer the same fate as those of E8.

Another quipu find was made in an intrusive collective tomb from the Late Horizon/Transition Period at Pachacamac Pyramid 3 (Eeckhout and Farfán 2001:40). This artifact was found in fragments, all made of white cotton (Figure 10). Unfortunately, the repeated plundering of its context does not allow the suggestion of more than what is immediately obvious; that is, that the quipu was part of a set of funerary objects.

Finally, there is a very well preserved quipu from Pachacamac that is now in the collections of the Vatican Museum in Rome (*vidi* 2002). Franco (1993:82; 1998) also reported the find of a quipu in Sector 4 of Pyramid 2, but it is not described or illustrated.

⁷ The original quotation reads: [Los quipus] “estaban completamente revueltos, enredados y sin orden. Parecería que todo fue muy rápido: la colocación dentro del pellejo, su asegurado, la deposición para ocultarlos, etc.”

The association of *collcas* and quipus appears to be generally quite coherent, because the reports of quipus being used as accounting registers are numerous, with that of Guaman Poma being the most widely distributed (Guaman Poma 1989 [c. 1615]:309, 336, 338). All specialists agree that the Inca registry system was decimal (Urton 1997, 2003). This can be seen in quipu structure, but can also be noted in other media. It is worth emphasizing that quipus served to register, while other implements, called *yupanas*, aided simple calculations (addition, subtraction, and multiplication). These instruments are based on a principle similar to that of the abacus, which consists of a certain number of beads set on rods, each one of which indicates a number. In the case of the ancient Peruvian abacus, small stones or seeds were used instead of beads, and they were not placed on rods, but were put into compartments carved into tablets of wood or stone, with each compartment having a particular assigned value. Some *yupanas* were very elaborate and sometimes have been compared or confused with architectural models. Others are very simple (Radicati 1990). As Henry Wassén emphasized (1990:218), “We do not need to think that a Peruvian abacus had inevitably to be made of a more or less solid material like stone, wood, etc. It is quite probable that sometimes they consisted of nothing more than the form of an abacus drawn rapidly in the sand, or on a piece of cloth, etc., and the final result was knotted into a quipu.”⁸

This perhaps explains why, in spite of their frequent use, *yupanas* are relatively rare in the archaeological record. Because of this, it is worth emphasizing a find made outside Pacha-

camac’s Pyramid 11 in 2008 (Figure 11). This stone artifact is a parallelepiped, 37.5 centimeters long. It was found in a layer of fill with late rubbish. Five faces have been made in a crude manner, while the last has a series of twenty round depressions carved in two parallel lines of ten units each. Although out of context, the object’s design makes one think of a *yupana*, with its depressions forming the compartments. Also, the fact that the depression number twenty attracts attention because, for one thing, that is the average number in old *yupanas*, and, for another, twenty corresponds to the design of Structure E8 described above. I do not mean to make a direct connection between this artifact and Structure E8, but, rather, to underline the fact that they are both based on a similar structural logic associated with the decimal system and with duality or bipartition. In this sense, I share the thoughts of Gary Urton when he says that “Dual organization and the decimal system of numeration, which . . . were central principles in Inkaic (Quechua) administrative organization, are seen to have been not only compatible but complementary principles of organization” (Urton 1997:216).

INTERPRETATION OF FIELD DATA FROM PACHACAMAC

So far as Structure E8 is concerned, the presence of a group of quipus, of an artifact possibly used to keep them, of a decorated wooden kero, and the general context, lead to the conclusion that this room was occupied by a functionary who dedicated himself to the administration of the goods that arrived in the building, strategically located at the edge of the monumental zone. The goods left in the patio, perhaps by llama caravans (which would explain the width of the access point), were recorded, and later kept in the nearby storage chambers. It would be very interesting to check this hypothesis with systematic excavations in the various parts of the structure. To make a comparison I

⁸ The original quotation reads: “No hay que imaginar que un ábaco peruano tuviese que ser invariablement de un material mas o menos sólido como piedra, madera, etc. Es muy probable que a veces consistiese nada mas que de la figura de un ábaco delineada rapidamente sobre la arena, o sobre un pedazo de tela, etc., y el resultado final anudado en el khipu.”

should state that Valdez (1996:42) has formulated the same hypothesis on the basis of a quipu find near the storehouses at Tambo Viejo in the Acarí Valley. The architectural layout of Structure E8 has many similarities with the Inca storehouses of Tambo Viejo, or with the great storehouse of Quebrada de la Vaca, in the vicinity of Chala, on the south coast of Peru, studied by Francis A. Riddell and Dorothy Menzel in 1954 (Riddell 2007) and, later, by Hermann Trimborn (1988:129). Valdez (1996:41) emphasizes that the storehouses at Tambo Viejo are a mixture of Inca and local forms, and that their homogeneous sizes facilitate the administration of accounts of the products they contained. The storehouses of Tambo Viejo were found to be completely empty (*ibid.*), but not far from this site, at the complex called Rodadero, Riddell and Menzel recovered quantities of textiles probably from *collicas* in use during Inca times to store the goods produced by local mit'as (Katterman and Riddell 1994). Excavations at Quebrada de la Vaca revealed only plant remains such as *algarrobo* seeds, chilli, corn-cobs, and quinoa seeds (Trimborn 1988:41). According to Riddell, "The Rectangular Storage Area [at Quebrada de la Vaca] certainly served as a storage facility, but it also may have been used for ritual activities..." (Riddell 2007:183). Riddell mentions three other sites with similar configurations in the Chala area: La Caleta, Parara Depósito, and Chala Viejo Antiguo (*ibid.*: 183-184). Unfortunately, Riddell did not publish plans, but only a photo and brief descriptions. Nevertheless, it is interesting that the same pattern reoccurs, a quadrilateral enclosure with a single entrance and rows of storehouses on one side. The overall dimensions are also similar (Table 2).

Site	Compound size	Number of <i>collicas</i>	Reference
Pachacamac-E8	80 x 60 m	20	See this paper, <i>passim</i>
Tambo Viejo	60 x 40 m	7	Valdez 1996:40
Quebrada de la Vaca	45 x 30 m	16	Trimborn 1988:129
La Caleta	30 x 30 m	Undetermined	Riddell 2007:183
Parara Depósito	40 x 20 m	Undetermined	Riddell 2007:184
Chala Viejo Antiguo	Not mentioned	Undetermined	Riddell 2007:184

Table 2. Comparisons of some coastal storage compounds

Perhaps this is a coastal *collica* model, related to the particular Inca form of management in these regions, inspired by local models. For example, one's attention is drawn to the configuration of the storehouse complex associated with Pyramid 6 at Pachacamac, dating to the Late Intermediate Period, in which two rows of five sunken, quadrilateral chambers are associated with a fore-chamber and a rectangular patio (Figure 12).

We have seen that during the Late Intermediate Period storehouses at Pachacamac were associated with the pyramids with ramp, not all of which had been in use simultaneously. By contrast, in the Late Horizon, all storage facilities functioned at the same time. For this reason, it appears somewhat artificial to compare the global storage capacity of the site before and during the Inca occupation. Nevertheless, this comparison is instructive and we make it here for heuristic purposes. If we add together the capacity of all the *collicas* used during the Late Intermediate Period, we arrive at a total of 9,270 cubic meters, while the total for the Late Horizon is 7,830 cubic meters. Remembering previously expressed caveats, we can make various deductions. First, the total global storage capacity of the two periods is almost equal, which suggests that in reality capacity was augmented in the Late Horizon relative to the Late Interme-

diate Period, because it was concentrated during a shorter time. Secondly, the distribution of the *collicas* changed completely and it is very revealing in terms of the Incas' management of the site and its region. The complexes and sectors in which one finds storehouses are, on one hand, closely related to ceremonial and religious aspects of the site (Temple of the Sun, House of the Chosen Women, Structure A1-A2, and Pyramid 13), and with state management on the other hand (Structure E8 and Pyramid 10/Tauri Chumpi).

It is logical to suppose that the storehouses associated with the Temple of the Sun are dedicated to the solar cult, and that the *Acllawasi*, as is well known, had its own resources for the *acllas* and the lunar cult (Tello 2009). Structures A1-A2 and P13 stand on the sides of the Plaza of the Pilgrims constructed by the Incas to receive the large processions organized throughout the empire to celebrate the Pachacamac oracle (Eeckhout 2008b) and heal the sick (Eeckhout 2010b). It is known that the pilgrims brought many offerings, and also that a substantial infrastructure was necessary to house them. The number of *collicas* in A1-A2 corresponds perfectly to these necessities. Pyramid 13, strategically located near the entrance of the Plaza, and with various access points to it, perhaps housed an important priest. Relevant to this hypothesis, early Spanish accounts mention two supreme officials at Pachacamac during the Inca regime: the high priest of the temple and the governor or *tucrikuk* (Xerez 1965 [1534]:87). The latter has been identified as an individual named Tauri Chumpi, and for that reason the structure excavated by Alberto Bueno in the northern portion of Pachacamac has been named "The Palace of Tauri Chumpi" (Palacio de Tauri Chumpi; Bueno 1974/75). All authors agree that this building can be assigned to the Late Horizon, being, in fact, the probable residence of the secular head of the site.

This brings me naturally to the portion of the *collicas* dedicated to state administration, those that are located, with good reason, in the same palace of the *tucrikuk* (for his personal use, for the use of his personal, for the needs of his office, etc.), and in Structure E8, in the same neighborhood, probably near an entrance that no longer exists. There, that portion of the products of the fields and other local resources requisitioned by Incas were received. It is interesting to note that the storehouses of Structure E8 were associated with a large patio, which, perhaps, served to receive people during the banquets and redistribution ceremonies that were part of the exercise of Inca power (Pease 1992:15-24, 1999). Perhaps this large patio also served to house the *camelid* caravans that brought goods to the site. No doubt these hypotheses can be tested with excavation.

Apart from storehouses and the presence of official functionaries, access to the Qapaq Ñan is another recurrent characteristic of the logistics of Inca state installations. We have an eyewitness account from the earliest days of the Spanish conquest concerning Pachacamac. Hernando Pizarro left Cajamarca towards the end of 1532, arriving at the site at the end of January 1533. He remained for a month, and from there he proceeded to Jauja and Cusco (Pizarro 1872 [1533]). He was accompanied by important Inca imperial officials, who took him along the roads and to the *tambos* that were found all along the highway (Guillén 1974:157-160). This has been amply documented by archaeology, and almost the entire length of the Qapaq Ñan from Pachacamac to Jauja has been identified. It is interesting to emphasize in this respect that parts of the Inca road, or at least its route, have been reused up to the present day (Hyslop 1984, 1990; La Torre and Caja 2005).

THE ROLE OF COASTAL STORAGE FACILITIES IN THE INCA POLITICAL ECONOMY

The new finds presented in this article help us to understand the specifics of Inca strategy and logistics in the coastal area. Above all one must emphasize the relative increase of storage capacity at Pachacamac under Inca rule. This can only be explained by three possible factors. The first is that the Incas may have concentrated at Pachacamac tribute coming from a larger area and more distant territory than that controlled by the Ychsma *curacas* in the Late Intermediate Period. However, I do not believe that this was the case, as I explain below.

The second factor would be demographic growth of the area, for example because of *mit'maq* (conscripted workers) coming from other parts of the empire and paying tribute at Pachacamac. It is certain that there was a colony called Quilcay established next to the site during the Late Horizon, and its members were dedicated to fishing (Eeckhout 1999:403). Perhaps they contributed to the increase of products that arrived at Pachacamac. The third factor, which one can add to that just mentioned, would be that the Inca tribute requirements were greater than previously and probably added to the traditional obligations of the population. In this context it is interesting to mention the work of Jane Feltham (2006) on the tribute of clothing during the Late Horizon. On the basis of her study of the textiles found in excavations at Pachacamac, she suggests that this tribute was onerous to the people, who found themselves obligated to save time when making their own clothing, forcing them to look for production methods that were faster than those employed previously. By contrast, clothing made for tribute followed standards established by the Incas and required more time.

A characteristic of Inca logistics was that they built their own administration facilities, but

adapted them to the local context. On one hand they adopted local construction techniques and traditional architectural design at Pachacamac⁹ but, on the other hand, built structures specifically for administration, that is, ones that were isolated and mostly separate from the elite residences. In this sense the Incas were very different from the Ychsma. The Inca arrangements also demonstrate a global control over the site, and over regional resources, probably with a focus on its ceremonial aspects, as the quotation from Pizarro cited above (“tribute is not paid to Cusco, but to the mosque”) suggests. This situation is not unique. Other authors have commented, on the basis of ethnohistorical sources, that storage to support the state cult can be considered to be separate from storage supporting other state functions (Snead 1992: 72).

This peculiarity perhaps explains why, in spite of its expansion, Inca storage capacity at Pachacamac remained modest (Table 1). Certainly the greater part of Pachacamac, outside the Second Wall but within the Third Wall, has not been excavated.¹⁰ Nevertheless, the little work that has been accomplished and published does not suggest *collicas* in this place, but, rather, activity centers, modest residences (Malaga

⁹ Pyramid 13 was built and occupied during the Late Horizon. Its design conforms to local tradition, but its location and specific characteristics suggest that it functioned both as an elite residence and as an *ushnu* (ritual platform) associated with the Plaza of the Pilgrims (Eeckhout and Farfán 2008). The palace of Tauri Chumpi resulted from the adaptation and transformation of a Pyramid with ramp into an Inca palace, the reason it is also designated as Pyramid 10 (Eeckhout 2010a: 429).

¹⁰ Pachacamac is divided into three major sectors or precincts. From south to north, the Sacred Precinct includes the major temples and is enclosed by the First Wall. The Second Precinct encompasses the pyramids with ramps and other buildings and is enclosed by the Second Wall. The Third Precinct is a desertic pampa with no monumental structures and is within the Third Wall.

2008), and Late Horizon and early colonial burials (Uhle 1903:62-70). Until we have more information, we must consider the Inca storehouses to be concentrated within the First and Second Walls, that is, within the monumental part of the site, and, more specifically, in the sectors related to ceremonial activities.

In this sense, one cannot consider Pachacamac to be a state installation of the major tambo type, used to house the imperial armies on the march, and, therefore, designed to store large quantities of goods. This was probably the case with Huánuco Pampa, Hatun Xauxa, or Pumpu, each of whose storage capacity is five or ten times larger than that of Pachacamac. The storage at this latter site appears to be directed principally towards religious functions, especially those relating to pilgrimage and administration (the palace of Tauri Chumpi). Structure E8 could have played a hybrid role, that is, be at the same time an instrument of local administration, as I have described above, but also include, in its placement and design, the functions of a tambo for traveling Inca officials and *chaskis* (messengers), but certainly not for an army on the move.

In other words, Structure E8 was involved in imperial administration at a local level, corresponding to what Snead (1992:69, table 3-4) classifies as “storage at secondary state facilities”. If we follow this classification, Structure E8 embodies the characteristics of a large tambo, but not a major one, that is, one containing a limited number of storehouses associated with a large number of facilities, as, for example, at Tambo Colorado or Quebrada de la Vaca (*ibid.*:79-82).

In my opinion, the Incas invested more in cult facilities than in the construction of *collicas* on a grand scale for two reasons. First, the Ychsma region already had a very well developed and hierarchical network of sites equipped with storehouses for the control of the resources

of the chiefdom (Eeckhout [editor] 2004; Eeckhout 2008a). There was no necessity for the Incas to build more, so they simply took advantage of what already existed. The context was not the same in those parts of the highlands where they established large sites like Pumpu, Hatun Xauxa, and Huánuco Pampa (LeVine 1992), or those in the Cochabamba Valleys (Pereira 2011), which concentrated the harvests and resources of immense regions. Second, the population of the chiefdom of Ychsma was not so numerous, nor its productivity so large, as to justify the expenditure of enormous energy in the construction of hundreds of storehouses or structures for their development (see Eeckhout 2001; Feltham 1983:354-360).

With respect to this, I can summarize Snead's general observations (1992:82-86) on the highland-coastal dichotomy in state storage. The total number of Inca *collicas* on the coast represents no more than three percent of the total number of imperial storehouses in the sample of 71 sites that he studied. Following Snead, I think that this reflects the indirect control of the state in regions where the degree of social integration was already very high, and where the type of social management of labor was different from the sierra, explaining the relatively low number of pre-Inca coastal storehouses (*ibid.*: 85). Finally, it is my opinion that the form of Inca storehouses on the coast, such as I have described in this article, proceeded from a local tradition, because there is great consistency, both in design and in size, in the Late Horizon. In the future this pattern may be considered to be an indication of indirect control by the Inca over coastal provinces.

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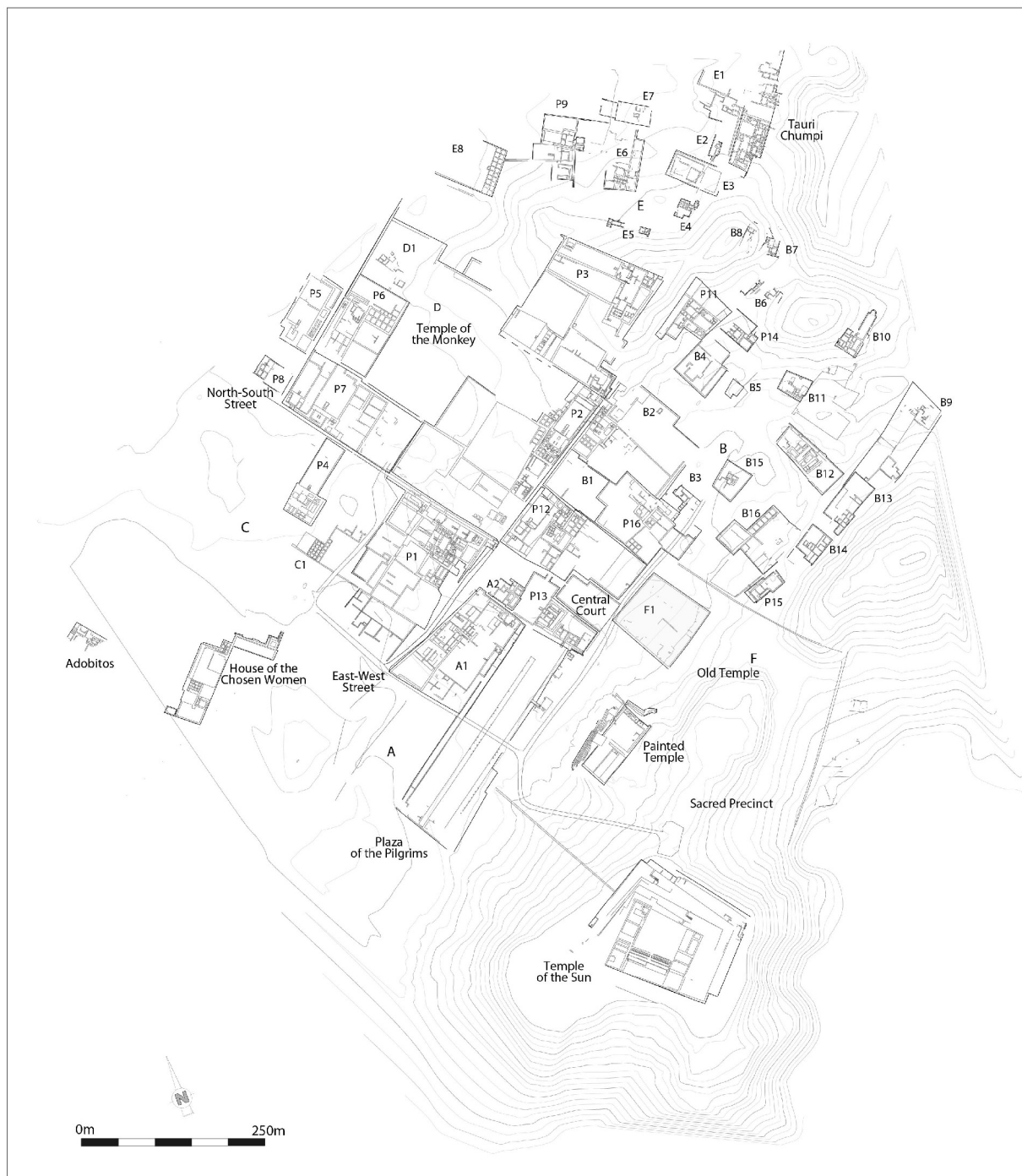
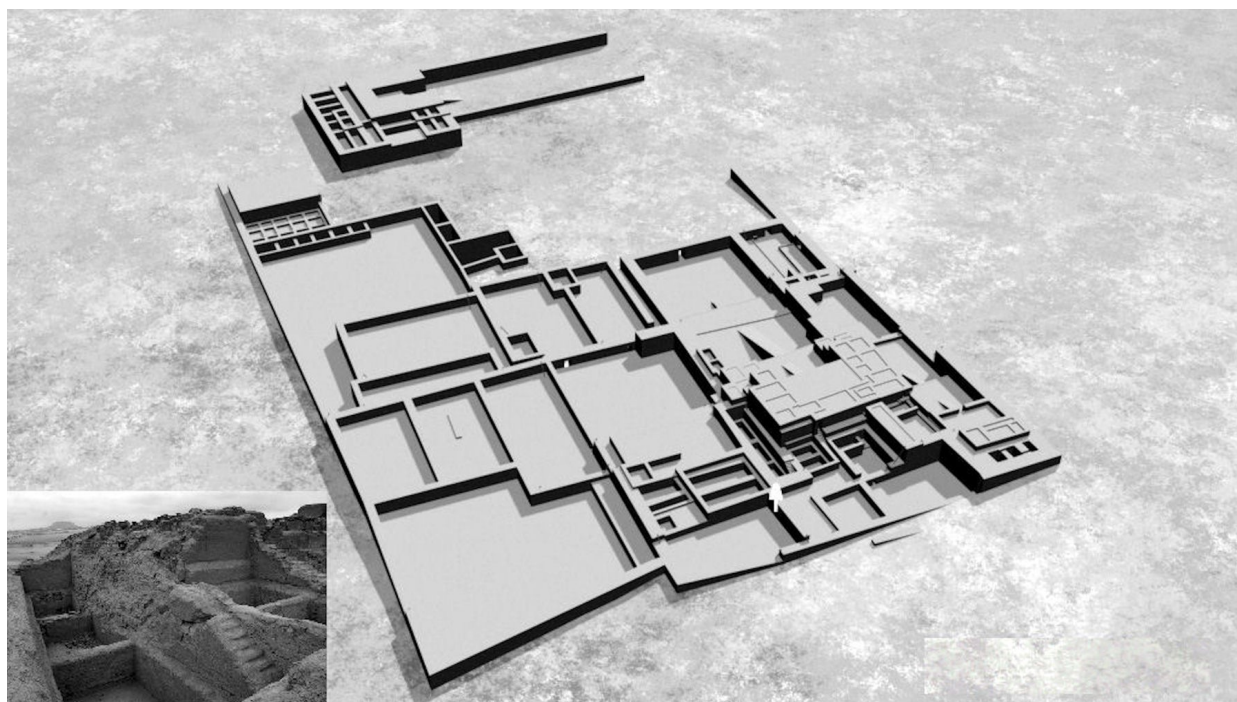


Figure 1: Plan of the site of Pachacamac (after Eeckhout and Owens 2008: figure 2).



*Figure 2: Storehouses associated with the Pyramid with Ramp 1, Pachacamac.
The white arrow indicates the position from which the photo was taken.*

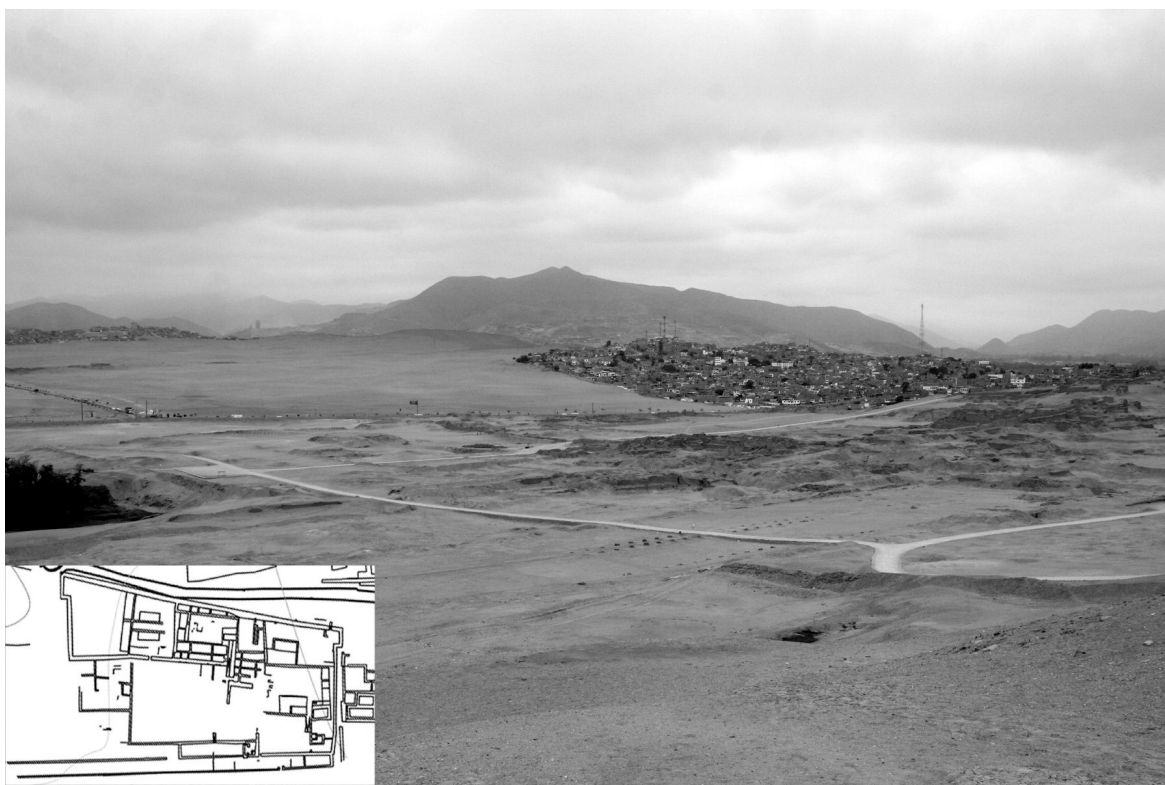


Figure 3: Panorama and plan of Structure A1-A2, Pachacamac, along the Plaza of the Pilgrims.



Figure 4: Aryballos found in Structure A1, Pachacamac.



Figure 5: View and three-dimensional reconstruction of Building E8, Pachacamac.

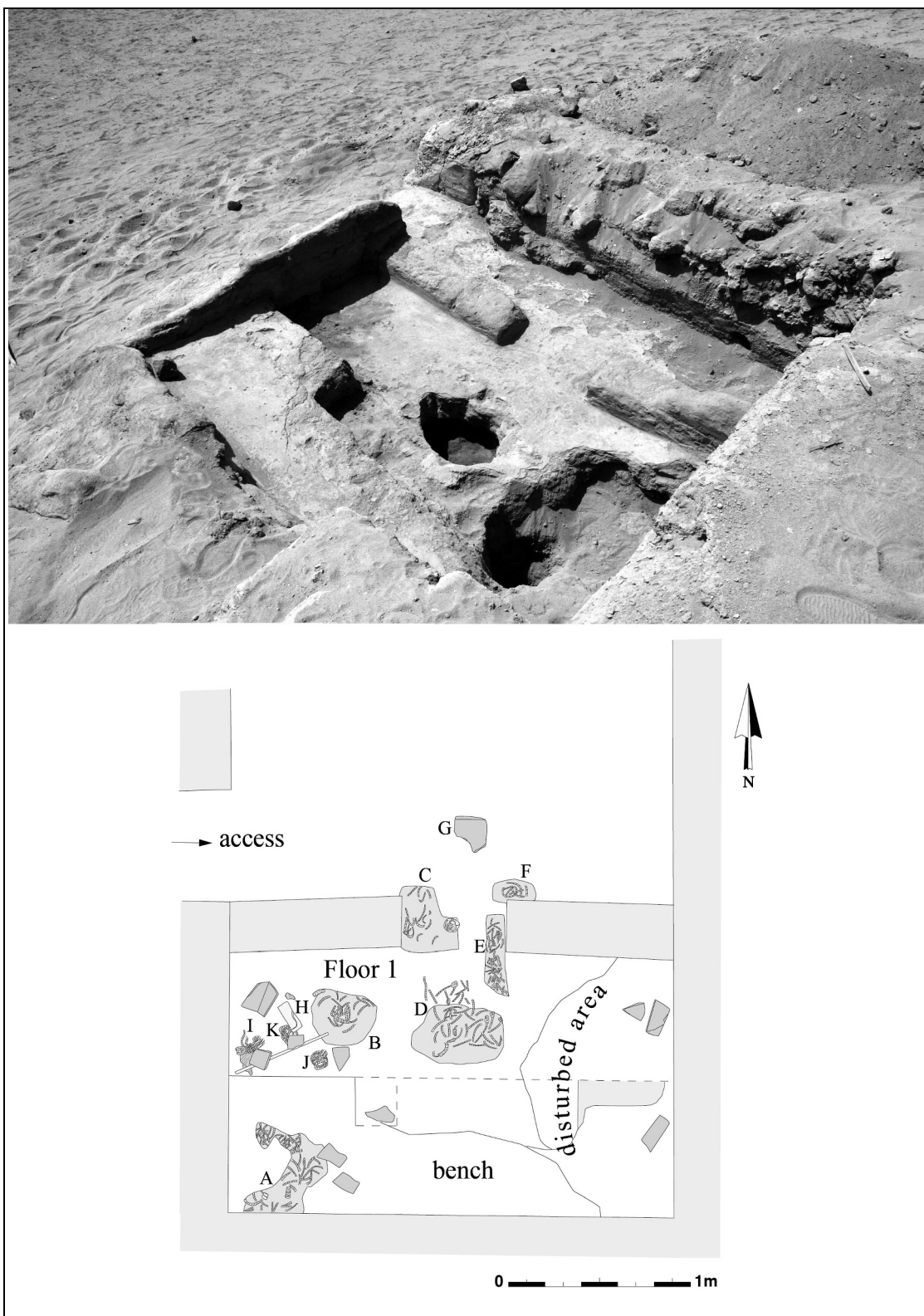


Figure 6: Plan of the excavations in the fore-chamber in Structure E8, Pachacamac.
 A, B, C, D, E, F, I, J, K: quipus; G: ceramic fragments; H: wooden kero.



Figure 7: Engraved wooden drinking vessel (kero) from Structure E8, Pachacamac.

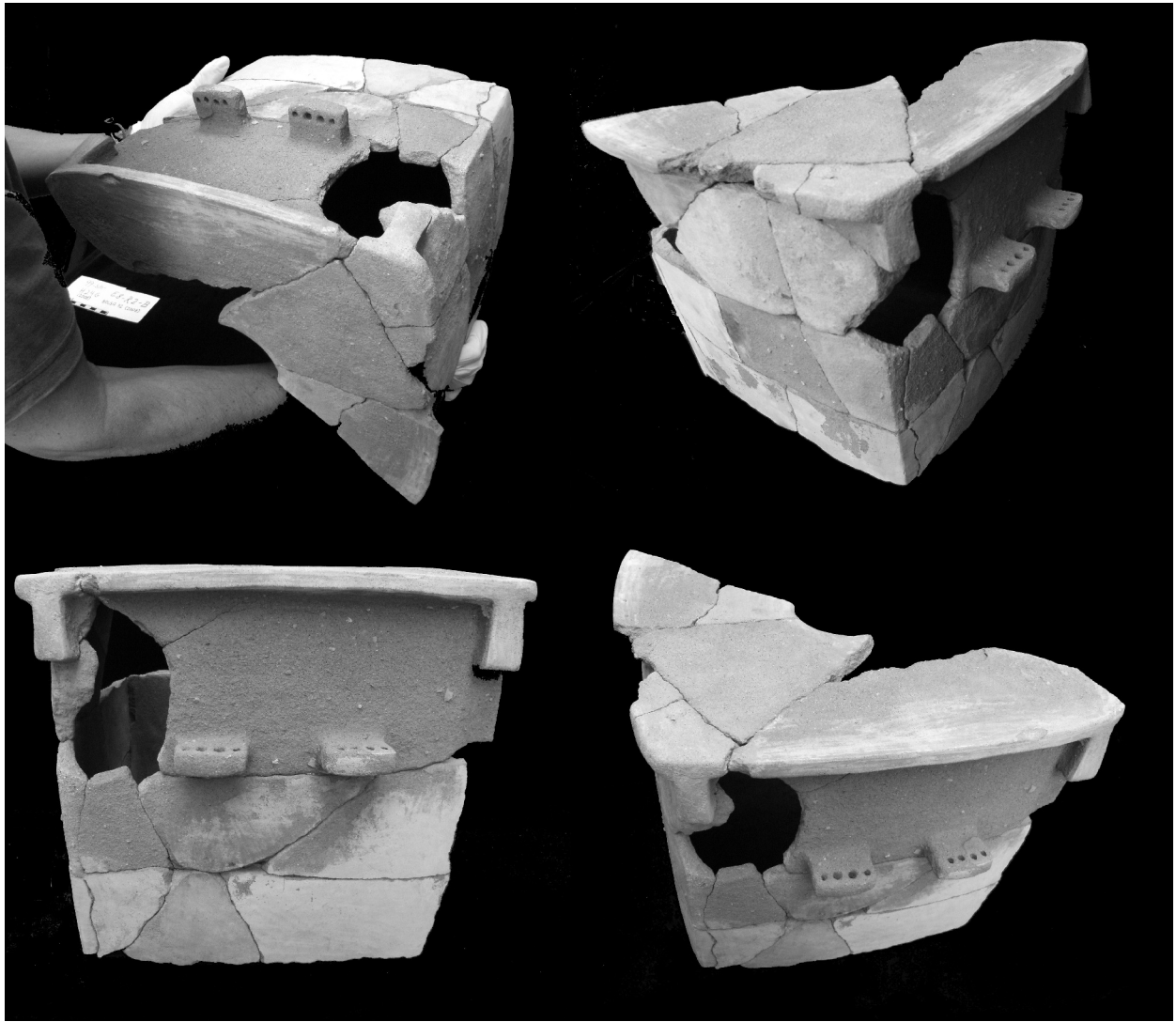


Figure 8: Ceramic artifact from Structure E8, Pachacamac.



Figure 9: Bundle of knotted quipus from Structure E8, Pachacamac.

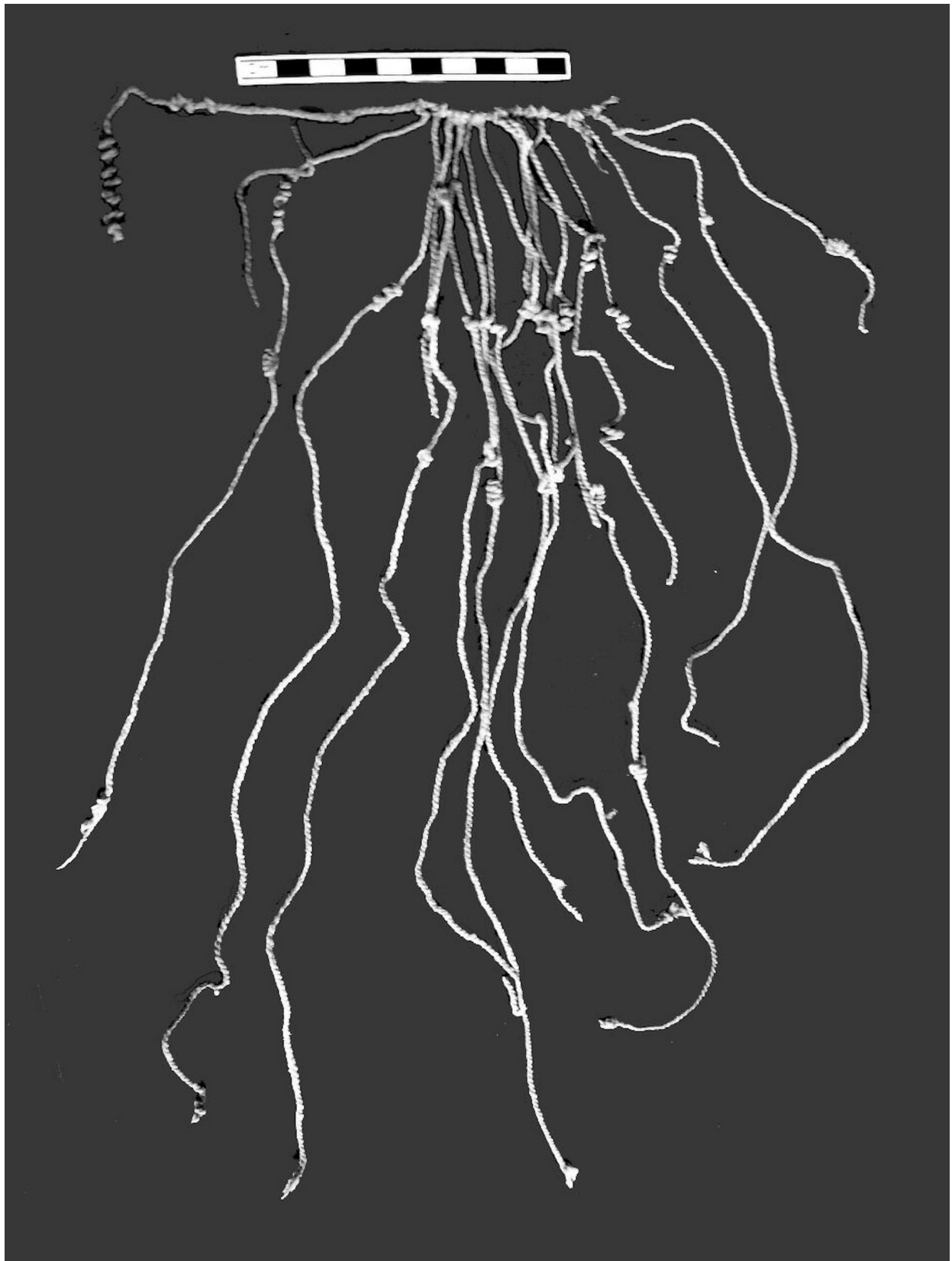


Figure 10: Cotton quipu from an intrusive tomb in Pyramid with Ramp 3, Pachacamac.

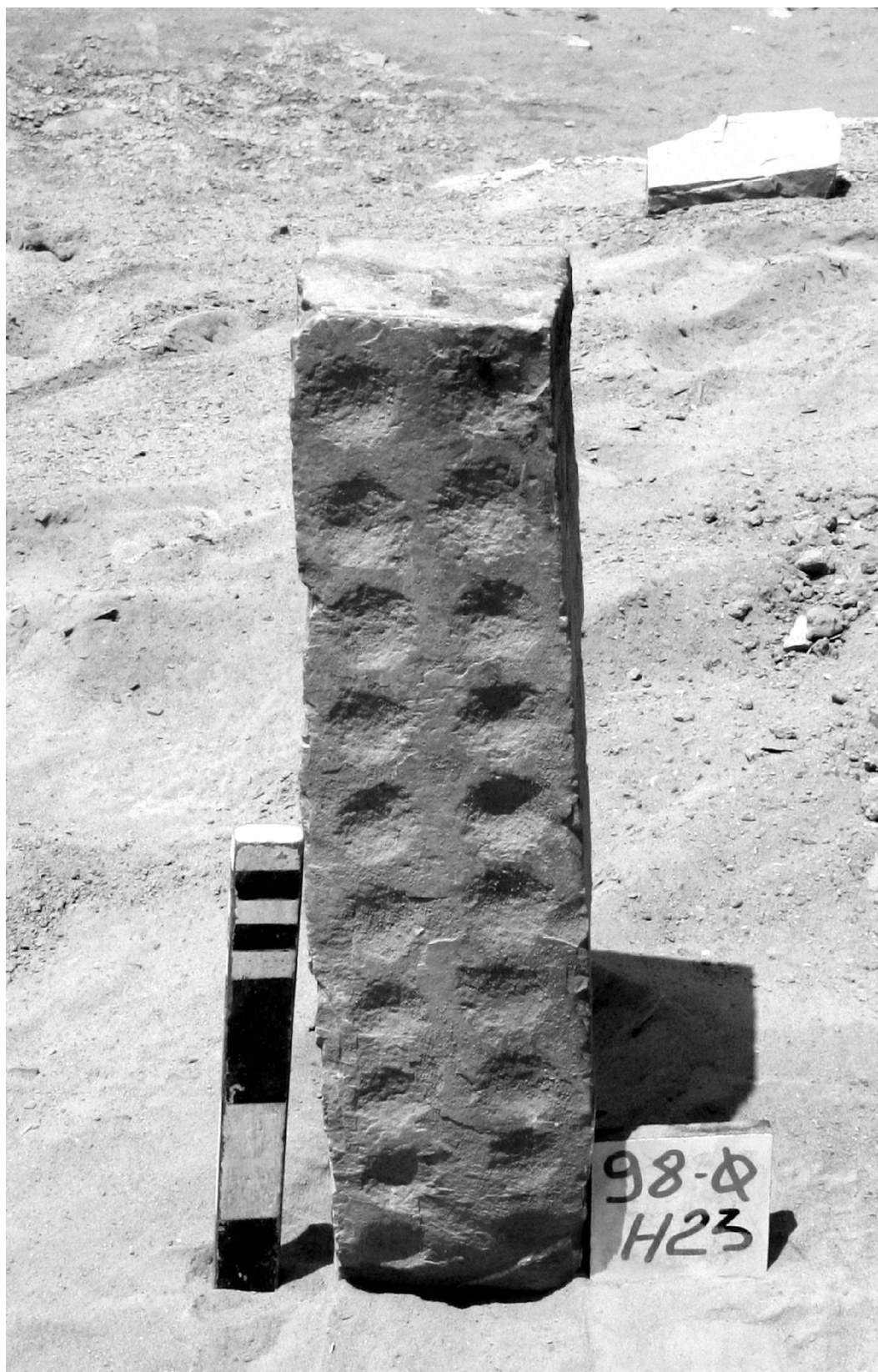


Figure 11: Stone artifact from the outskirts of Pyramid with Ramp 11, Pachacamac.

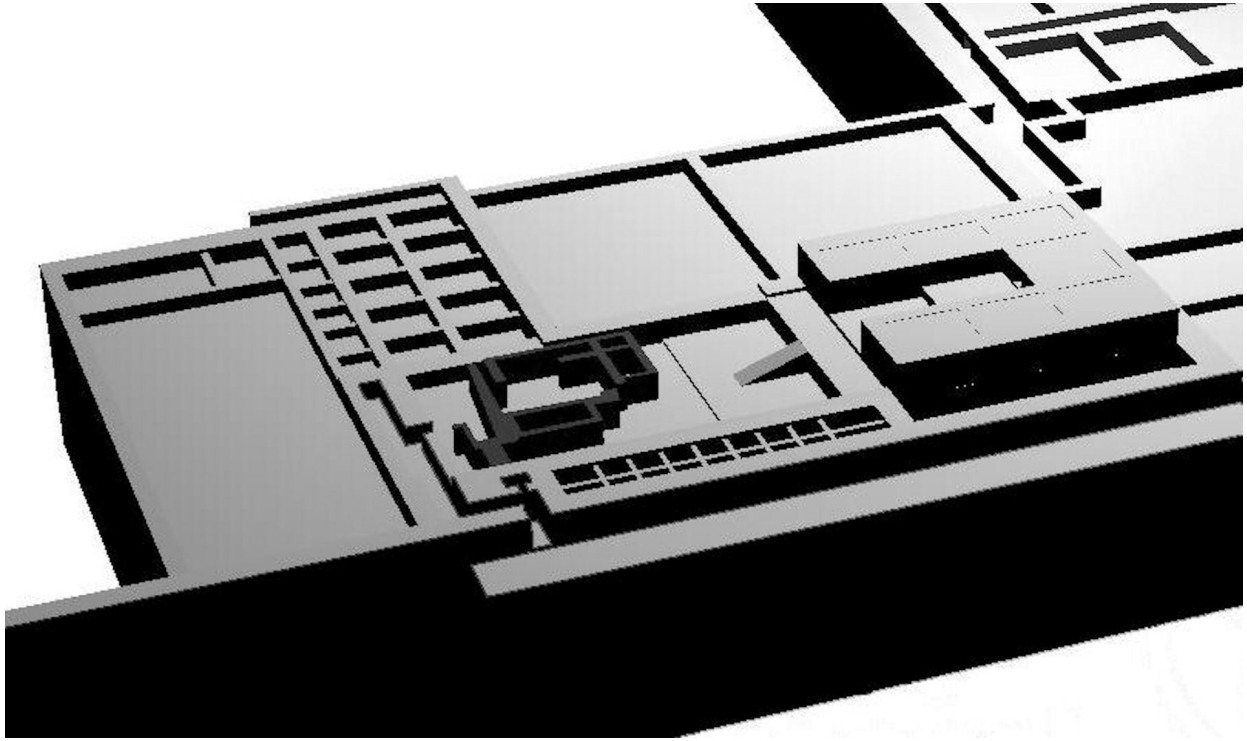


Figure 12: Three-dimensional reconstruction of Pyramid with Ramp 6, Pachacamac, with its rows of storehouses.

