

BALLCOURTS

Linton Satterthwaite

1 BALLCOURT TERMINOLOGY

The two ballcourts at Piedras Negras to be described in this Part differ remarkably in details which must have greatly affected the style of play. These differences are to be seen in cross-sections of the respective structures, and such cross-sections have very properly been made a chief basis for a typology of Middle American ballcourts. In 1932 Blom distinguished two types of courts by cross-section criteria, with a third depending on the material of supposedly always used rings (Blom 1932:516). Acosta (1940:188-190) has distinguished three types, using cross-section criteria for each, though linking the ring with one of them only. Acosta's Type A seems to include Blom's early and second stages; at least it would do so if subdivided to allow for presence or absence of permanent stone rings. Our Structure R-11, without stone rings, clearly falls into Blom's early stage type, and Acosta's Type A (Figs. 8.6a and 8.6b).

Acosta's Type B was unknown when Blom made his analysis, and is announced as a new type. His Type C is the same as Blom's "last development," the type of the great court at Chichén Itzá. Acosta properly, I think, notes the paucity and confusion of data and the danger inherent in present attempts to deal with the questions of ballcourt origin and evolution. Surely, as he assumes, a proper approach to these fundamental problems is proper classification of each new court on an empirical basis, as it becomes known. Our Structure K-6 is not of his Type-A or C; and one must decide whether it is Type B, a new type, or whether it should be considered a variant of Type B.

This Piedras Negras structure (K-6) was apparently the second of its kind found in the Maya area, and the first of this sort to be recognized as a ballcourt, but it is now by no means unique. Its correspondence with others can better be noted if we adopt the device of numbering the inner surfaces of a ballcourt structure (of whatever kind), beginning with the surface which rises from the field between the twin structures. This reverses the direction of Blom's device of lettering them A, B and C, in order to allow for more than three surfaces which may have affected the play. A fourth surface is sometimes present.

The vertical nature of surface 1 on our Structure K-6, and (as a probability) of surface 3, was noted in 1932; at the time a somewhat garbled interpretation of Structures 9 and 10 at Copán as a ballcourt should have allowed for verticality of surfaces Nos. 1 and 3, and a sloping surface no. 2, plainly indicated in a sketch by Gordon many years ago (Satterthwaite 1933b:21-22). This vertical-sloping-vertical combination was established for Structure K-6 in 1933, but is now published for the first time (see Figs. 8.19a and 8.19b). It was soon noted at Uaxactún by Smith (1938:4). Similar brief notices of others in the Maya area describable in this manner have appeared since. They differ from Acosta's Type B court at Tula in that surface No. 1 is vertical, but agree, in the sequence of slopes, with the court at Yucununahui, Oaxaca. I think Acosta means to include the latter in Type B. But the sloping surface No. 2 in the Maya courts mentioned is not nearly so deep as at the two Mexican sites, and the structures are much shorter.

It is quite clear that this vertical-sloping-vertical type of cross-section is of fairly wide distribution in the central and southern parts of the Maya area, at least. Whether it should be considered a variant of Acosta's Type B is a question I should like here to leave open. But it is clear that both of our courts must find their places in an eventual general classification of Middle American courts; and presumably these in turn will eventually be compared in detail with ballcourts in the Antilles, as well as with structures interpreted as ballcourts in the southwest United States. We ought therefore to use terms which will facilitate such comparisons, and such as now seem to have a chance to survive changes in tentative classificatory schemes. Such changes must surely come as classifications are extended to cover new data, or refined to make sharper distinctions.

Beginning with the early sources, ballcourts have often been described too simply, and Blom's example of carefully labeling each playing surface should, I think, continue to be followed in principle. But numbers or letters, constantly used in other connections, do not stick in the memory. Blom did not use his letters in finally describing his stages.

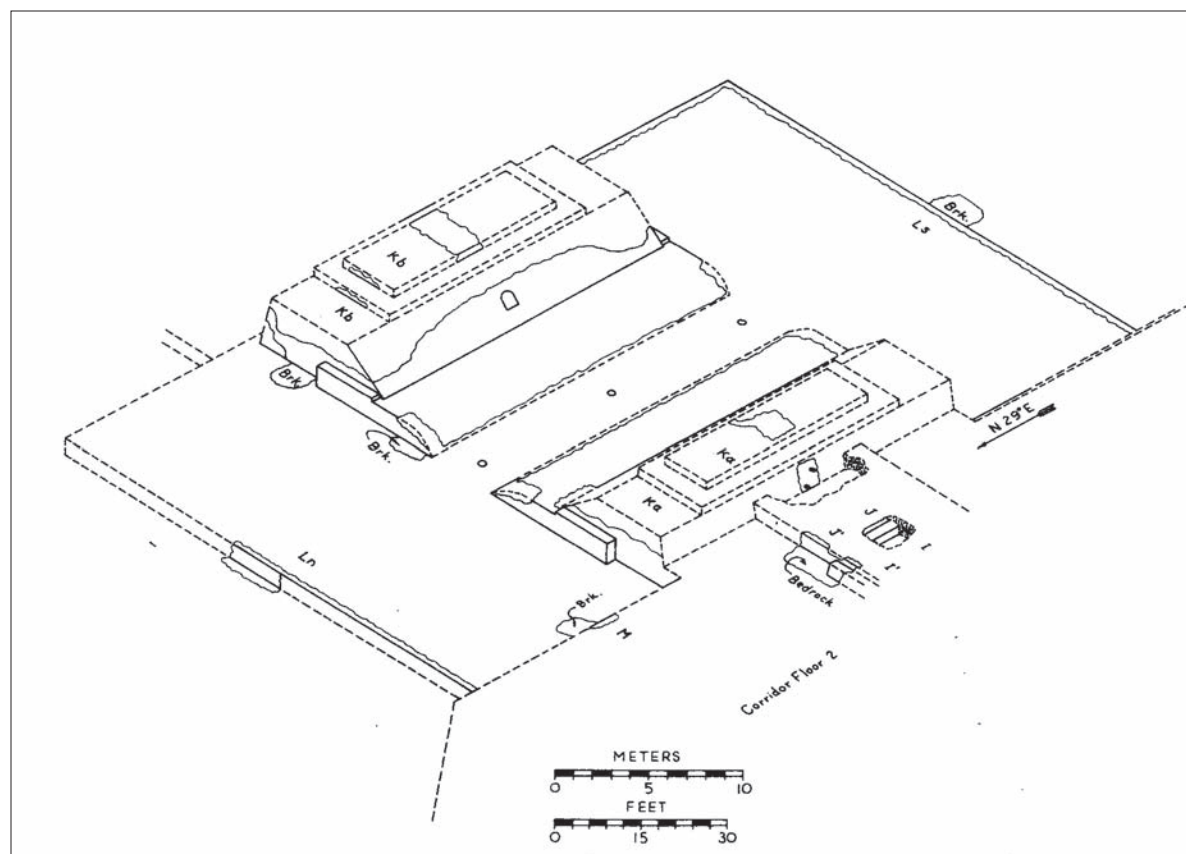


Figure 8.1 Isometric reconstruction: Structure R-11-2nd-B (Units M, Ln, Ls, Ka, Kb, J, and J') Structure R-11-2nd-A (Units I and I'). Letters refer to units of construction described in text.

The definitions below are chosen with known and possible function in mind and with an eye to wide applicability, ease in memorizing, and, in most cases, to the clear limitation of a term to a particular part of the complex. Current terms are retained if thought consistent with these objectives. The major omission is "side wall" or "wall," sometimes used as if there were only one wall per structure to be considered. The most radical innovations are stop surface (which ought to be bettered by someone), "apron," and "bench-top." Using these, Acosta's Type A is one including a level bench-top and apron, and his Type B is one including a sloping bench-top and vertical stop-surface; his Type C is one including a level bench top and vertical stop-surface plus rings. All include the bench (as that term is used here).

Terms as Used in this Report

Ballcourt

As used here, a symmetrical or quasi-symmetrical arrangement of surfaces in more than one plane, especially

designed for the playing of an aboriginal game involving the bouncing of a rubber ball against some of these surfaces.

Ballcourt Structure

A construction with a playing surface or surfaces adjacent to the central field: the main range of Pollock (1932:109). Typically in Middle America there are two such structures, one on either side of the central field, their ends also partly delimiting end fields. Distinguished from end-field structures or walls, which may or may not be present and thus further outline end-fields. A ballcourt structure may be called simply structure when only ballcourts are under discussion.

Bench (of a Ballcourt)

An element of a ballcourt structure providing two playing surfaces, a face rising from the central field and a top connecting with a third playing surface, which latter may or may not be the limiting or stop-surface. Distinguished as level-top or sloping-top benches. The face may be sloping or vertical (see also ramp). Under the definition

adopted the bench may be comparatively insignificant like the low sill at Cobá (Pollock 1932:110), or provide most of the playing surface of the structure; it includes the “terrace” of Blom and others, and the “platform” in our Preliminary Paper 2.

Capital I

Same as preferred Double T. May be modified by partial, complete, etc. Properly applicable to representations of ballcourts in native manuscripts and to many actual courts, but not to others with one or both end-fields open.

Double T (see also Capital I)

Term used by Acosta, perhaps by others, to represent the outline of delimited end- and central fields taken together. Preferable to I since T can be used for courts with one open end-field and one delimited end-field. Modifying adjectives can be used, such as partial or complete T (or Double T) outline.

Extension

A bench extension is that part of the bench which sometimes extends longitudinally beyond the ends of the higher part of the structure. A possibly significant detail, apparently of wide distribution in Middle America. It

occurs in the Great Court at Chichén Itzá, at Monte Alban, and at Piedras Negras on Structure R-11 (see Figure 8.1). At Piedras Negras the K-6 structures were secondarily extended to the rear and also at the rear portions of the ends, thus forming an angle in this part of the end-fields. Perhaps this feature should be looked for elsewhere, and if found, also given a name.

Field

An approximately flat and level surface adjacent to a ballcourt structure, all or part of which is supposed to have been used in the play. Typically in Middle America the central field lies between two ballcourt structures, being centered with respect to them. Usually, if not always, it connects with end-fields extending laterally along the ends, or inner portions of the ends, of the structures, and the central field is more or less centered with respect to these end areas. It is the combination of rectangular central and end-fields (in this terminology) which gives these courts the Capital I or Double T outline. The I may be considered to outline the fields only. When, as is usual in Middle America, the central field is rectangular and relatively narrow, and separated from end-fields only by lines (if separated at all), the term alley is retained as a more specific alternative for central field. The latter term allows for presence or absence of end-fields.

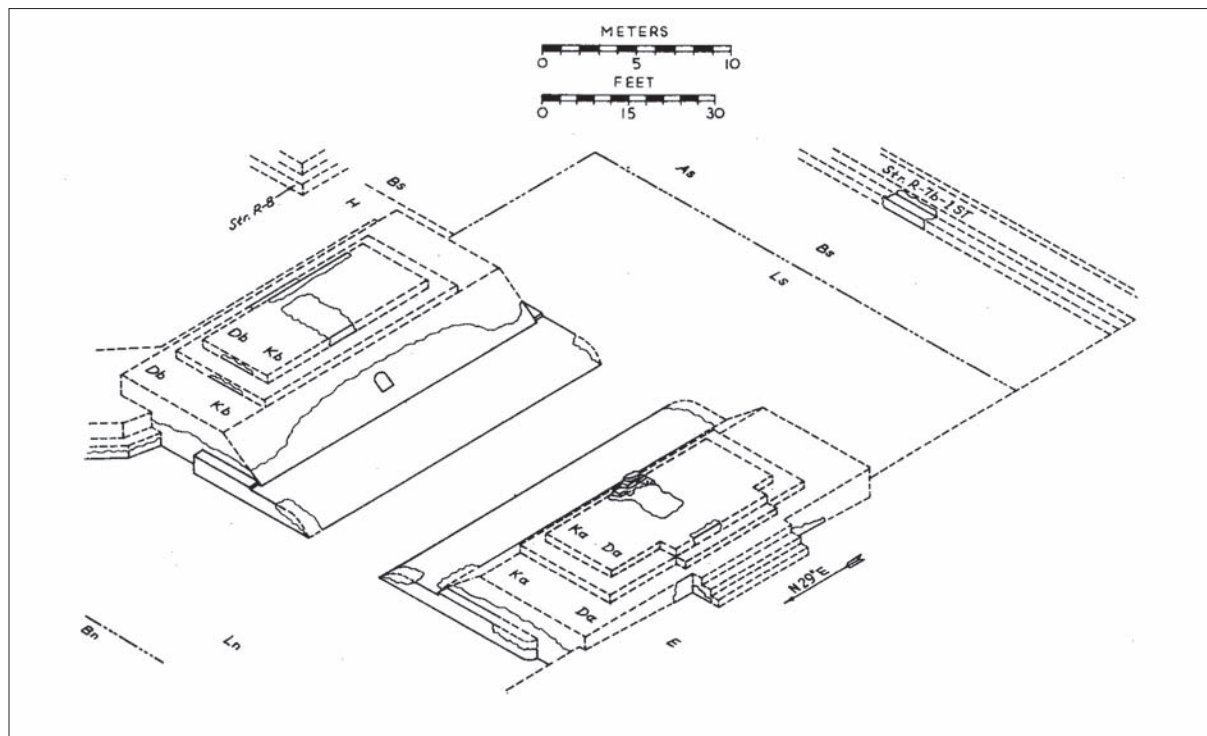


Figure 8.2 Isometric reconstruction: Structure R-11-1st-B (Units E, Da, Db, Bn, and Bs).

The end-field cannot be said to be surely rectangular, or to have any other particular form, unless it is known that, in addition to the ends of the ballcourt structures, other features marked its limits. Such additional definition of end-field peripheries could be obtained with mere lines, which might or might not survive in the courts as now found. It could also be obtained by fill retaining walls rising from the end-field, producing the sunken court effect of Blom, an effect which is very striking at Monte Alban. But this additional limitation would also be achieved by walls which descend instead of rise from the plane of the end-field surface. On Structure R-11 at Piedras Negras the end-fields were limited by combinations of rising and descending walls (Fig. 1.1). The exact role of the end-field in the playing of the game is not yet clear. Walls rising from it might have acted like back-stops in our tennis courts, or conceivably as playing surfaces against which to bounce the ball in the ancient Maya game. Walls descending from it could not have functioned in either of these ways. Hence a distinction between these two ways of limiting end-fields seems worth making.

If an end-field is completely or partly limited by walls rising from its surface, in addition to those of the ends of the ballcourt structures proper, it will be called enclosed or partly enclosed. If the additional limitation is wholly or partly by walls descending from the end-field level, the field will be called raised or partly raised, since it is above, or partly above, surrounding areas. Either type of field limitation, or combinations of them, can be said to produce delimited or partly delimited end-fields, as opposed to open end-fields. The latter term is proposed for examples such as Structure K-6 at Piedras Negras where considerable unobstructed level areas extend out from the ends of the ballcourt structures, without any apparent limits.

It should not be merely assumed that end playing surfaces may not have been marked off by lines or otherwise in open or large delimited end-fields.

Such an array of specific special terms for fields seems rather involved. An example of their use may help to justify them. The central field of our Structure R-11-1st-B is an alley (Fig. 8.2). It is not a large field as at Chichén Itzá, nor an oval one as may exist in the Southwest. The southerly end-field is partly delimited, being partly enclosed; the northerly one is completely delimited but is partly enclosed, partly raised; neither is completely enclosed and delimited as shown for Tenam Rosario by Blom. In each, prior to a possible slip of fill, end playing surface may have been marked by tops of delimiting walls of an earlier phase. If so, these were of similar proportions to the complete end-fields at Tenam Rosario. At Structure K-6-A both end-fields were open (Fig. 8.18). At Copán, one end-field seems to be open, the

other partly enclosed. A photograph of this incompletely published court suggests that part of one of its end-fields was differentiated from the rest as an end playing surface by special paving. Surviving features marking end playing surfaces on the Structure K-6 fields were not looked for, but should have been.

Inner

Of direction, i.e., toward either axis of the whole complex and away from its peripheries.

Lines

Specialized perishable or imperishable elements defining lines on playing surfaces. Either paint or plaster is a perishable line-marking material possible in Middle America; broad stone lines, sometimes at least raised slightly above surrounding surfaces, have survived in some Maya courts, and painted ones are mentioned for Mexico by early sources. Axis lines may be longitudinal (long) or transverse (short); the physical drawing of both would divide the playing area into quarters. Whether an axis line is known to have been placed on the court itself, or is imagined for descriptive purposes, is left to the context. Inter-field lines, running transversely, may set end-fields apart from central fields; in the presence of both axis lines, the central field itself would then be completely marked off in quarters. If transverse lines are found, placed slightly in from the ends of the structures, they can be considered to limit the central field or alley, and still be inter-field lines. It seems desirable to consider that boundary lines may have delimited end playing surfaces, when this function is not discharged by walls. I do not think they have been looked for.

Markers

Specialized elements marking particular points or small areas on playing surfaces. Presumably, like lines, these could have been painted, or made of perishable materials, and plaster markers have actually survived in one of the buried Copán ballcourts.

If this broad definition is accepted, and one imagines that axial and inter-field lines were all present on a single court, whether surviving or not, the surviving markers which have been found in Maya courts bear a relation to these lines. They have been found most commonly in the central field at intersection of long and short axes, and on the long axis, a little inside imaginary inter-field lines joining the extreme ends of the benches, as in Figure 8.1; and they have also been found on various of the surfaces of the structures, yet on the transverse axis line and at or near the ends of the structures, where they might be considered as on extensions of interfield lines. Under our definition it is proposed to include all specialized elements at the above positions. If this is done, such specifically

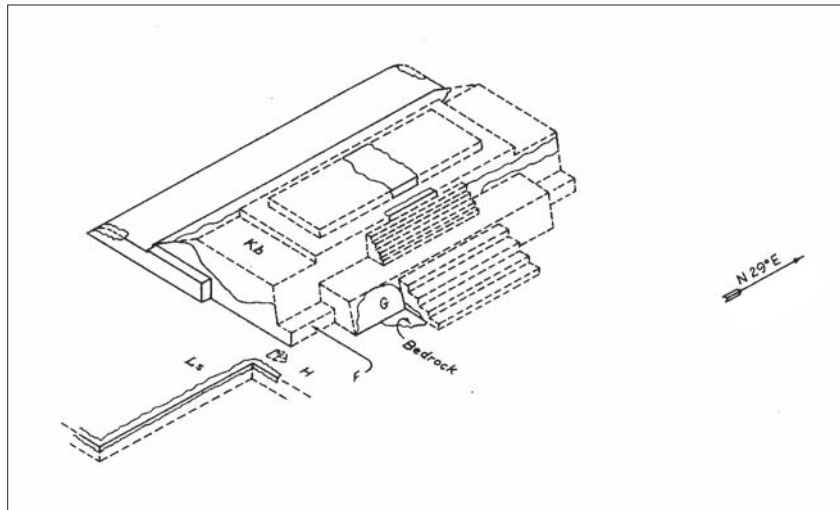


Figure 8.3 Isometric reconstruction: Structure R-11-2nd-A (Units H, G, and F).
Rear of Structure R-11b in this phase.

different things as plain or carved flat rectangular or round panels, sculpture in the round, and stone rings are brought together in one class. This is an expansion over usage of the term to date. I think the following example justifies it. A ring at Chichén Itzá, a parrot-head at Copán, and a carved flat panel in Structure K-6 at Piedras Negras must each have had different effects on the movement of the ball, but each marks the center of a stop-surface in its respective court, and suggests that fundamentally the game was the same.

Having expanded the use of marker, modifying adjectives will be needed. Thus central and end alley-marker and a central apron-marker may be seen in Figure 8.1. In Figure 8.17 there is a central stop-surface marker, there a carved panel. The Chichén Itzá rings must remain rings, but they can sometimes be referred to conveniently as central stop-surface ring-markers, when making comparisons with other courts. The resulting terminology is less simple, but it more truly reflects the degree of complexity of the facts.

Niches (of Ballcourts)

Features occurring in some Mexican end-field walls which, it has been supposed, may have figured in the play and scoring.

Playing Surfaces

The surfaces of the fields, together with those inner surfaces of ballcourt structures (and, possibly, of end-field structures or walls?) on which it may be supposed the ball was intentionally rolled and/or bounced. The playing surfaces of the structure may vary in form, if Southwest

courts are considered, for there they may be curved, but in Middle America they were, typically at least, flat, and either level, sloping or vertical. For convenience, 90 degree slope will be used interchangeably with vertical.

Stop-Surfaces

Surfaces supposed to have defined the extreme possible limits of play by insuring that the ball must, on striking one, stop an outward series of motions and move in an inner direction. If surfaces of end-field structures or walls were not playing surfaces, they might nevertheless have been stop-surfaces under this definition, functioning like the back-stop behind the playing surfaces of a modern tennis court. The stop-surface of a Middle American ballcourt structure was surely also a playing surface, yet it seems never to connect directly with the central field. Instead, directly or indirectly, it connects with the top of a bench (see Bench). If the bench-top is level, a sloping element may connect it with a vertical stop-surface as in Figure 8.1, or it may connect with a molding apparently functioning as a stop-surface as at Cobá. In some cases it may be impossible to say that the sloping surface was not the final outer or stop-surface. If high or steep enough, such surfaces would always turn the ball inward; on Piedras Negras Structure R-11 (Fig. 8.1) this is hardly the case.

Aprons

For lack of a more satisfactory term we shall call sloping elements, rising from the backs of benches, aprons, whether a surface no. 4 is present or not. As used here, the difference between an apron-surface and a sloping

bench-top is primarily in position; the apron is surface no. 3, the numeration proceeding outwardly from central field, while the bench-top is surface no. 2. Besides this, it seems probable that the slopes of aprons were always steeper than those of bench-tops (esp. Figures 8.6 and 8.19). But apron is probably not a suitable term for a very steeply sloping Surface No. 3, if such are reported.

The two ballcourts at Piedras Negras have been classified on the basis of the playing surfaces of their structures as level-bench and sloping-bench types or, more fully, as level-bench-top with apron and sloping-bench-top (Structures R-11 and K-6 respectively). Both types or sub-types, thus defined, seem to have wide distributions not confined to the Maya area.

Ramp (of a Ballcourt Structure)

A bench-face of so gentle a slope that the ball could roll and a player could readily run onto the bench; conversely, the ball could roll down from the bench-top with little or no bouncing at the bottom, and a player could run down from the bench-top without jumping. This feature,

very marked in Structure R-11 (Figs. 8.6a and b), may have been linked with level bench-tops, and together they must have profoundly affected the manner of play, as compared either with sloping bench-tops with vertical faces or with level bench-tops with steeply sloping faces, as in the Great Court at Chichén Itzá. This must be true, I think, whether or not the rules permitted a player to pass between field and bench-top. In either case the ball must have done so.

It is not supposed that the above definitions are perfect, nor that all innovations will come into general use. But if they irritate others into providing better ones for the same or for other distinctions, they will serve a useful purpose. Help and criticism in framing them, without any responsibility for what is adopted, were received from A. V. Kidder, Tatiana Proskouriakoff, Harold S. Colton, Emil W. Haury, John C. McGregor and Kenneth MacGowan. Unfortunately sought-for criticisms from many others, in Mexico as well as in the United States, have not been received in time to be utilized, and I have had to depend on their publications.

2. STRUCTURE R-11: SOUTH GROUP BALLCOURT

Linton Satterthwaite

Preliminary Remarks

At the time of writing (1944) this court is of special interest as being the only Maya one of Blom's "early" stage yet published after considerable excavation. In most important respects it confirms the general picture which he gave for that type, but it adds to and also subtracts from his general picture. For instance, it is practically certain that here a fourth playing surface was present on the structure, without the stone rings found on the corresponding surface at Cobá; the partial enclosure of end-fields in a late phase seems non-essential; the bench faces were clearly ramps, and curved in vertical section.

This complex was described in our Piedras Negras Preliminary Paper No. 2, which is now superseded. Morley discusses one of what I now call apron-markers, supposed to be a re-used stela (Stela 45, Morley 1938:3:107-109). When first seen by the writer (Satterthwaite 1931) nothing was visible except some of the higher slabs veneering the aprons. But, as I was then unfamiliar with Blom's paper, the peculiar and symmetrical form of the debris contours, caused by the two benches, puzzled me. Ricketson had reproduced these faithfully on his map,

and later when Morley, then visiting the site, told me that Structure K-6 was a ballcourt, with a copy of the Ricketson map before us, I pointed out that if Structure K-6 was such, so was this. Morley and Ruppert agreed at once that this was probable, and Ruppert went down to the South Group and tested for alley-markers with a machete, finding solid stone just below the surface at the expected places. Mason laid these markers bare the next day. I recount all this to show how easily a ballcourt may be identified with little or no excavation, and to emphasize the service of Blom in merely opening his mind and interpreting what he saw without reference to the then current dogma that ballcourts must be Mexican or due to late Mexican influence. It is quite possible that other dogmas now prevent us from seeing other significant things. So let us examine the two courts here without preconceived assumptions that one type must be earlier than the other, and let us not assume that either type must have its origin here in the central Maya area, or must have it in Mexico or somewhere else. We must, however, look for evidence on these questions, and it is quite obvious that ballcourts can eventually profitably be used in working out inter-regional and chronological relationships. Acosta has pointed out some of the details

which must first be recovered and analyzed in more quantity for such a project.

Structures R-11a and R-11b, with central and end-fields and limiting features, considered as a single complex, will be designated simply as Structure R-11. It lies on the easterly side of the corridor connecting East and South groups, which passes over the gently sloping crest of Hillock O (see site map). Its excavation was assigned to the writer in 1932, with labor which was entirely green and when he was only less so. Unburied constructions were in very bad condition except at and near their bases (Figs. 8.12 and 8.13). As a result of these factors there is an unnecessary lack of desired information. Some supplementary work was done in 1933 and again in 1939, but without sufficient study of existing notes to suggest elimination of all unnecessary lacunae. Too much time was spent on the badly disrupted tops of the ballcourt structures, too little at and below field level. However, it has been possible to assign a place in a believable reconstruction to nearly everything found; and in most cases, where doubt is greatest, the proof seems of little theoretical importance or else was beyond recovery.

Unit Designations

A considerable number of parts of the whole complex must be considered separately in order to come to some idea of the time intervals represented by structural changes, and of the form of the complex at any one time. We follow

our standard practice of special unit letters for these in order to make it easy to refer from the text to the proper part of a drawing. The problem of handy designations is complicated by the presence of pairs of essentially alike features. The designations R-11a and R-11b on the site map refer to the respective ballcourt structures in a general sense; the context must determine whether, for example, R-11a means the northwesterly structure as it was in the beginning, or during some later phase or period. It denominates the whole northwesterly structure as of the phase under discussion. Thus Structure R-11a during the time when it was part of Structure R-11-2nd-B the whole complex as of the earliest phase of the earliest period, consisted of Units Ka and (we think) J; during the next phase, that of Structure R-11-2nd-A, Structure R-11a consisted of Unit Ka and J, with Unit I added (Fig. 8.6a). When the distinguishing small letters are omitted in the temporal designations, as in the above Structure R-11-2nd-B, the whole complex is connoted. Structure R-11-2nd-B" connotes not only the ballcourt structures R-11a and R-11b, but also the end- and central fields all as of the time of phase B of the 2nd or earlier period.

The use of the small letters to distinguish between pairs of like features has been carried into the unit designations, "a" referring to the northwesterly, "b" to the southeasterly item of a pair; while "n" and "s," respectively, distinguish northeasterly and southwesterly end-fields and extensions to them.

Table 8.1 Structure R-11 Adopted Scheme of Temporal Sequences

Str. R-11-2nd-B (earliest phase)	Northerly and southerly end-fields	Units Ls, Ln, M
	Ball-court structures	Units Ka, Kb
	Rear platform (R-11a only)	Units J, J'
Str. R-11-2nd-A	Rear platform extension (R-11a only)	Units I, I'
	Rear base-surface extension (R-11b only)	Unit H
	Partial destruction of rear stairway of prior period, R-11b	
	New R-11b rear stairway, reconstructed as compound shouldered type.	Units G, F
Str. R-11-1st-B	Raising of corridor floor, rear of R-11a	Unit E
	Partial destruction of R-11b rear stairway of prior period	
	Laying a new floor at rear R-11b	
	Rear extensions of main structure component and of top platforms, both R-11a and R-11b	Units Da, Db
	Narrow probable bench, rear of R-11b	Unit C
	Approach to rear corner at terrace level, R-11b, forming raised platform connection with sweat house Str. R-13	Str. R-12
	Extensions of both end-fields at or nearly at established levels	
	Further enclosure of southerly end-field	Units Bn, Bs
		Strs. R-7b-1 st , R-8
Str. R-11-1st-A (latest phase)	Probable lateral extension of bench at rear of R-11b	Unit A

Table 8.2 Structure 20 Stratification Table.

Str. R-11	Fig. 8.1	Fig. 8.3	Fig. 8.3–8.4	Fig. 8.5	Fig. 8.6a	Fig. 8.6b	Fig. 8.7	Fig. 8.8	Fig. 8.9	Fig. 8.16
-2 nd -B	Ka J	Ls	Ls Kb*			Ka J	Ls	Ls		Kb
-2 nd -A	I*	H	H F	G	I			H	H	
-1 st -B			Db	Db C	E Da*	Db C	Bs		Db Bs	R-12
1 st -A										

*Stratifications from J' behind I' and Kb behind F seen but not illustrated; J'-under-E-under-Da seen at late R-11a stair angle though merely reconstructed in Figure 8.6.

The main letters of the unit designations are chosen in our standard manner: in alphabetical order they either run through a group of units considered to be contemporary, or run backward in time, Unit A being considered the latest, Units Ls, Ln and M,, the earliest.

Temporal Sequence

It is not possible to prove that some of the units we have grouped together as contemporary in a single phase were actually contemporary, but three principal phases must be distinguished at both R-11a and R-11b. While digging was not so complete as it should have been for R-11a, the sequence-Ka behind J, or that of Unit E under Da can be considered as showing a mere sequence in contemporary constructions, but I' and J', and J' and E cannot be reasonably interpreted thus. For Structure R-11b, perfectly clear corners in the final southerly face, from base level up, showed that Unit Kb lay behind F, and F behind Db. While Unit C, a bench, was very likely contemporary with Db, against which it was built, there is little doubt that Unit A was an extension of this bench. We have given this latter minor item a phase of its own, making four as the probable minimum, distributing other units among the first three, utilizing stratigraphical controls where available, and the assumption that essentially similar units, paired symmetrically on either axis, were contemporary.

The tabulation [in Table 8.1] of these assignments is given for quick reference, and for the benefit of a reader who may want to check the drawings in detail, without following the detailed remarks which follow later, for each phase. It must also be remembered that elements of an early phase usually survive and form a part of the next later one, but only the new things are listed for the later phase.

Features not assigned in the [Table 19] scheme:

Probably after R-11-2nd-B:

Probable raising of central and at least parts of end-fields by thickness of new floor.

Consequent probable burial of central field-markers.

Masonry construction on top platform of R-11a.

At any time:

Burial of pots and cache objects in Unit Ls.

Curved addition to northerly bench-extension of Structure R-11a.

There is no physical evidence or theoretical basis which would prevent shifting the last two items under R-11-1st-B to the A phase and, so far as physical evidence goes, the same applies to Structure R-12. So it is quite possible that there were four phases, each involving a considerable amount of construction, instead of an

extremely minor fourth one, and that even then more phases would be necessary to represent the actual series of changes if we could be sure of them all. The degree of modification at the rears of the structures caused by Units Da and Db seems to justify the adopted division into 1st and 2nd periods, but it should be noted that only the unassigned supposed raising of the alley floor level, and possibly the end-field extensions, could have affected the manner of play, and then only in a minor manner.

The tabulation [Table 8.2] lists the stratifications available as controls, proceeding downward with advancing time under each figure where the situation is illustrated.

A careful analysis of blank spaces in [Table 8.2] might lead to bewilderment. Thus Figure 8.16 shows a cut through Structure R-12 to Unit Kb; on the basis of our reconstruction in Figure 8.3, Unit G should appear between Kb and R-12. Inexperienced digging is the probable answer, while Maya tearing out of the G wall here is a possibility. They may have wanted the tabular stone and taken it from here, yet left the remnant on the other side of the Unit G stairway. Clear cases of partial demolition not required by the projected new design are known elsewhere at the site.

Remarks on the Drawings

Certain observations on specific drawings are gathered together here to make the drawings more intelligible without recourse to the more detailed Discussion by Periods and Phases, following. But the latter should be consulted before relying on something seen in the drawings as a basis for important inference, and an effort is made to avoid repeating there what is given here.

The plan of Figure 8.10 is by Parris. Notes and drawings of the writer are basic to the others. Figure 8.3 was constructed by Proskouriakoff, and used by the writer in drawing the other isometric perspectives. As usual, on the sections, actually excavated portions only are hatched. In the case of the structure tops, in both perspectives and section, floors are shown in the same manner as if finishing plaster on them had survived, though it had not. But in this case the concrete was in good condition in the parts shown, its top very clear. Because of its special interest for dating purposes here, an occurrence of bedrock at or very close to the base of a wall is indicated as if it were an exposure of floor, but such areas are marked bedrock or Brk., an abbreviation for it.

Figure 8.1 reconstructs Structure R-11-2nd, that of the earliest period. Unit I (Phase A) is cut down from the top to expose the front of Unit J. If one eliminated Unit I and F entirely, and carried the step-terraced front of Unit J clear across the front, the drawing would completely represent R-11-2nd-B, the earliest phase, so far as we have reconstructed it. There may or may not

have been buildings or other constructions on the tops of the structures, of either perishable or imperishable materials. The stepped front of Unit J was seen in the side of J'-I', but the juncture would have been hidden by plaster, much of which survived on the side of Unit J. A cut-out is drawn through the rear of Unit J, wider than that actually dug, to expose a feature which may possibly argue for Unit J belonging to a separate phase, later than the structure proper. Remains of a probable stairway rising from Unit J were not sought, and in any case might easily not have been left by the Maya.

Figure 8.2 shows our idea of Structure R-11-1st as drawn from the same point of view. Attention is called to special doubt whether the quasi-tau shapes given the top components of Structure R-11a are correct or not. As to possible constructions on the ballcourt structure tops, see *Discussion by Periods and Phases*. There is no doubt about the existence of a stairway for Structure R-11a at this time, though it was badly disrupted, and little doubt that it was more or less broad-treaded, though this is not absolutely certain. Neither is it proved that the tops of retaining walls of Units Ls, Ln, and H still showed in this late period; a special dash-three-dots line is used here and in Figure 8.10 to indicate this doubt. In the 1933 report this line represented buried terraces, and it still does, with the proviso that it appears likely that they were not quite completely buried. But this is not absolutely proved.

A small addition to the rear of the northerly bench extension of Structure R-11a, as seen in Figure 8.1, gives it the curved form seen here. Inadvertently this was not assigned a unit designation. No such changes were encountered on Structure R-11b. Failure to note any difference in base level suggests that this addition predates the raising of the floor.

Figure 8.3 reconstructs the rear of Structure R-11b in Phase R-11-2nd-A. No evidence of the upper flight of steps survived, nor any positive evidence of the existence of two flights, nor of the broad-tread type of steps reconstructed as the lower flight. But the rather certain presence of shoulders (Unit G), flanked by a step-terrace (Unit F), as at Structure J-6, argues strongly for broad-tread steps here, possibly with sloping treads and risers. It is obvious that Unit F, so far as we really know, may have followed Unit G as a minor phase. A cut-out through Unit H shows the wall of Ls behind H, which was followed in only as far as the end of the structure (Unit Kb). This Ls retaining wall, maintaining a level top, doubtless originally continued in until rising bedrock made it unnecessary. It will be clear from the drawing that an additional area had to be leveled up by Unit H to give the stair unit F, perhaps also G, a respectable surrounding base surface, so that H and F almost surely belong to this one phase, and follow that of Unit Ls.

Table 8.3 Structure R-11 Playing Alley Dimensions

	North Alley	Central Alley	South Alley
Diameter	0.5	0.5	0.5
Thickness	0.2	0.4	0.3

If the Units H, F and G were removed from the drawing, except for the upper flight of entirely reconstructed steps, and if this upper flight were then continued down to the base level, the drawing would represent the structure as we believe it was in the earlier Phase B of this period. A buried remnant of the northeasterly side wall for such a stairway was found projecting 1.9 m from the base of Unit Kb and surviving to a height of 1.5 m at the angle with Kb. This could have been the wall of a projecting platform, since it showed a very slight batter toward center, but this seems unlikely.

Figure 8.4 from the same point of view as Figure 8.3, reconstructs the rear of Structure R-11b in the final R-11 1st-A phase. A cut-out shows the wall of Unit Db based on floor material which raises its base level enough to permit it to pass over the same remnant of the side wall of the Unit G stairway shown in the previous figure.

Figure 8.5 at double scale, is a combination of sections and isometric perspective. The shoulder-forming terrace of Unit G and the wall of Unit Db are shown cut off in horizontal section and, at the left, in vertical section. Unit Db, thus cut down, is in two disconnected pieces, the better to show its relation to Unit G. The face of this latter, behind the steps, was a crude fill wall, its face about 20 cm behind the face of the exposed shoulder-forming portion. When the steps were torn out by the Maya the stones of this shoulder were left terminating in a ragged but quite straight vertical line, showing that the stairway side wall was constructed first. Figure 8.5 gives a fuller representation of the surviving remnant of this stairway side wall, part of which appears in the cut-out of Figure 8.4. Unit Db passed over it, and formed a mere veneer-like layer where it lay against the shoulder G. A similar situation was noted in the nearby South Group Court, where Unit D of Structure R-9 lay against Unit E of that structure.

Figures 8.6a and 8.6b. Taken together the sections of these figures may be taken as truly representing a single cut through both structures, at a right angle to the long axis and at longitudinal center. This is not exactly along the transverse axis, due to marked parallelogram distortion of the plan (see Figure 8.10). The two sections were actually measured on lines running through the apron-markers at right angles to the long axis, and we have pretended that the distortion did not exist, thus bringing the central alley-marker into the picture in both

cases. Counting up from the benches, the second and third stones of the apron in Figure 8.6a are fragments of the apron-marker of Structure R-11a; the third, fourth and fifth stones in Figure 8.6b are fragments of the R-11b marker. The other stones are thinner irregular slabs such as may be seen in Figures 8.12 and 8.13.

The section of Figure 8.6b is composite in other respects since certain features were actually seen only to one side or the other of the section as drawn. An area of two or three square meters of alley floor concrete without finishing plaster but brushing to a good level surface, was seen along the base of the R-11b bench a little northeast of center. When this was recorded and its level taken, the rest of the alley floor had been broken up in following the bench slabs below it, a very careless procedure for which the writer is responsible. The section of floor and front or inner part of the bench used was actually 3.5 m northeast of center. The top only of the rear wall of Unit Kb was seen on the section line, but it was seen complete about 5.9 m southwest of the northeast corner (Fig. 8.16). This is only about 1.5 m from section line, due to parallelogram distortion. The rear profile of Unit Db was measured about 4 m, and of Unit C probably about 1.5 m southwest of section line. Again due to parallelogram distortion, the section line, at a right angle to the long axis, actually passed through Unit A, an extension of the Unit C shown.

These sections are the work of the writer, not of Parris. Section lines were established only with a Brunton compass, but errors on this score must be inconsequential. Checking with Parris' plan shows a maximum discrepancy of 40 cm in a single structure depth. Horizontal distances were carefully measured with tape and plumb line; vertical ones with tripod telescopic leveling instrument.

Figure 8.7 is a section on the long axis through the southerly end-field. It is of some theoretical importance to remark that the top of the Ls retaining wall has been reconstructed as if a few centimeters below the top level of the southerly alley-marker, but that the exact vertical relationship was not measured. The level shown is surely approximately correct. The exact levels of Structure R-7b components with respect to the marker were, however, determined, though data of various seasons and persons are utilized. The suggestion that the surface of Unit Bs was slightly below that of Ls is a matter of unproved inference, and presupposes that the surface of the secondary floor covering the alley-marker merged with the old Ls surface by the time the Ls retaining wall was reached. Being uncertain, our drawings suggest what is only an interesting possibility, that the original limitation of end-field area was maintained throughout. If the ballcourt ceased to be used as such by the time of the Bs unit, the reason for graphically calling attention to the possibility would disappear. The inference that at least

the top of the Unit Ls wall was not buried by a secondary floor is independently drawn from the noted fact that it was found at the surface; and that it was exposed throughout by merely scraping away leaves and a little humus. Contrastingly, the alley-marker was found under a layer of crushed stone as noted; so doubtless were the other two alley markers, though the nature of the material removed to expose their tops was not recorded.

The northwesterly step-terrace limiting Unit Ls, at a point only 3 m from Structure R-11a, had its base level 27 cm below the datum. The end-fields were certainly not perfectly level, and the Ls wall may be shown too high in this drawing.

Figures 8.8 and 8.9 are respectively on lines at a right angle to and parallel with the long axis, respectively a little southwest of and a little southeast of the juncture of Ls and H walls. Together they establish the sequence Ls-H-Bs.

Figure 8.10 is a partial copy of Parris' plan of the final period, R-11-1st, as published in the 1932 report. It is based on careful surveying with triangulation and check measurements with tape. The reconstruction of Figure 8.2 agrees with it except for some minor reconstructed details in the stairway of R-11a, which are uncertain anyway. The peculiar form on the top of this structure is a remnant of wall seen in Figure 8.2 and in section in Figure 8.6a. The dash-three-dots line shows the outer edge of Unit Ls, and of Ln and H, so far as those are known to have survived. The probability, which may however be questioned, that these were visible in this period, is discussed under Figure 8.7.

Attention is called to the apparent lack of the bench extension at the southeasterly end of Structure R-11a.

This end had nowhere survived to bench height, and it is possible that a secondary extension (using the word in the ordinary sense), like that on the other end but running all the way to the rear, prevented us from recognizing the plan of an original bench extension here. We failed to find a dividing line in the wall face, but did not trench in to make sure that the plan of this structure was never symmetrical. Absence of the dividing line is the basis for the absence of a reconstructed bench extension in this figure. Such absence is not absolutely conclusive. We cannot say positively that some stones of an original rear corner of a bench extension were not torn out, and that the new wall running further back was not bonded to it, thus masking the juncture. This certainly occurred at Structure J-22, where plaster, absent here, tells the story.

The numbers in the area of Unit Ls locate caches below its surface.

For a more complete picture of the relationship of this complex to the corridor and to neighboring structures, including a palace (R-7) and a sweat house (R-13), see Square R of the map of the site. It lies across the corridor from a temple (R-16), but the temple faces somewhat away from it.

Discussion by Periods and Phases

Structure R-11-2nd-B (earliest)

(See also Remarks on Figures 8.1, 8.3, 8.6, 8.10)

The contemporaneity of Units Ka and Kb is guaranteed by their ballcourt function, which is obvious from comparisons with courts with rings, such as at Cobá and Chichén Itzá, considered together with early

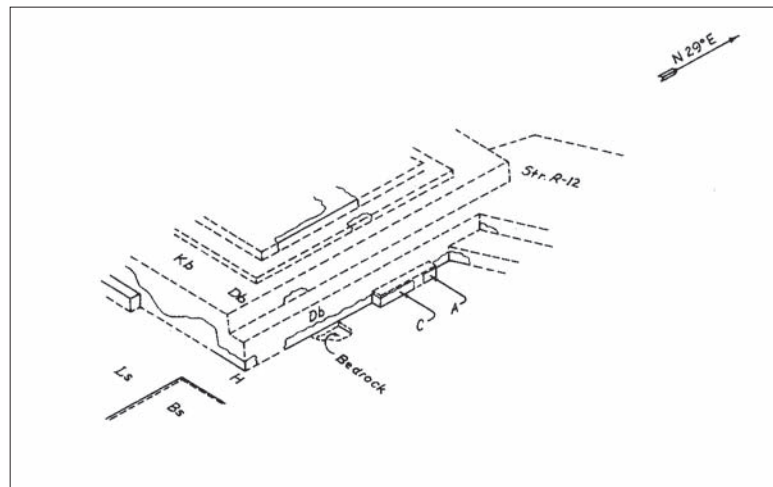


Figure 8.4 Isometric reconstruction: Structure R-11-1st-B Units Db and C; Structure R-12; Structure R-11-1st-A (Unit A), from same point of view as Fig. 8.3.

Spanish accounts. The conclusion that these units are contemporary with Units Ln and Ls, forming the end-fields, cannot be absolutely proved because surface plaster did not survive. But it is a conclusion that can scarcely be avoided. In a search for other field markers, with negative results, large areas of the fields were excavated to a depth of about 30 cm. These areas included the entire central field or alley, a full-width extension of it along the long axis to the bounding wall of Unit Ln, and, except for small areas around a few scattered small trees, the entire southerly end-field, between the ballcourt structures and Structure R-7, from the northwesterly boundary of the field to a line about 26 m to the southeast. Since this operation disclosed no walls buried within Ln or Ls, but a continuous section of solid fill and floor material on the long axis from Ln to Ls walls, they must be taken as contemporary with each other. Part of this section is shown in Figure 8.7.

We should consider the possibility that they predate the structures. Figures 8.6a and 8.6b show sections through this same material, at a right angle to the long axis. If the area had been surfaced before construction of Unit Ka, the surface, or at the very least the crushed stone material of a floor should have been identifiable below the bench of Unit Ka (Fig. 8.6a). Instead, a solid fill, not of floor character, and with an irregular surface, rises below the pure rubble fill of the bench to a height greater than that of the final alley floor, finally giving way to bedrock which rises still higher. In the figure the solid fill is distinguished from the overlying rubble fill of the bench by differing hatching.

At a considerable number of points, side and rear walls of Unit Kb were noted as either on bedrock, or a few centimeters above bedrock. Units P and V were recorded as based on bedrock, as was Unit M. (Fig. 8.1). Both situations were found for the northerly end of Unit Kb in a check-up in 1939. Floor material was not seen to pass under these walls, even when a little above bedrock. Since indubitable limestone often has weathered to soft soil of a light brownish color, with no sharp line marking the transition, it is probable that both Units Ka and Kb were built on bedrock, undisturbed soil, or mixed soil and earth very likely to accumulate in leveling off the area. Probably this was accomplished with some cutting down of humps of bedrock, as well as with filling. The wall of Unit Ls, where followed to the base (on the long axis) was also noted as based on bedrock; that of Unit Ln was based on solid fill up to the point it reaches in Figure 8.10. From here southeastward it had completely disappeared, and rubble fill replaces the solid.

These factors lead to the conclusion that the structures and end-fields of this phase were contemporary, and were the first constructions at this spot. An ancient slip in the rubble fill, certainly placed on a hillside,

may account for the disappearance of the rest of the Ln wall; if not, it may have been torn out for building stone at the time this field was extended northward.

The Double T or Capital V form of fields, as reconstructed in Figure 8.1, thus seems well established as part of the original plan when construction here began.

There is no reason to doubt that the alley-markers date from the earliest phase, but in the absence of surviving surface plaster, this could not be proved. Neither can one say it is impossible that the apron-markers are later insertions.

The levels of the alley-markers call for an earlier alley surface, as does presence of crushed stone found over them. This early surface was nowhere actually identified, and in 1932 we speculated on the possibility that there was only one surface which dipped down around the markers. If rolling, the ball would then tend to come to rest at a marker. We have since concluded that this was fanciful. Several cases have been found, notably at Structure P-7, where several layers of finishing plaster marked off successive floors in protected places, but these disappeared completely in exposed places, leaving an apparently single deposit. One should here also allow for the personal equation. At the time I had little experience in following doubtful floors, and did not try to do so here. The reconstruction of a secondary floor surface is not only reasonable for the alley but necessary at the rear of Structure R-11b, where Unit Db is based on crushed stone floor material lying against and over the remnant of Unit G, which was based on bedrock (Fig. 8.5).

The sections of Figure 8.6a and 8.6b suggest that the original alley must have been about 75 cm less wide than the 4.3 m of the final period, when, we suppose, the added floor thickness extended the alley floor somewhat up the bench faces. If we call the original alley width 3.5 m we shall not be far wrong. Allowing 15 cm for secondary floor thickness, an approximation, this makes the bench heights, above floor level, that much greater in this earliest phase.

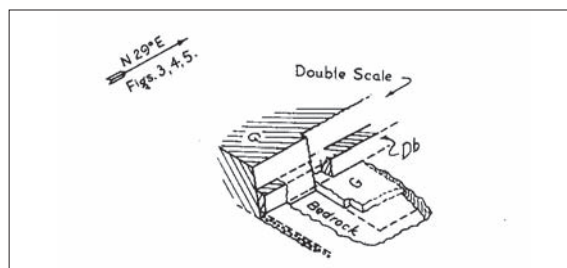


Figure 8.5 Isometric reconstruction: Structure R-11-2nd-A (Unit G; Structure R-11-1st-B (Unit Db).

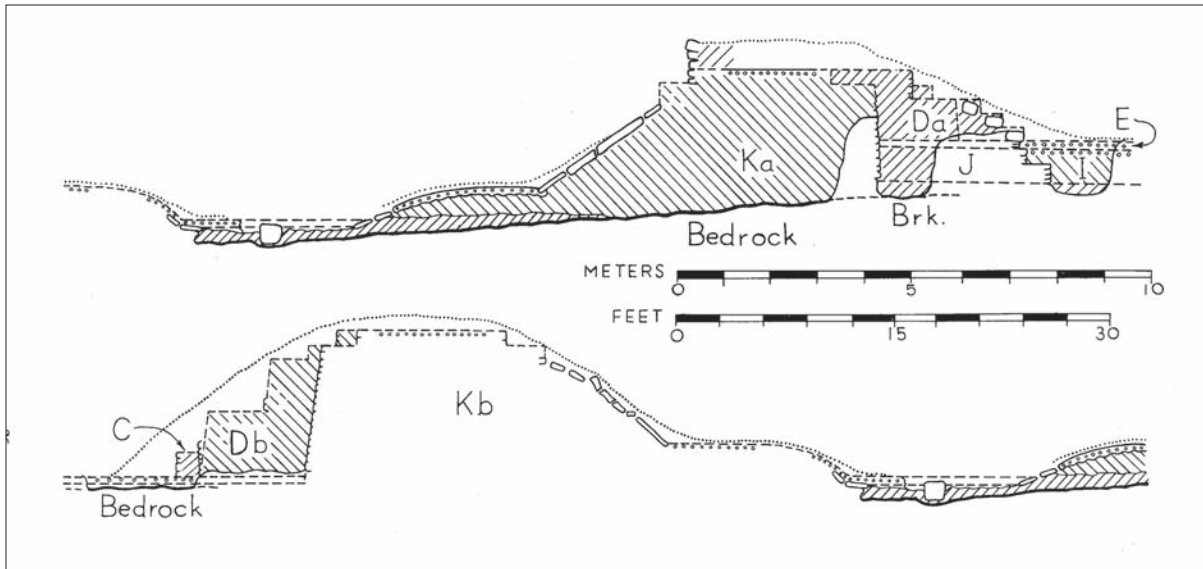


Figure 8.6 a. Cross section: Structure R-11a (central field and markers; Units Ka, J, I, E, and Da) composite passing through central alley and apron markers; b. Cross section: Structure R-11b (central field and markers; Units Kb, Db, and C) Composite passing through central alley and apron markers. All letters refer to units of construction described in text.

Unit JJ' was certainly constructed after Unit Ka (Figs. 8.1 and 8.6a). In Figure 8.1 its surface is cut out to show two projecting stones in the Ka wall, approximately at center. These are staggered horizontally about 45 cm. Vertically their tops are 70 cm apart, the lower about 40 cm above the base of the wall. They are about 15 cm wide by 10 cm thick, projecting, wide side up, about 20 cm. It seems probable that a stairway rose from Unit J to the top of Unit Ka, in which case the upper as well as the lower of these stones was buried in the time of Unit J. In our sequence scheme we have considered them as temporary climbing stones. An alternative is that they were to support stucco decoration, in which case Unit J would require a separate phase designation. Broken lines in Figure 8.1 show how little we know of Unit JJ'. It could be reconstructed along lines similar to the combination of Units G, H and I of Structure R-9.

It is supposed that a single-flight standard stairway connected the R-11b structure top of this period (Unit Kb) with base level to the rear. A remnant of the northerly side wall of the supposed stairway built against the rear of Kb was uncovered. It had been largely torn out by the Maya, and survived only to a height of 1.5 m, hence might possibly be part of a projecting platform similar to Unit J, but much higher. The southerly wall was not sought; assuming symmetry, and using reliable but not accurate measurements, stairway or platform occupied the middle third of the rear of Unit Kb.

There is thus fair evidence but not absolute proof that provision was made during this phase for easy ascent

to the tops of the structures, in each case from the rear. No evidence of buildings or other structures on the tops was found in this phase. This raises no presumption that such were absent, whether of perishable or imperishable materials. No finishing plaster was found on the tops, though the level surface of the concrete was easily made out. Under these conditions evidence of complete removal of masonry walls in later phases, such as is clear at Structures J-6, J-9 and J-11, would be very difficult to find, and was not sought for.

We cannot say, however, that the remnant of masonry wall, set flush with the front of the R-11a upper component (Figs. 8.2, 8.6a and 8.10), positively does not date from this earliest phase. Recollection of the writer, rather than a proper record, suggests it is not physically bound to Unit Ka, and merely rests on it.

Whatever the date of this construction, Figure 6a shows that a vertical stop-surface must have bounded the top of the apron at the center, whether or not we have correctly placed it forward of the one which survived. Figure 8.1 shows well enough that it must have extended along most of the top, though probably not clear to the ends.

There is no question but that the bench extensions step up about 15 cm just behind the line of the apron. This feature was well preserved at the south of Structure R-11b. One remarks in passing that the ball could not roll back onto this narrow shelf-like part of the extension. A field sketch suggests that the southerly bench extension is bonded to the main structure and there is no reason

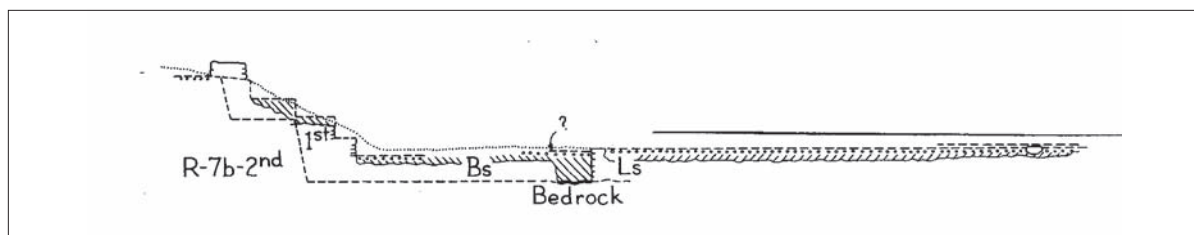


Figure 8.7 Cross section: On long axis, southerly alley marker to Structure R-7b-2nd (marker, Units Ls and Bs).

to suspect that the extensions are secondary. However, the evidence for contemporaneity was not properly recorded. The unsettled question of whether Structure R-11a had a southerly bench extension is discussed under Remarks on Figure 8.10.

R-11-2nd-A (See also Remarks on Figures 8.1, 8.4 and 8.5)

The postulated raising of the alley floor could have occurred during this phase, but if all field-floor raising pertains to one operation, then not until the R-11-1st-B phase. Otherwise, all changes assigned to this phase have to do with the rears of the structures, everything else remaining as before, so far as known.

Figure 8.1 tells all we know about Unit H'. Possibly if we knew its whole extent it would deserve a separate structure name. Figure 8.3, and Remarks on it, make further detailed discussion of Units H, F and G unnecessary. The figure shows a lamentable lack of imagination in digging. A very little time would probably confirm the reconstruction of this type of stairway beyond doubt. However, no other reconstruction using components known elsewhere at the site, will account for both Unit G and the known corner of Unit F, and it accounts very well for the broken-down condition of the shoulder near where we have placed its corner, and for its relatively large deviation from vertical. I think this reconstruction is quite probable, though not established with certainty.

Structure R-11-1st-B (See also Remarks on Figures 8.2, 8.4 and 8.5)

This phase, like that just before it, is marked by changes to the rear of each of the twin structures, but there were also changes at the ends of the complex, requiring large amounts of new fill. Special attention is again called to the speculative nature of the reconstructions, in showing the end-field extensions (Units Bn and Bs) with surfaces slightly below the original end-fields. Data at hand would permit bringing these surfaces up to the old end-field walls at their tops. They suggest, but do not absolutely prove, that at least the tops of the old walls were left in view, in which case they may have continued to mark off

the same less extensive end-field areas as playing areas. However, interpreting thus, one must assume (without any surviving evidence) that the old limits were somehow indicated in a new way for that portion of the north field where the old wall had by this time, in one way or another, been destroyed.

It seems likely that the new alley floor was now laid, and it must have extended out onto the endfield areas, so that a complete blanking out of the old end-field limits, as well as of the alley-markers, would be natural at this time, if the old limits did not have to be preserved. If they were not, the Double-T field outline, as defined by imperishable materials, was changed drastically in proportions, and distorted largely beyond recognition. This will be very apparent if one traces the field outline from the map of the city, and then sketches in the old limits, at the proper scale, from Figure 10. Even so, painted or plaster lines could have been used. The surviving situation permits us to extend the supposed playing limits or to make them indefinite, but really gives us no sure ground for doing either.

The changes to the structures include a deepening rearward, which included the tops. It seems likely that buildings or subsidiary platforms, or both were now placed on these tops, if such did not survive from earlier phases. But they probably were not alike in materials. On Structure R-11a we found not only the masonry remnant shown in the figures, but a cap of debris 50 cm deep. Vault-indicating slabs were absent, but tabular stone, presumably from walls, was present. The surviving wall remnant stood 65 cm high. No rear or inside face could be made out, due possibly to faulty digging. On the top of Structure R-11b the debris layer was about 30 cm deep, and included broken rock, rather than tabular wall stone; again there were no slabs. The situation suggests a small centered building on Structure R-11a, and a platform (less wallstone) on Structure R-11b. However, this interpretation is highly speculative. The debris layers are undoubtedly the reason for good preservation of floor concrete on the tops, in strong contrast to the situation at the other ballcourt, Structure K-6.

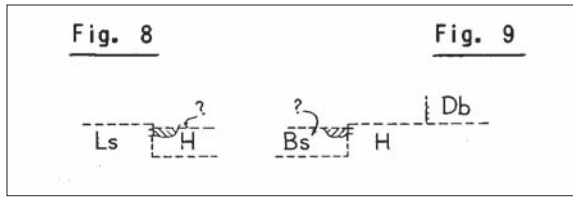


Figure 8.8–8.9 Cross section: Southerly end-field, Units Ls and H (8). Southerly end-field, Units H, Db, and Bs (9).

The rearward extensions required new arrangements for reaching the tops. The stairway of Unit Da (Figs. 8.2 and 8.6a) is reconstructed as of somewhat broad tread merely on the basis of the height to be reached and the horizontal distance between the wall and bottom step, the latter step only being in position. In the case of Unit Db (Fig. 8.4) we thought a slight bulge in the debris contours indicated a centered stairway there, but it could not be found, and the narrow bench and its probable extension (Units C, A) establish absence of such a stairway well enough. This argues strongly for contemporaneity of Unit Db and Structure R-12, a very peculiar platform connecting with the nearby Structure R-13, a sweat house. Stair arrangements leading up from this may be imagined, but were not looked for.

In 1932 we considered that the retaining walls of the rearward extensions (Units Da and Db) were vertical, and made a point of the contrast with the rear wall of Unit Kb, which was steeply sloping. In fact, the remnants of Units Da and Db as found were either vertical or leaning outward. But later experience has shown that steeply sloping walls may be pushed to either of these positions by internal pressure of the fill. Since no well-preserved vertical terrace walls of comparable height have been found at the site, we have abandoned the hypothesis of verticality here. The particular steep slope used in the figures is conjectural.

In this phase the court has become more like that of the West Group in that the stone alley-markers have almost certainly been blanked out, and also in that more extensive end-field areas could have been utilized in the game, though whether they were so utilized we do not know, in either case. From the point of view of the play, the structures themselves have remained unchanged throughout, except that raising the alley floor a little has reduced the effective height of the benches correspondingly. This makes them even less like the benches of the other court than before. Considering the amount of labor expended in this phase, relatively little more would have sufficed to modify the structure playing surfaces in the direction of the other type; instead, none of the structure changes affected the play except in a minor incidental way, and changes to the end-fields may not have affected it.

Structure R-11-1st-A (See also Remarks on Figures 8.2, 8.4 and 8.5)

Figure 8.5 shows that Unit A might be a short separate bench instead of an extension of Unit C, in which case the subdivision of this period into phases is not required. The southwesterly part had been torn out by unskillful digging before it was seen. This would be more likely to happen with an extension than with a separate bench. The function of an ordinary bench (as opposed to ballcourt benches) in this position is unknown. It may have no real connection with the ballcourt, but if an extension, marks the passage of another increment of time.

Measurement

The solid-line portions of the plan of Figure 8.10 provide one of our best grounds for believing that structures were laid out with great care in linear measurement, but that as a result, an initially badly estimated right angle infected the whole plan (see under Structure K-6). Here a glance shows that Structures R-11a and R-11b follow a parallelogram rather than a true rectangular type of plan. Both may be approximately fitted into a single larger parallelogram, and if opposite corners of the benches were joined by lines, did so fit. More than this, the larger parallelogram containing the structures and alley, thus defined, dictated the directions of the walls of the end-field Unit Ls, and of Unit Ln so far as known, or vice versa. The distortion from presumably intended right angles is not, of course, absolutely constant in all units, but according to Parris' carefully surveyed plan, which first revealed it to us, the variation is no more than a degree. The distortion of depth lines is between about 5 and about 6 degrees from corresponding lines drawn at right angles to a bench face.

This distortion was unquestionably established in all major components in the earliest phase of the earliest or second period, but very stupidly only one of the two rear or outer corners of R-11b (which were both seen) was accurately located; those of R-11a for this period were not seen. However, it is only the rear or outer parts of the structures, and rear portions of the ends of the structures, which do not belong in the earliest phase.

A few dimensions, scaled from the full-size Parris drawing which represents a careful survey, will give a further idea of the degree of accuracy in linear measurements reflected in the actual construction. Transversely, measuring from the northwesterly corner of the southerly end-field along the line of the ends of the structure benches, at field level, 13.45 m brings us to the long axis, 13.7 m more to the edge of the original field-raising wall shown in dash-three-dots line. From the intersection of this line with the long axis to the inner corners of the benches scales almost exactly the same for each, 2.1 m, which means that the structures, and

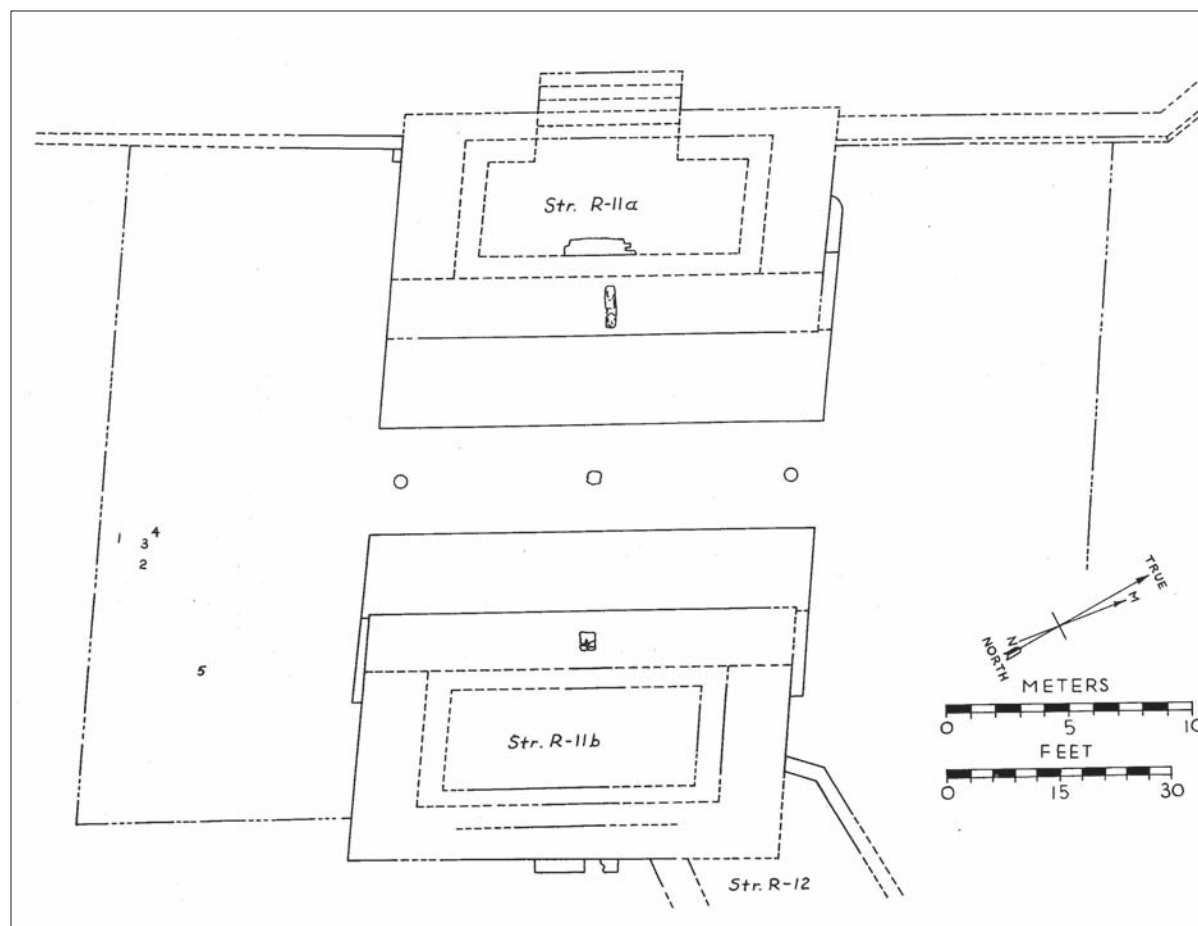


Figure 8.10 Plan: Structure R-11-1st-A (final phase of final period).

hence the alley, are very well centered transversely, with reference to the southerly end-field. Longitudinally, from the intersections of the lines joining the benches with the long axis, and measuring along the latter to the ends of Units Ls and Ln (dash-three-dots lines), expected equal measurements scale to 12.1 and 12.2 cm, respectively. Hence the structures were carefully centered in this direction also, and since they define the central field or alley, it may be said that the Double T form was constructed with great accuracy, except for the angular distortion, which is very marked.

In the phase or phases which accounted for the extensions of the end-fields, this longitudinal centering was not maintained. The northerly addition amounts to about 10 m, the southerly to only about 6 m. Parris drew the edge of Structure R-7 as departing somewhat from the parallelogram pattern, but this was largely reconstruction based on debris contour, and unreliable in this connection.

It goes without saying that the extensions of the structures themselves, always outward (to the rear), were doubtless laid off from what already existed, so that the parallelogram plan, once established, would be maintained through the final one, as we see it in Figure 8.10.

The outermost alley-markers are just about where expected with reference to corners of the benches, but not as exactly as one might expect for short measurements. The center of the southerly one is 1 m, the northerly one 1.2 m in from lines joining the bench corners. The central marker is displaced about 20 cm south of center of the long axis of the alley. A perpendicular from its center almost exactly bisects the R-11b bench face and therefore cuts off unequal segments of the R-11a bench, but perpendiculars through the other markers cut off unequal segments of each bench. One suspects that the longitudinal axis of the alley, on which all three lie with accuracy, was

carefully laid out, but that positions of the markers on it were selected with the eye only. The same remark applies to the apron-markers, that of R-11a being just about at the center of the apron (if there were bench extensions at both ends), while that of R-11b is about 50 cm north of center of the apron. Notwithstanding this, both apron-markers lie on opposite sides of a perpendicular through the central marker, as called for by the distortion of plan, though in the case of Structure R-11b, not so much as expected. As a result of these inaccuracies a narrow painted line joining the centers of the apron-markers and the center of the central alley-marker would not be quite straight. This circumstance is, perhaps, an argument against postulating such a line here, or against our identification of the apron-markers as such. On the other hand, a painted line through centers of alley-markers would be straight.

Table 8.4 Structure R-11 Apron Dimensions

	R-11a Apron	R-11b Apron
Length	1.9	1.0
Width	0.4	0.7
Thickness	0.2	0.1

The suggestion above, that alley-markers may have been located by use of a measured longitudinal axis line, but on this line with the eye only, may be discarded in favor of another suggested by Proskouriakoff. Positions on this line may have been measured from its intersections with the outer edges of the end-fields (i.e., of Units Ln and Ls). At such distances, differential stretching of a cord might account for the minor discrepancies noted, just as it might account for the 20 cm difference in short dimensions of the end-fields. Perhaps that is the answer to all small discrepancies in dimensions obviously intended to be equal. We had some difficulties of our own in this respect, when using metallic rather than steel tapes.

A few accurately determined levels at corresponding points where there was no reason to suspect appreciable settling may be noted. At approximately opposite points at the bases of the two aprons, the bench height differed by 7 cm; heights of the tops proper of the structures were measured as exactly equal. The top of the southerly alley-marker was 5 cm below that of the center marker, and it was 22 cm above the base of the enclosing northwesterly wall of the southerly end-field, a few meters from Structure R-11a. More levels should have been taken. Those which we have suggest that they were determined with the eye only, and that the one exact equivalence noted is a matter of chance.

Proportions

In the earliest phases (R-11-2nd) the alley width was about 19 percent of the alley length. With the raising of the floor this percentage was probably increased to about 24 percent.

Taking the distance between stop-surfaces, one of which is entirely reconstructed, as about 15.8 m, the alley originally occupied about 20 percent of the area between the stop-surfaces. But the benches are so ramp-like that players may have moved from alley to bench-tops. Taking the average distance between the bases of the aprons as 11.2, the alley and benches together occupied about 70 percent of the area between the stop surfaces.

Considering the alley alone, it is much narrower in proportion to the short dimension of the R-11-2nd end-fields than Mexican picture manuscripts would lead one to expect. Those reproduced by Blom suggest an alley about as wide as the shorter dimension of the end-field. This relationship is obtained here if alley and benches are considered together. The shorter dimensions of the two end-fields scale between 11.0-11.2 m. These were clearly meant to be equal, and are very close to the distance between the bases of the aprons.

An equivalence may be noted for what it is worth: the distance between the outer or rear corners of the northerly bench extensions scales 18 m, the average length of the alley and benches. Still another possibly significant pair of scaled measurements is 15.9 m between centers of the end alley-markers, compared with the 15.8 m between the stop-surfaces. This latter was pointed out to me by Proskouriakoff. If those markers were on transverse lines extending to the stop-surfaces, the area thus enclosed was a square, modified by parallelogram distortion.

Markers - Sculptural Decoration

Field sketches of five stones are reproduced in Figure 8.11. Two of these (A and B, respectively on Structures R-11a and R-11b) we believe functioned as central apron-markers, and three (C, D and E) were alley or central-field markers. Of these, C and D in Figure 8.11 were respectively northerly and southerly end alley-markers, E the central alley-marker. It was our best judgment that the central alley-marker had never been sculptured, but that all the others were sculptured. This is quite certain for the R-11a apron-marker (Fig. 8.11, A), which has received the further designation Stela 45 on the theory that it is a re-used stela. This may be seen *in situ* in Figures 8.12 and 8.15. It is also certain that the northerly and southerly alley-markers were sculptured, and probable that the R-11b apron-marker was sculptured. No other stone sculpture and no stucco fragments were encountered. Painted decoration would have disappeared.

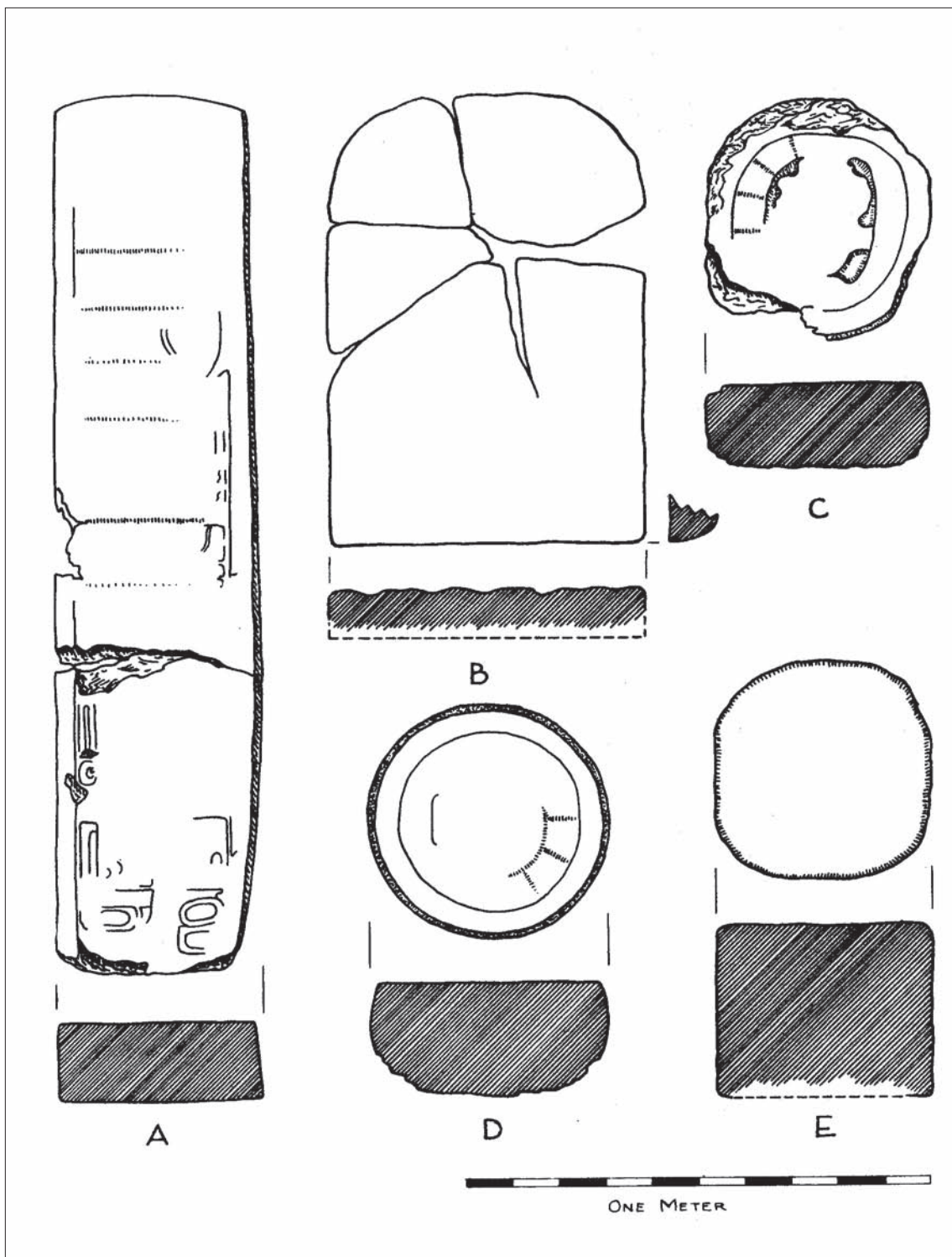


Figure 8.11 Drawings of markers: a. apron marker ("Stela" 45) of Structure R-11a; b. apron marker of Structure R-11b; c. northerly end alley marker (Miscellaneous Sculptured Stone); d. southerly end alley marker (Misc. S. S. 4); e. unsculptured central alley marker.



Figure 8.12 Structure R-11a, playing surfaces of Structure R-11a, looking west. Central alley and apron markers in situ. Alley at earliest floor level except at extreme left; note sloping veneer slabs and concrete bench top curving down toward observer.



Figure 8.13 Playing surfaces of Structure R-11b, looking south; apron and two alley markers in situ.

The Structure R-11b apron-marker may be seen *in situ* in Figure 8.13, where its four fragments can be identified by comparison with the drawing (Fig. 8.11, B). If unbroken, it would have been very striking in the photograph, by reason of its large size, compared with other slabs on the slope, and because of its rounded top. The positions of the fragments indicated breakage after placement, presumably after abandonment. Unlike the ordinary surrounding veneer slabs, its edges were tooled, not rough-chipped only. Its bottom edge is curve-beveled, recalling somewhat similar treatment of probable vertical panel stones, such as “Lintel” 12, or Miscellaneous Sculpture Stone 13. In addition to these specializing factors, this stone was thicker than the ordinary slabs, and unlike them had weathered to an uneven surface such as one expects in badly eroded reliefs.

The above factors, together with a fairly accurate central position, lead us to consider it a marker, probably sculptured. Against this interpretation one must weigh the fact that the two apron-markers differ very greatly in form; and also that Stela 45 was apparently set flush with the general apron surface, and could have been hidden by plaster. The alternative is to believe that two differing stones, both very much larger and heavier than the normal slope-veneering stones, one sculptured, the other Probably so, merely happened to be used in central positions on the aprons and nowhere else, their surfaces hidden under the plaster of the slopes.

We must dispose of the question of possible panels functioning as markers at the ends of the aprons with the remark that no good evidence for or against their existence was found, or properly searched for. Such markers, if existent, were not of the long stela-like type of Figure 8.11, A. Such stones, if placed opposite the end alley-markers, would have been found in place. If at

the extreme ends of the aprons they might have fallen to the end-fields, but scarcely could have broken to small unnoticed fragments. Such stones were certainly not placed at the extreme apron ends with their bases as close to bench level as in the known case. In three of the four possible cases, smooth slabs of ordinary thickness were still in these positions. More or less broken, these seemed to be larger than the average. One of them may be seen in Figure 8.12. It measured 1.2 m on the slope, 0.9 m in width. The others were 1.1 and 0.8 m high. Stela 45 was set with its base only 0.7 m from the bench, measuring on the apron slope.

However, end apron-markers of the Figure 8.11, B type might have existed in positions similar to that of the supposed central apron-marker on Structure R-11b which had its base about 1.1 m from the base of the apron. Veneering slabs were not in position at any extreme end, or opposite end alley-markers at this level. If broken, the special nature of their fragments could have been easily overlooked, since no special study of the nature of the debris in these areas was made.

Curiously, the central alley-marker differs from the others in several details. Its top seems not to have been sculptured. It is much thicker, and apparently bedrock had to be scooped out to get it at the correct level (see Figure 8.6a or 8.6b). In vertical section its sides are approximately straight but rather rough, while those of the other two are for the most part at least nicely worked, except toward the underside, and show a bulging tendency. They also seemed to be more truly circular than the cruder central marker.

The vestiges of sculpture are very disappointing and are, I think, sufficiently indicated in Figure 8.11. For the end alley-markers there was undoubtedly a central design with peripheral glyphs, though whether this

band formed a complete circle is at least doubtful. In the case of Stela 45, enough remains to indicate quite surely a double column of glyphs, with a narrow border, probably extending from top to bottom. Taking the four identifiable glyph blocks at the bottom and other identifiable glyph remnants and inter-glyph-block channel remnants into account, it seems probable that there were 14 blocks to each column, or else 12 in each, below a four-block introducing glyph, the latter being a possibility.

The top, sides, and back are nicely smoothed, the top slightly but definitely rounded. These factors, plus the all-glyph design recalling the four-column Stela 36, also with a rounded top and parallel sides, suggest an original stela, here re-used. Such an interpretation is now somewhat fortified by finding in fill at Structure R-9 the fragments of an even smaller stone, unsculptured, with a top only slightly rounded like this one, but with non-parallel sides and a rather obvious butt suggesting vertical erection. On the other hand, Stela 45 has no plain butt whatever for vertical erection. In 1932 we supposed this had been broken off, as appeared probable, with the stone in position. But in 1933 it was taken out and has been left on the bench. The broken character of the base holds good only near the face; the bottom is elsewhere nicely worked and even somewhat rounded, like the top. A plain butt might have been removed for some unknown reason, perhaps to allow slight elevation of the inscribed portion only, above the apron face, though it seemed to be set flush. However, the bottom was completely hidden by the apron fill and its tooling at this time would seem meaningless; it probably never had a plain butt. If it did not have, it is very doubtful if it ever stood vertically and free, like a stela as ordinarily conceived.

A fair deduction from the facts presented seems to be that the term Stela 45, with quotation marks indicating doubt as to stela function, is a proper modification of the straightforward Stela 45 already used in print by Morley, while the hypothesis of re-use is fortified by the finished nature of the bottom. Such re-use, in turn, fortifies our central apron-marker interpretations for both structures. That for Structure R-11b, if sculptured, was a stone of the same general slab-character as a central structure-marker found in the other ballcourt, Structure K-6; the R-11a marker may differ so decidedly from it because of a desire to incorporate and preserve a pre-existing inscription.

Abandonment of a hypothesis that the alley-markers may have been set in depressions in the alley floor, suggested in the 1932 report, has been noted elsewhere. Northerly and southerly alley markers have been designated Miscellaneous Sculptured Stones 5 and 4, respectively.

Maximum dimensions of the markers, in meters, are given in Tables 8.3 and 8.4.

In view of the possibility of use of end-fields, or parts of them, as playing surfaces, it was considered worthwhile to search for markers there. Excavation over a large area, made it practically certain that the three alley-markers were the only field ones, at least of imperishable materials. There were definitely no imperishable center markers on the benches, as found by Morley at Yaxchilan.

Orientation

The long axis runs about 29 degrees east of true north. The short one runs about 35 (instead of 29) degrees north of west, because of parallelogram distortion of about 6 degrees. The general northeast and northwest orientation is the same as that to be seen as a general rule in the South, East and West Groups. All indications are that this general trend is due to application of the rectangular court and plaza idea to a broken natural terrain. For both this court and the West Group ballcourt (Structure K-6), the northeast-southwest line was chosen for the longer axis. This has no necessary symbolic significance. In each case this resulted in a good view of the playing surfaces, from vantage points on structures which may have been nearby at the time the court was laid out. Here, this could have been Structure R-7-2nd; in the West Group, one of the phases of Structure K-5. We have here no support for a theory that there was a special rule for orientation of ballcourts with respect to the cardinal points. Had it been desirable to run the long axis of Structure R-11-2nd-B toward true north and south, that could have been done with little or no extra labor.



Figure 8.14 Cut section through alley floor exposing veneer slabs of Structure R-11b bench face. Brush on final floor; note plaster of bench overriding slabs, which also appears at lower left in Fig. 8.13.



Figure 8.15 Apron marker (Stela 45), Structure R-11a in situ (trench at observer's left).

Dating

Failure to find plaster or the crushed stone remains of concrete floors under any of the units of R-11-2nd-B leaves little doubt that it is the first masonry structure ever erected on this spot. The conclusion is supported by frequent instances in which walls of this phase seemed to rest directly on bedrock, while walls at later phases did not.

If Stela 45 was a re-used stone, as suggested by its dissimilarity to the other apron-marker and by the tooling of its bottom surface, the court surely does not date back to the very beginning of the site. There are inconclusive hints that the 2nd-B phase was, however, quite early. According to Morley, this stone exhibits early glyph-style characters, and if, after all, it is a re-used stela, in proportions it is most like a unique plain one broken up and buried at Structure R-9. There are some grounds for thinking that the latter stone was fairly early. This stone therefore permits a fairly early date for this court.

Ceramic finds were pitifully few, and dating on that basis cannot be attempted here. However, a few suggestive facts may be noted. The caches in Positions 1 to 5 were in Unit Ls (R-11-2nd-B). The vessels at Position 3 are illustrated in Butler (1935, Plate VI.1-2). A sherd of what could be the twin of the mat-design bowl was taken from clay on bedrock below the well-preserved floor of the earliest Court I level on the Acropolis, which marked the first of six major construction periods there. Types

which seem to appear only in later constructional periods there, including lipped bowls and orange-bar decoration, were present here in Position 8 (see Object Table). These might be later than any of our ballcourt constructions; they at least suggest that the site of this structure was not abandoned before others. This of course is no proof that it was in use as part of a ballcourt down to the time of abandonment of the city. My impression is that the various phases of the court cannot be dated with the meager number of sherds recovered, and because of the uncertainty arising from lack of well preserved floors. But early and late sherds are present, and special excavation with such dating in mind might be successful. We can say this much: unless the caches in the Unit Ls part of the southerly playing field were late intrusive deposits of out-of-style bowls, the earliest phase probably goes back to a time within the period of Butler's Polychrome E. This is associated elsewhere with tripod flanged, bowls and plain slab feet.

Function

The ballcourt function of Phase R-11-2nd-B cannot be doubted. However, the marked differences in disposal of playing surfaces, when compared with those of the other ballcourt, Structure K-6, cause one to wonder if it did not finally become obsolete as a ballcourt. If it did, the structures, certainly never removed, might have eventually been used as bases for buildings having nothing to do with the game. Most additions to the original form of these structures can be interpreted, if one wants to speculate as making them more like ordinary building substructures than they were before, as seen from outside the court proper. So I do not think the later forms should be taken as surely representing what one might call local "ballcourt architecture."

The marked differences in the approaches to the R-11a and R-11b tops in the later phases may be mentioned in this connection, and also the difference in character of debris on the respective tops.

Table 8.5 Structure R-11 Average Dimension Table: Structures

Structure	R-11-2nd	R-11-1st
Bench Height	0.8*	0.7*
Bench Depth	3.8*	3.4*
Bench-Face Height	0.8	0.7
Bench-Face Slope	**	Same
Bench-Top Slope	0.0	Same
Apron Height	1.8*	Same
Apron Depth	1.5*	Same
Apron Slope	36 degrees	Same

* Dimensions depending on reconstruction.

** Bench face curved in cross-section. Effect is of very gentle slope.

Table 8.6 Structure R-11 Average Dimension Table: Alley

Alley	R-11-2nd	R-11-1st
Width	3.5*	4.3*
Length (equals length of benches)	18.0	18.0

Table 8.7 Structure R-11 Average Dimension Table: End Fields

End Fields	R-11-2nd	R-11-1st
Short Dimension	11.1	17.0
Long Dimension	27.1	21.0

Table 8.8 Structure R-11 Object Table (Operation S-1)

Position	Sherds	Figurines	Cache Contents	Eccentric Obsidians	Remarks and Miscellaneous Objects
1	-16	-16	-16		Cache was of bowl, eccentric obsidians
2	-18				Cached bowls (two, polychrome)
3	-19		-19		Cached bowls (two, polychrome)
4	-20				Cached bowl (possibly two)
5	-24				Cached bowl
6				-50 -51?	-7 (spindle whorl; -53 (bone)
7	-8; -9				
8	-6; -47	-44			-41 (bone); -42 (hammerstone?); -45 (pottery disk); -46 (pottery rectangle); -48 (mano stone)
9	-40				-40 (pottery object, obsidian, shells)
10	-28; 35	-25; -26; -27; -34			-29 (bone); -30, -31 and -36 (flint points); -32 (mano stone); -33 (flint and obsidian). Discarded red pebble, pumice stone.
11		-49			
12	-11; -12; -15	-11; -13			
13		-17			
14	-52	-1; -2; -3; -4; -5			-23 and -37 (pottery disks); -38 (fragment of metate?); -43 point

Note: Pottery disks are cut from sherds.

Key to Position Numbers

1–5—Horizontal positions indicated by nos. 1-5 in Figure 8.10. Vertical positions: 1, not noted; 2, in crushed stone floor material which rested on fill of Unit Ls; 3, same; 4, level not noted; 5, in floor material. Despite incompleteness of record, no reason to doubt all five positions are those of caches in Unit Ls, but proof lacking as to when made; cache at position 2 was surely of one bowl inverted over another. 6—In or below Unit Ka (center trench); sherds and spindle whorl may date with or before this unit. 7—In or on Unit Ls. 8—In or on Str. R-11a, top. 9—Same, northerly corner of Unit Da; probably a cache, hence probably in Unit Da. 10—In debris just right of Unit Da stairway wall, 30 cm above Unit E floor. 11—In or on Str. R-11b, top. 12—In debris from Strs. R-11a, R-11b, or in or on Unit L. 13—In or on Unit Bs or Str. R-7b-1st. 14—At Str. R-11, precise location unknown or doubtful.

Future Work

It would be of some interest to know whether either of the end-fields in the earlier 2nd period was originally raised on three, and not merely on the two known sides. If half of the rear face of Unit Ka were laid bare, the function of the projecting stones found at center might be determined; if others appeared and showed a pattern, stucco decoration would seem likely, and actual remnants of it might be found. Care in such an excavation might prove presence of cached pottery in the later addition, of which we already have uncertain evidence. To learn these things, several days and several workmen with equipment would be needed. On the other hand, a very little digging ought to confirm or disprove our reconstruction of a shouldered stairway in Figure 8.3. A small amount of digging, with care, following the walls of the early end-field Units Ln and Ls below Unit E might settle the interesting question whether the tops of the early end-fields disappeared in the next period. This last question would have some bearing on the interpretation of ballcourts elsewhere, and the answer should have been sought. The other unknowns mentioned do not seem important from this point of view. Accurate heights of the bases of playing surfaces at various points could be quickly secured with a leveling instrument, and should have been taken, for the same reasons mentioned under this heading in the description of Structure K-6 (Tables 8.5-8.7).



Figure 8.16 Trench through late fill and debris of R-11b and Structure R-12 to show earliest rear wall and remnant of stair sidewall of Structure R-11b (R-11-2nd-B phase).

Masonry Notes

Fills

Pure broken rock, Units Ka, Da. The rock is all small in the shallow fill under the bench and only there; rests partly on solid earth and stone layer which may have been accumulated in preliminary leveling of fields, and which forms base of the fill under bench (Fig. 8.6a). Pure broken rock also used in building up part of northerly end-field. Solid earth and stone fill used for Unit L, where seen. Excavation insufficient to reveal fill walls, if present.

Walls

Outer or rear walls of Units Ka and Kb known from satisfactory exposures (Fig. 8.16); for the most part of medium-sized tabular blocks, with chinking. Laid dry (unless mortar had leached out). Impression is one of well-made dry wall; remnant of plaster surface in place proves it was plastered. Dry-laid effect not seen elsewhere. Exposures of other well preserved sections of wall unsatisfactory. Tabular stone used throughout. Ends of Units Ka and Kb seemed to tend to use of longer stones.

Concrete

Benches surfaced with thick layer of very hard concrete, for the most part well preserved. Concrete floors topping Units Ka and Kb also in good condition, better on Ka than on Kb, but those presumably topping Units Da and Db were disintegrated and remains not evident, presumably having percolated downward into the fills. Less durable type of concrete in later phase thus indicated. Crushed stone remains of concrete floors seen for Units L, H, B (base surfaces) and for Units I and E. No reason to doubt that all floors were concrete except possibly in some places where leveled bedrock may have been left exposed and served as floor-surface.

Bench Faces

Concrete continuous with that of tops; at base plastered sloping veneer-facing of thin slabs on solid fill. If bench concrete had disintegrated, the stone-clad slope effect of Blom would have remained, but not to full bench height.

Apron Faces

Sloping veneer of thin slabs; where seen in section (Unit Ka), facing rested directly on pure broken rock fill.

Plaster

Remnants seen at stair-angle of Unit Kb; at junction of bench-top with apron face of Unit Ka, proving apron face was plastered; and on face formed by side of Units J' and I', extending across the line of juncture. All plaster noted was relatively thick; no fine finishing plaster noted as surviving. Note: In the section-drawings of this

ballcourt, solid lines over crushed-stone symbol indicate clearly recognizable surface of still hard concrete, but not finishing plaster on it. Finishing plaster would not be

expected to have survived anywhere on this structure, and the survival of some of the concrete in good condition is surprising in such exposed positions.

3. STRUCTURE K-6: THE WEST GROUP BALLCOURT

Linton Satterthwaite

Preliminary Remarks

The ballcourt function of Structure K-6 was apparently first suggested by Lothrop, his opinion being based on Ricketson's delineation of twin mounds (K-6a and K-6b). On the unpublished Ricketson map they were known as Structures XXXVII and XXXVIII. They were mere mounds then and when we first saw them, no masonry whatever being in evidence. An excavation had been made through the top of Structure K-6a. We later found a sherd at this court with the incised notation "CAR. INST. MAY 1921" and Ricketson's initials, and presumably the excavation was made by Morley and Ricketson. This cut was at center, and proceeded back from the bench-top.

In 1931 Mason determined the absence of alley-markers; in 1932 the writer found the bench faces to be vertical. A short note recounting these facts was appended to *Piedras Negras Preliminary Paper* no. 2 [Chapter 2, this volume]. In 1933 the writer undertook what seemed at the time a reasonably thorough examination. The mounds were bushed, except for a tree or two (Fig. 8.23), and ends and all playing surfaces of the structure were followed in their entirety, or until they gave out. Structure K-6a was trenched at center to full depth, the top of the trench showing as a dark line in the figure. The surface of the alley and of a narrow strip along the ends of the structures was taken down below wall-base level, principally to make absolutely sure of the absence of stone markers in the alley.

Unit Designations and Temporal Sequences

Three pairs of sequent constructional units make up the final structures, and define as many phases. For identification on the drawings these units are lettered C, B and A, in order of time, with small letters attached to indicate whether on Structure K-6a or K-6b. The capital unit-letters correspond to the phase letters in the designations Structure K-6-C, Structure K-6-B' and Structure K-6-A. There were, without much question, at least two floor surfaces on the alley and adjacent parts of the open end-fields. The earliest ballcourt units (Ca and Cb) were almost certainly later than the earlier of these floors, and later than what seemed to be a remnant of some

earlier structure on it (Fig. 8.19a). Hence the earlier floor is considered to be a general plaza floor which was in use for some time before the ballcourt was built on it. We do not know whether the resurfacing occurred as part of the activity of ballcourt construction or not. It occurred after the bench faces (of Units Ca and Cb) had been built, since they are based below its surface. But we neglected to ascertain its time relation to the later increments.

Remarks on Drawings

Walls could be followed everywhere at field and alley level, but for the most part were in good condition only near this level. None stood to full original height. Stop-surfaces behind the bench could be followed except near the ends, but above the first course or so were in very bad condition. Hence there is little imagination needed in reconstructing the basic plan, but full reconstruction requires a good deal. All satisfactory parts of walls seemed to be vertical. But except for the rear of Unit Ca, the surviving height seen was too little to assure positively that there was no slope whatever, and even there a possibility of movement of a steeply-sloping wall to vertical position should be allowed for. However, this wall was seen at a corner (Fig. 8.24) as well as at center, and to fair heights. Everything noted indicates true verticality throughout.

Figure 8.17. The broken-line reconstruction illustrates a failure to follow the rear of at least one of the C units from a corner to center. The reconstructed rear projection, common enough on temples, must here be taken as a suggestion only. It accounts for the following facts. At all four corners a veneer-like secondary wall, about 30 cm thick, had been placed against the rear of the C unit, its end flush with the end of the C unit. These additions are labeled Ba and Bb in Figure 20. They were not properly investigated. But photographs of the two southerly rear corners show rather clearly that the division line between the C and B units does not quite reach the base level of the earlier, in either case. The secondary unit, Ba, was not found at center (Fig. 8.19a). But, according to the cross-section, the rear of Unit C at the section line was on a line joining the corners (above

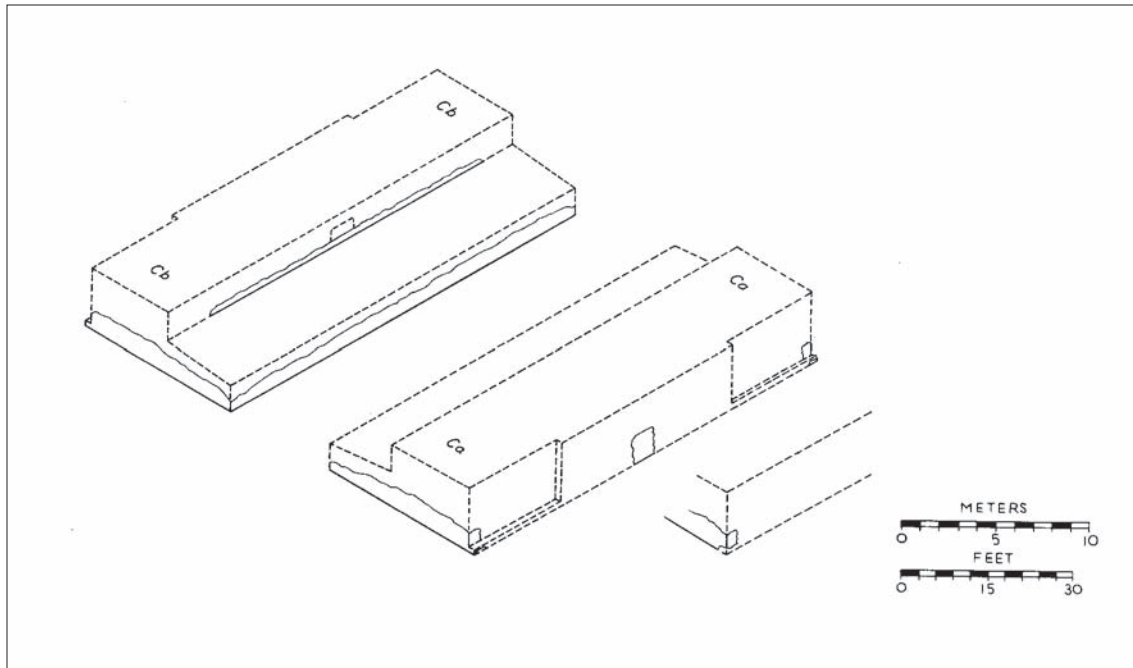


Figure 8.17 Isometric reconstruction Phase C of West Group Ballcourt Structure K-6a at right, Structure K-6b at left, with alley between. At extreme right, alternative reconstruction of rear of Structure K-6a.

base level) formed by the additions. It is thus restored in Figure 8.18. Unfortunately, while corners were located by Parris with the instrument, location of the Unit C wall in the section depends only on a taped measurement by the writer.

Rear projections on temples probably reached here from the direction of the Petén. By way of hypothesis we might suppose this sloping bench type of ballcourt structure did likewise. It is therefore important not to use the suggested Petén-like rear projection as a satisfactorily established trait on this ballcourt. To discourage such use an alternative simple and possible reconstruction is suggested in part at the lower right in Figure 8.17. However, the main drawing presents a reasonable explanation of otherwise not understood facts.

For doubts as to the exact placement of the panel-marker in the stop-surface.

Figure 8.18. If Units Aa and Ab in this figure were removed and lines hidden by them supplied, this figure would show the supposed simplified form of the structures in Phase B. It is supposed that this consisted merely in blanking out the hypothetical rear projection of Phase C. In the final phase, Units Aa and Ab were added, and we show these as found, ruined except near the base. Whether they rose to full height or not could not be determined.

Figures 8.19a and 8.19b. Figure 8.22a is a composite cross-section. The bench face, the rear wall of Unit Ca and the early court floor are at center, and only here was the fill cut through, as indicated by hatching. The surface line and the section through the stop-surface wall and bench top were carefully measured on a line several meters southwest of center, where preservation was better. This fact may contribute in part to a difference of 23 cm in the maximum height of the bench here, as compared with that of the other structure (Fig. 8.19b). Despite this difference, total heights are reconstructed as identical. This seems required by the nearly identical maximum surviving heights of the rock fill behind the benches, though it results in a stop-surface slightly higher for Structure K-6a than for Structure K-6b.

In contrast to alley and playing surface sections, for which heights at short intervals were carefully taken, the early floor below Unit Ca is merely assumed as level. Unit Aa was seen near center (though undoubtedly carelessly dug through there); it is left hanging in the air since we do not know whether it was based on the early floor or on a later one.

The slope of the bench top used in the reconstructions accords with that of the indicated small remnant of concrete, which dropped 10 in 100 cm. A bench-face height of about 1.2 m results. The maximum surviving height, not at this part of the structure, was 84 cm. A

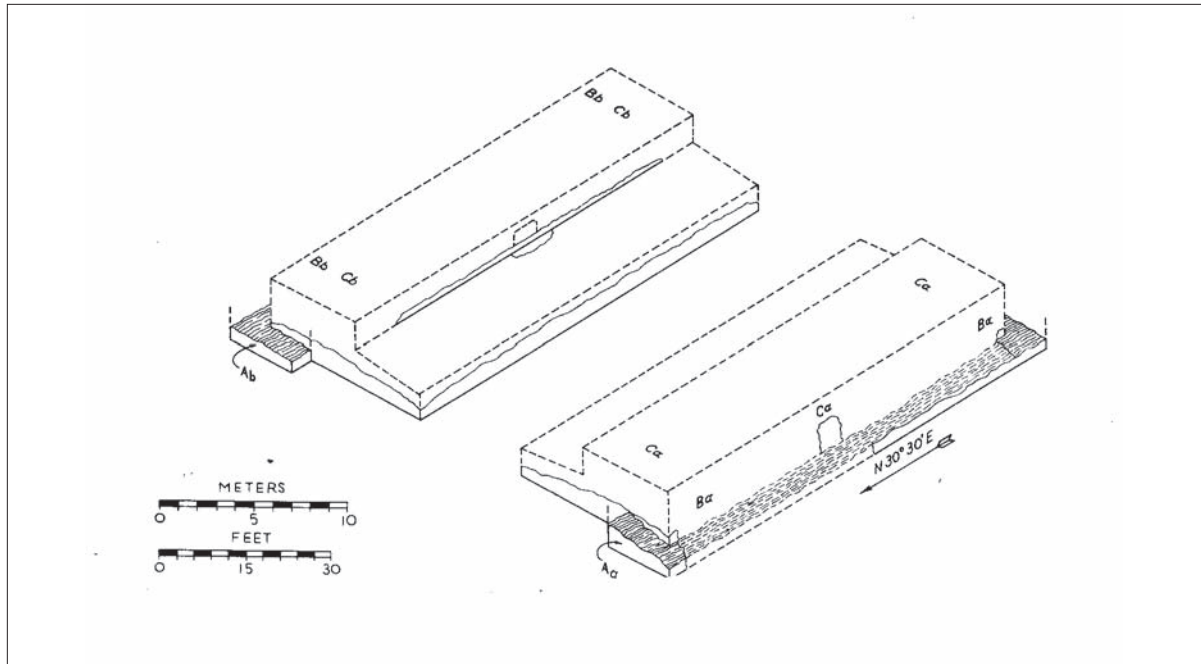


Figure 8.18 Isometric reconstruction, Phases B and A of West Group Ballcourt. Letters refer to constructional units described in text. Reconstruction of Phase A (Units A_a and A_b) incomplete.

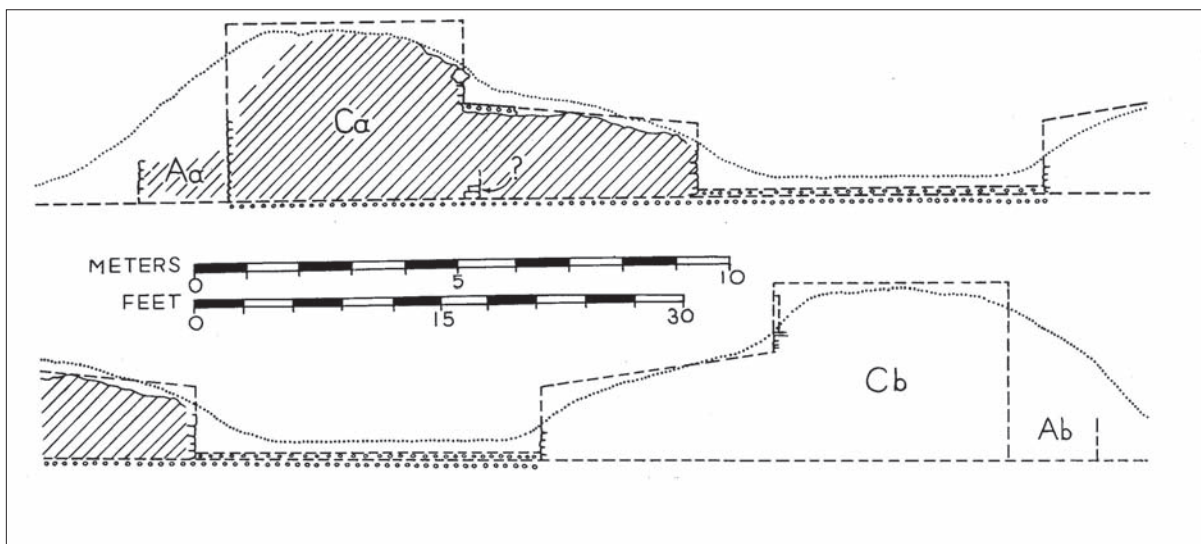


Figure 8.19 a. Cross section, Structure K-6a and alley (all phases); b. cross section Structure K-6b and alley (all phases).

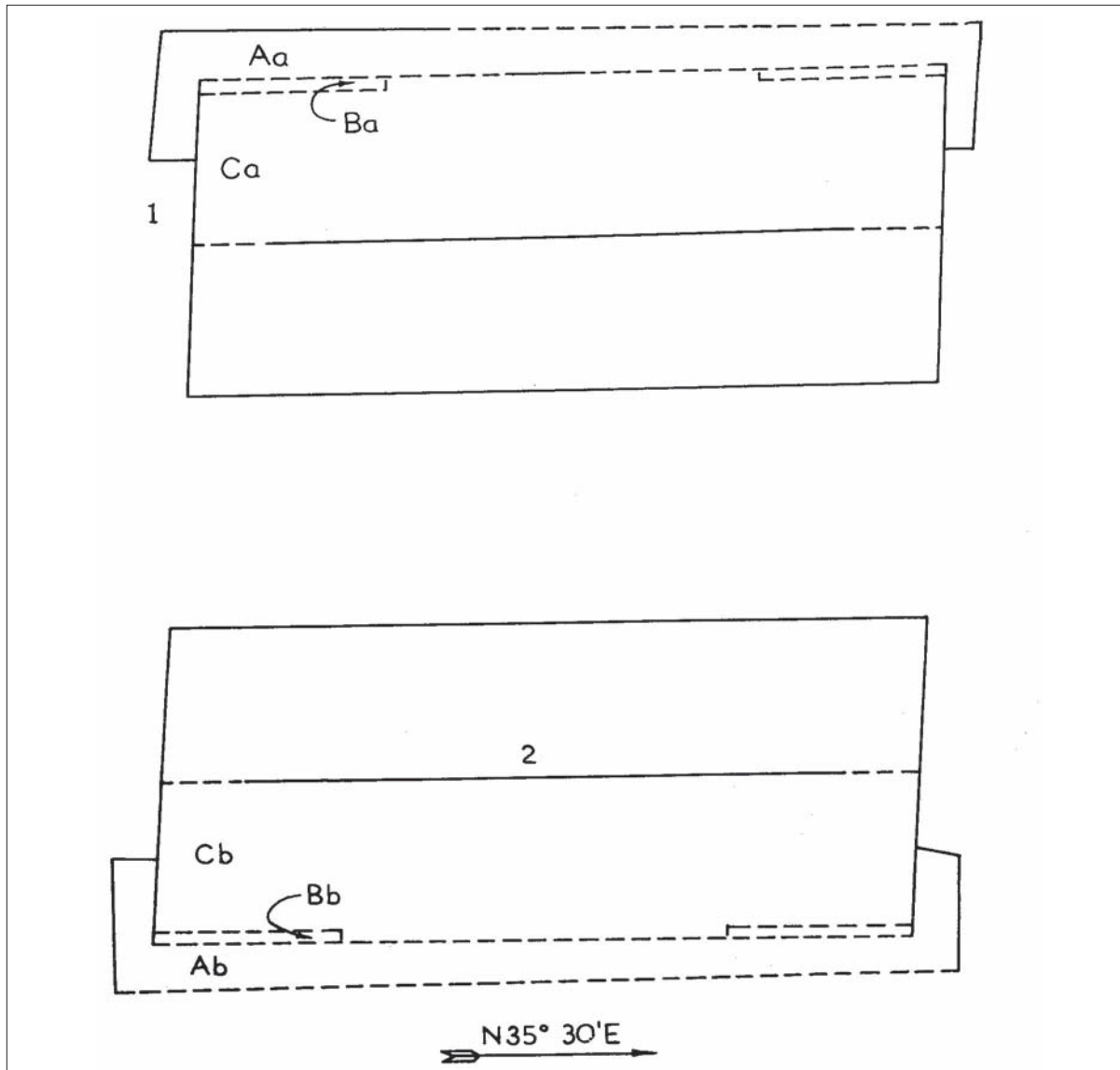


Figure 8.20 Plan of West Group Ballcourt, Structure K-6a at top, K-6b below with alley between. Lettered units of all phases are shown.

gentle slope of something near that adopted is confirmed by the maximum surviving height of rock fill just behind the bench face. In the figure the top of the fill, i.e., of broken rock apparently in original position, is indicated by a wavy line limiting the hatching for Unit Ca. This line represents the situation in the same vertical plane as the surface line and the section through the concrete.

The same bench height is arbitrarily used in Figure 8.19b, but the bench top reaches a point measured as 23 cm higher than the corresponding one in Figure 8.19a. The result is a slightly steeper slope in Figure 8.19b (Structure K-6b). Figure 8.19b is not composite, and represents the situation as found at center only.

Rather than scaling bench dimensions from these sections it seems safe to say that they are both about 4.4 m deep, average about 1.9 m in total height, and that the average bench-face height was something over 84 cm, with the actual average height surely at least a meter and probably somewhat more. As reconstructed, the bench height is 1.2 m, the resulting slope only about 6 degrees. If the average bench height is taken as only a meter, the resulting slope would be about 11 degrees. Probably the intended slope was somewhere between these, and very likely it varied somewhat in different parts of the structures.

Figure 8.20. The plan shows walls of all phases, at or near base level of the element concerned. It is founded on points indicated by circles in Figure 8.21, which were carefully located by triangulation with instrument and check measurements, except that location of the exposed section of the rear wall of Unit Ca is based on taped measurement by the writer. Apart from this last item the plan is by Parris and considered to be quite accurate. The numbers 1 and 2 indicate the approximate locations, as found, of Miscellaneous Sculptured Stones 9 and 10, respectively.

Figure 8.21. This diagram is a projection, from Figure 8.20, of Phase C points located by Parris. See under Measurement.

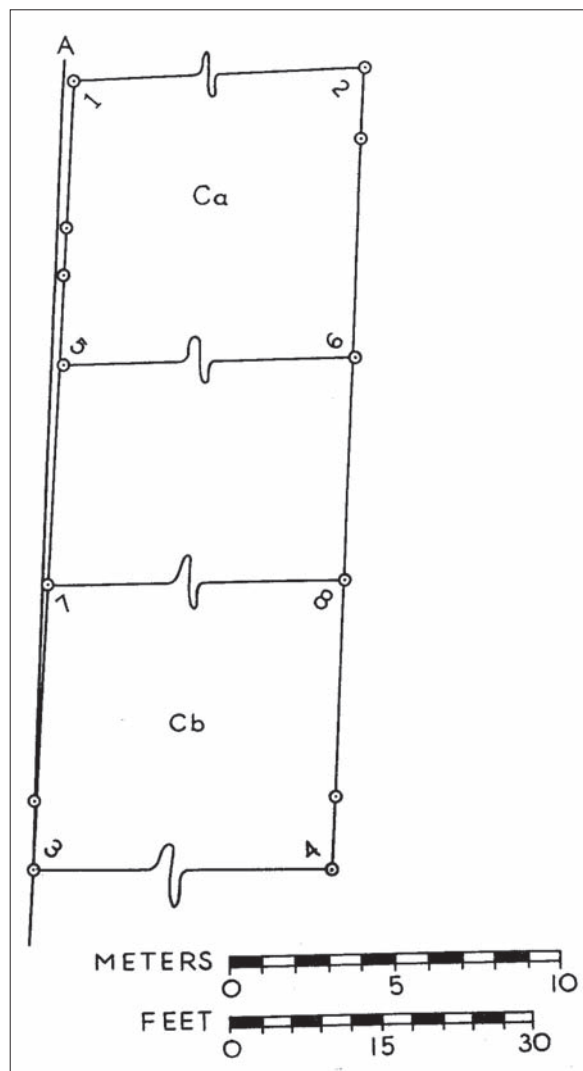


Figure 8.21 Diagram showing projection of points on Units Ca and Cb to illustrate parallelogram distortion. Line A-to-3 is parallel to Line 2-to-4.

Measurement

For the plan of Phase C included in Figure 8.20 Parris located 20 points with the instrument. Fifteen of these were at or close to field level, and of these, 13 were on the ends of the structures. In Figure 8.21 these 13 points are selected and shown as if projected to the left from Figure 8.20, and are made the centers of small circlets. Of course they occur approximately on two lines, and to save space the two lines of points are brought closer together than in the plan of Figure 8.20. Otherwise Figure 8.21 preserves the correct relative positions of all points shown. Those given the numbers 1 to 8 in the figure are at corners, the rear or outer ones (Points 1 to 4) being slightly above field level. Thus we avoid the somewhat doubtful question of whether during this phase the rear corners at field level were in line with the supposed central rear projection. In the diagram the outer or rear corner points (Points 1 and 3, and 2 and 4) have been connected by straight lines.

If the Maya had laid out the structures perfectly and had then built exactly to the line, then with perfect surveying and drawing on our part the geometric figures 1-2-5-6 and 7-8-3-4 would be exact rectangles, and all points located would fall on lines 1-to-3 and 2-to-4. The circlets are intended to aid one in noting discrepancies from this ideal situation. The structures are undoubtedly close to bedrock and there was no evidence of appreciable movement of any of these points, a factor that we shall therefore disregard. Of course the surveying and subsequent drawing were not so accurate as the most refined techniques might have made them, but were done carefully with the thought that conclusions might be drawn. Figures 8.20 and 8.21 probably present approximately true pictures of the Maya deviations from the ideal.

Both Points 5 and 6 (on Unit Ca) lie somewhere between 5 and 10 cm north of Lines 1-to-3 and 2-to-4, respectively. Point 7 and the unnumbered point between it and Point 3 (on Unit Cb) lie about 5 cm south of Line 1-to-3. The other unnumbered points lie too close to Lines 1-to-3 or 2-to-4 to permit estimate of the amounts of discrepancy if any.

Line 3-to-A has been drawn through Point 3, parallel to Line 2-to-4. It passes south of all the located points of the southerly series except that nearest Point 3. It brings out the fact that the figure 1-2-3-4 is not a perfect parallelogram. Considering Line 3-to-4 as a base, side 4-to-2 makes an angle of about 93 degrees to this base, while side 3-to-1 makes an angle of about 94 degrees to it. But the figure closely approximates parallelogram form, both divergences from the expected right angle being in the same direction.

Table 8.9 lists measurements, in meters, scaled from the original Parris plan, drawn at scale of 100 to 1. These figures were obtained without benefit of special equipment for great accuracy in reading.

Table 8.9 Structure K-6 Metric Dimensions

	Unit Ca		Unit Cb		Alley		Units Ca-Cb Outer Corners	Ca-CB Corners
Depth	1-5	8.5	7-3	8.6	5-7	6.6	1-3	23.8
	2-6	8.6	8-4	8.7	6-8	6.7	2-4	24.0
Length	1-2	21.2	7-8	21.5	5-6	21.2	1-2	21.2
	5-6	21.2	3-4	21.5	7-8	21.5	3-4	21.5

On the basis of Table 8.9, so long as we consider only one structure at a time, lines expected to be equal are so within a discrepancy limit of about 10 cm. This also holds good for the two structures considered together as to depth lines, but not as to lengths. The Ca unit bench-face (Line 5-6) is 25 cm shorter than the Cb bench face (Line 7-8). The rear of the Ca unit does not compensate for this discrepancy but adds to it, Line 1-2 being the shortest length of all. This, when compared with the longest, Line 3-4, gives 35 cm as a maximum discrepancy from expected correspondence in linear measurement.

How much may eventually be deducible concerning the Maya method of laying out this court I do not know. What was learned concerning the facts is presented for what it is worth. A stumbling block is lack of any way of knowing how faithfully the actual builders may have followed lines laid down for them. It appears to me necessary to believe that at least cords were used to translate the length of an element, once established at one place, to other places where needed. Neither judging with the eye nor even pacing, seems a likely method of producing repeated correspondences within 10 cm of identity, some between lines as much as 22 m long. Differential stretching of such cords might account for some of the discrepancies noted. A shifting from one established line to another when stretching the cord for use at a third place might result in a final error greater than any single one.

Suppose Lines 3-to-4 and 4-to-8 were first established as the rear and one side of Unit Cb, by pacing or some other method, resulting in the obtuse angle of Figure 21. Then let two men stretch a cord from Point 3 to Point 4; let one then carry his end to Point 8 and let the other carry his end to the neighborhood of Point 7. If, drawing away till the cord was taut, he merely estimated the correct position for Point 7 by estimating a right angle to Line 8-to-4, the resulting angle at Point 8 might be right, acute, or obtuse. The resulting angle at Point 3 would be acute, and Line 7-to-8 would equal Line 3-to-4; but only by chance would Line 7-to-3 be equal to Line 8-to-4. It would seem natural for another pair of men to stretch a cord from Point 8 to Point 4, one end then being carried

to Point 3, the other to the neighborhood of Point 7. If the two men there then brought their cord-ends together, they would have Point 7 at the proper distances from Points 8 and 3, apart from small errors creeping into the process. This much geometrical construction must, it seems to me, be allowed to these Maya, in order to account for observed facts,

Such a process, with perfect linear measurements, must produce a figure with opposite angles equal. It would be a rectangle if the original angle was 90 degrees, a parallelogram if not. Since the linear measurements, if it is granted they were made, were quite obviously not perfect, the process would produce only approximations of perfect rectangles or perfect parallelograms. The latter we find here, as we did at the South Group Court. An occasional nearly perfect rectangle, resulting from nearly perfect estimate of the first angle, would not be unexpected.

The amount of distortion from the ideal rectangle must, with imperfect but reasonably accurate linear measurements of the sort just postulated, correspond by and large at all corners, but should not correspond exactly. As to direction, and approximately as to amount, the angular/error would everywhere be determined by the angle between the first two adjacent sides laid out. If this angle was judged with the eye, without benefit of geometrical construction, one would expect it to vary within limits from structure to structure, though all were intended to be truly rectangular. That is the situation when we compare the distortion here, 3 to 4 degrees, with that at the South Group Court, where it was 5 to 6 degrees. This difference in amount of parallelogram distortion, in structures of the same function, argues against the mere logical possibility that parallelogram plans were actually desired and purposely constructed.

Our tentative conclusion from the data here presented has been that parallelogram plans were inadvertently constructed as a result of estimating the first angle and thereafter controlling the plan with fairly accurate linear measurements. The latter, however, need not necessarily have involved use of standard units of linear measure. It is implied that a standard of length for each like element

was determined upon for the structure being laid out. This length could be recovered at any time by stretching a cord along the first such element constructed, or a cord might be knotted for this particular length for use wherever needed thereafter.

This bit of theorizing is inserted in a factual portion of the report by way of exception. It seemed wise to justify as far as possible the parallelogram principle which we use extensively in other reconstructions, without waiting for publication of sections of the report set aside for interpretation.

Cord measurement of the simple sort postulated could very easily be adapted for the purpose of getting the stop-surfaces one-half way to the rear of each structure. The plan of Phase C shows that they are so placed, within a few centimeters, if the supposed rear projection is disregarded. To accomplish this for Unit Ca, the structure having risen to full bench height, one had only to stretch a cord from Point 1 to Point 5, double and stretch along the wall from either Point 1 or Point 5. This would give the horizontal position of one end of the proposed stop-surface at field level. It could be translated to the proper level with a stone tied to a string, i.e., with a plumb line. And so for the other end. If the higher point was located above the lower by sighting without a plumb line, resulting errors would affect the plan very little.

Table 8.10 Structure K-6 Alley Dimensions

	North	South
Unit Ca	6.5	6.6
Alley	6.7	6.6
Unit Cb	6.5	6.5

When we come to Phase A we find that the rear addition has been carried around each corner so as to leave a constant amount of the original ends still exposed at field level. A symmetrical arrangement is what one would expect, but the particular amount of old wall left exposed may possibly be significant, it is equal to the alley width. To obtain this distance one had only to stretch a cord between the bench corners and use the cord as the unit in measuring back along the ends from each corner. To check the degree of accuracy with which this may have been done in the latest phase, measurements scaled from the original Parris plan are listed below (Table 8.10). The alley widths at north and south ends are compared with lengths of those portions of Units Ca and Cb left exposed during Phase A (Table 8.10).

At the north, if the northerly alley-corner distance was taken as the unit there, the discrepancy is as high as 20 cm. But if the southerly distance (6.6 m) was taken

as the unit, the cord knotted and the same cord-length used throughout, the maximum single error at this time comes out as minus 8 and plus 10 cm. We should remember that our own techniques of measuring what was built are subject to error, and builders in rather crude tabular masonry probably would not follow established lines with exact precision.

Unless Parris has made a bad blunder, the Maya were very careless during Phase A, at the north end of Structure K-6a. The amount of projection of Unit Aa is quite constant at three of the four ends of the structures, but differs sadly here.

No walls survived to the top edges. Accurate levels at the bases of stop-surfaces were taken at only one point for each, these differing by 23 cm in height. At neither was there any particular evidence of settling. Levels at various points of the other wall bases were not taken, so we cannot say whether this discrepancy, or part of it, was due to slight slopes in the original plaza floor. However, the maximum surviving heights of rock fill behind the stop-surfaces were identical (measured as 3.16 and 3.17 m above the same zero point at base of Unit Ca bench). The meager data available suggest that correspondences in level were not very accurate, except by chance.

Proportions

Disregarding small discrepancies discussed under Measurement, and a probable central rear projection, the depth of the bench during Phase C was equal to the depth of the structure top proper. Using average values of 6.7 m and 21.3 m, respectively, the alley width was about 31 percent of alley length. Taking the average distance between stop-surfaces as 15.3 m, the alley occupied about 43 percent of the area between the structure stop-surfaces. During Phase A a rear modification encroached on the original ends, but left the latter still exposed in amounts each equal in depth to the alley width.

Table 8.11 Structure K-6 Average Dimensions Table: Structures

Bench height	1.9
Bench depth	4.4
Bench-face height	1.2*
Bench-face slope	V
Bench-top slope	6 degrees*
Stop-Surface Height	2.9*
Stop-Surface Slope	V

*Note: Starred dimensions are approximations based on reconstruction. Bench top slope is possibly somewhat greater but less than 13 degrees. V means approximately vertical.

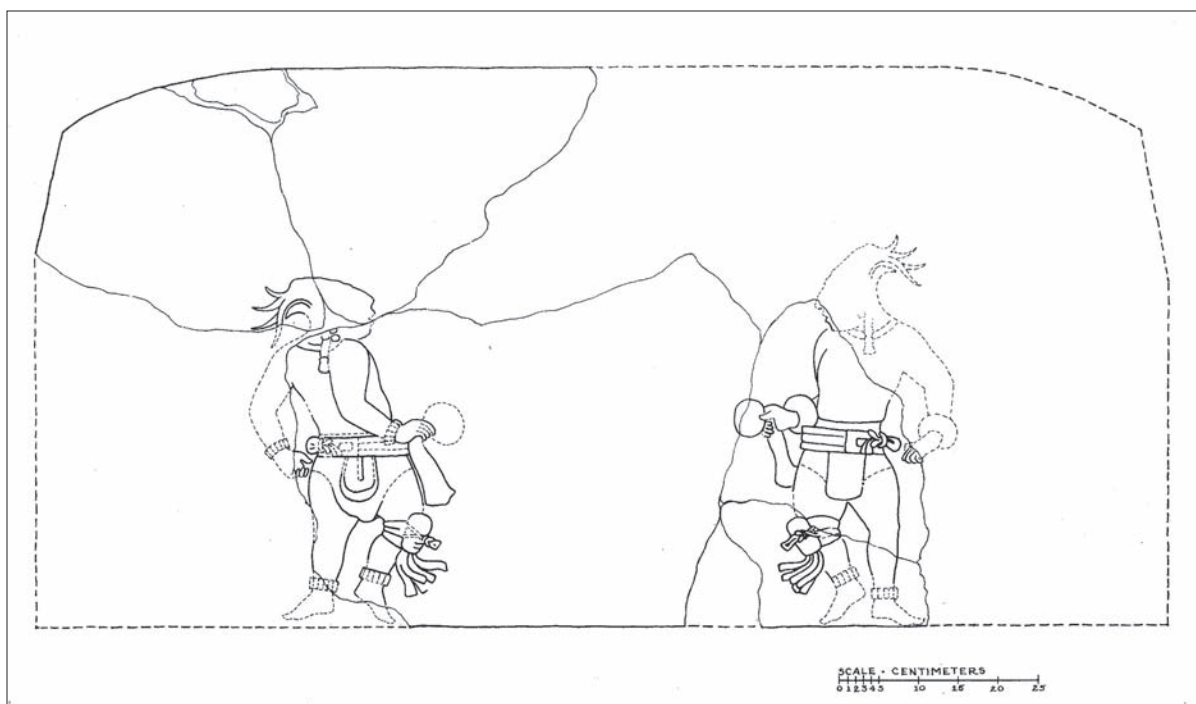


Figure 8.22 Drawing of fragments of stop surface marker from Structure K-6 (*Miscellaneous Sculptured Stone no. 10*), with reconstruction in broken lines, after Proskouriakoff.

Markers, Sculptural Decoration

As already indicated, the search for stone alley-markers was thorough, and negative in result. Since everywhere at field level the floor had disintegrated to mere crushed stone and earth, nothing can be said as to presence or absence of painted or plaster markers, or lines of perishable materials.

The panel illustrated by the reconstruction drawing of Figure 8.22 undoubtedly marked the center of the K-6b stop-surface, almost surely placed with its base 35 cm above the juncture of this surface and the bench. Here at center, and here only, the stop-surface survived with a level top for a length of about 1.9 m. The reason for this even-top survival was a course of slabs, 35 cm above the base, which acted as headers into the fill. Obviously this strengthening effect was not their only intended function, or they would have been found elsewhere than at center. They undoubtedly were placed here, partly if not entirely, to give an even level bearing for the marking stone. About 2 m from this line of slabs the wall was noted as surviving to a height of 60 cm. Such slabs were not seen elsewhere in this wall, or in the corresponding one on Structure K-6a, the center there having been torn out by a prior excavation.

The marker is known as *Miscellaneous Sculptured Stone no. 10*. The fragments were found lying face down on the bench, at the position marked 2 in Figure 8.20, in front of the slab construction. They were seen in position by the writer when summoned by Benjamin Aguirre, one of our sharpest-eyed workmen, who noted that they were sculptured. Six fragments were then present, most of the immediate area having been already cleared. An extensive search in recently dumped material from this general location failed to yield more fragments. We have every reason to suppose that all fragments were here, but that most of those not found were plain, and one or two others so broken and weathered that the missing pieces were consigned to the dump. Once removed they probably could not have been identified without matching hundreds of fragments against what was found. The problem was similar to that of isolating the sherds of one plain pottery vessel from a pile of hundreds of sherds. Only a few attempts at actual fitting were made.

In view of this experience it is obvious that remains of broken-up markers from the ends, or from near the ends, of the stop-surfaces may have gone entirely unsuspected. As at Structure R-11, here we have no evidence that such end-markers existed, but the negative evidence means little.

Table 8.12 Structure K-6 Average Dimensions Table: Alley

Width	6.7
Length (equals length of benches)	21.3

The fact that a companion central panel on Structure K-6a was not found also means nothing, considering the poor condition and extremely flat relief of this one, and considering also that any other workman might have missed it. If the special slab-construction for the support of such a stone on the K-6a structure existed, it was destroyed by the prior excavation. So, I think, symmetrically placed center panels, at least, are to be assumed as probable for each structure, since they are twins in other respects.

The stone, as reconstructed on an assumption of symmetrical placement of the two carved figures, measured 1.4 m in length. The height was 69 to 70 cm, thickness 9.5 to 10.5 cm. The top edge was slightly rounded in cross-section, the bottom not, which confirms the supposed vertical placement. The rounding of the top edge suggests that this was somehow left exposed; but remnants of white plaster on the face all but prove the contrary. A surviving patch of this plaster ended on a straight horizontal line at the bottom of the patch. It here turned out to a ragged edge, as if it were the base of a broken-off plaster band or molding which ran across the top of the face of the stone. This was so placed as to indicate a failure to follow the quasi-rounded outline of the upper corner of the stone, as seen from the front. This evidence indicates a molding here about 8 cm wide, which presumably turned vertically down the sides, and perhaps turned at the bottom to run immediately below the feet of the figures. Here at the bottom the molding could have been affixed to the supporting wall. In Figures 8.17 and 8.18 this stone is restored to its obvious place

without these plaster modifications, which, after all, are somewhat speculative. However, there is a probability that when in use the figures were seen as in a rectangular plaster frame. It is also quite possible that the stone was set in from the general face of the stop-surface. In other words, the slabs may have floored a shallow niche, with the panel-stone at the back of the niche. Something of this sort might account for the presence of a line of slabs with a total length of 1.9 m, though the panel-stone was probably somewhat shorter. This again is speculative. Alternative possibilities are suggested against the time when such details of many courts may be definitely known. Intelligent choices may then be possible.

Figure 8.22 is a reconstruction of the design by Proskouriakoff. This was made from full-scale drawings and rubbings by the writer, from photographs, and also with the fragments themselves as checks. They have been bonded together, and the whole stone reconstructed, with plaster. But the missing parts of the figures, reconstructed in the drawing, have not been indicated in the plaster. This piece, now (1944) in the University Museum on loan, will eventually go to Guatemala. Its field and University Museum catalogue numbers are W-7-9 and L-39-239, respectively.

While certainly not in good condition, there is little doubt that surviving surfaces, except for the figures, were plain. Hence there was no ball between the figures, unless it was quite high up in a missing area. If the suggested plaster molding is added there will be little room behind the figures for anything else, though it is perhaps only an intelligent guess that a completely plain background existed. This un-Maya-like plain background may have been compensated by surrounding stucco-work.

The technique of the carving is also somewhat unusual. Nothing stands out beyond the general plane of the surface of the stone. Very shallow relief was obtained by cutting into it. With cross-lighting a silhouette effect

Table 8.13 Structure K-6 Object Table (Operation W-7)

Position	Sculpture	Sherds	Figurines	Mod. Frag.	Miscellaneous
1	W-7-4				
2	W-7-9				
3					W-7-5; -6 (<i>manos</i>) W-7-8 (small greenstone celt)
4		W-7-3; W-7-10	W-7-12 to 17; W-7-19; W-7-20	W-7-18	
5					W-7-1; -2 (human teeth and bones: Burial 4)

Key to Position Numbers: 1—On end field surface, probably fallen from Unit Ca, possibly from Unit Aa (see plan); 2—On Unit Cb, fallen to bench top from stop surface (see plan, Figure 8.20); 3—From alley, probably fallen from positions on or in benches of Units Ca and Cb; 4—Specific locations not given; probably fallen from position on or in the structures. Noted as "in debris;" 5—From alley, at approximate center; probably a subfloor cist burial.

results at the peripheries of the design, where a deep cut is made at right angles to the stone. From this depth (about 5 mm) the figures are worked out in shallow relief, with the original surface as the limiting factor. Figure 8.22 makes no attempt to indicate the silhouette effect. This drawing, made with great care, and for the first time reconstructing missing parts with broken lines, is intended to supersede an earlier one by M. Louise Baker. That was published in Satterthwaite 1933c; and Morley (1938:3:84) published a similar drawing, based on it. The Baker drawing, not made from the original stone, indicates the lines of deep cutting which outline the figures.

The style amounts to an inseting of the design so that its highest relief elements are flush with the general surface. Speculating, one is tempted to wonder if this may not have had a special purpose. If the large rubber ball was expected to strike the panel, the presence of the design could not have affected its course appreciably. But if the design projected from the background, its presence might on occasion have affected the angle at which the ball rebounded from the panel. Such a speculation is not meant to be taken seriously at present. But if, eventually, a correlation between ballcourts and this style of carving should emerge, it might then have some value.

Burial

In testing for a central alley-marker in 1931, Mason encountered some stone slabs, probably from a disrupted cist, and human remains listed as Burial 4 in our records. These included portions of skull bones, jaws, humeri, and 21 teeth, apparently of an adult. Levels with respect to structure walls were not taken and floor surfaces had not survived here (or elsewhere), but there can be little doubt that this was an interment below the alley floor, at or close to its center. Despite the absence of alley-markers, special interest in the center of the alley is indicated, though such a burial could have no direct effect on the play.

Orientation

The long sides run about 35 degrees east of true north. A glance at the map shows the very prominent position of this court in a main plaza, which was richly supplied with sculpture in the final period. The precise orientation is obviously intended to agree in general with those of neighboring structures, and the ballcourt has been centered before the important temple Structure K-5. That pyramid and basal platform exhibit several periods, and a parallelogram distortion of their own not followed by the pyramid stairways. It is therefore difficult to say how accurate was the centering of the ballcourt with respect to it.

In 1939 Godfrey located the four corners of the ballcourt alley with reference to the two inner outsets (next to and on either side of the stairway) of the K-5-

3rd lower pyramid terrace. His drawing shows that the axis of the alley almost exactly bisects a line joining the outsets, and therefore the base of the pyramid, on which they are symmetrically placed with little error. The alley axis is apparently at a true right angle to that line.

However, this is probably coincidence. The description of Structure K-5 will show that as one moves up and back from the lowest terrace, the center of each component shifts or probably shifted so as to stay over the axis of the parallelogram formed by the lowest. The centers of temple buildings and altars reflect this process of progressive displacement, as seen from the plaza. The stairway, as known from the phase of K-5-2nd on, makes a fairly good right angle with the front of the pyramid, but its base is shifted well over a meter from a centered position at that level, so that when seen from the plaza, the stairway led straight up to the building, despite the displacement of the latter. It is the stairway and the building in some period, rather than the extreme corners or the outsets of the pyramid, with which one would expect an alignment to be sought. With respect to these, from the 2nd phase of Structure K-5 on, the ballcourt is well over a meter too far southeast for perfect centering.

Dating

Floor material, that is, a layer of crushed stone and earth, without a surviving plaster finish, and not in hard condition, was followed below the Unit Ca bench face, and thence all the way back to the rear wall of this unit. About half-way back in this trench we passed over what appeared to be a remnant of an early wall. This is shown in Figure 8.19a, which also illustrates the fact that floor material rose 5 cm or more higher in the alley than below the structure. It is fairly obvious that the ballcourt was built on a plaza floor which had already been in use for some time, and that then or later there was a resurfacing. But the dividing line between the two surfaces could not be detected.

The court is placed in front of, and fairly close to, the temple Structure K-5, as we have noted, and the excavations there show four main periods of building activity. The latest includes erection of Stela 38 and 39, dated by Morley at 9.12.5.0.0 and 9.12.10.0.0. It is thus quite evident that this end of the West Group plaza was in architectural use a considerable time before those dates, and it is at least probable that the floor below Unit Ca goes well back in the city's history. We failed to penetrate it deeply for still earlier surfaces. So about all that this permits is the conclusion that the ballcourt is not the earliest construction on this spot. It might nevertheless have been quite early.

However, we have a clue in Miscellaneous Sculptured Stone no. 9, which Morley (1938:3:82-83) called Throne



Figure 8.23 General view of West Group Ballcourt, from south to west. Structure K-6a at observers left, Structure K-6b at observer's right; Stela 39, at base of temple Structure K-5-1st shows through trees in background. Aside from bench tops, structure tops are untouched, except for bushing, and for trench through Structure K-6a.

2, and dates at 9.11.10.0.0 with one question mark. The stone is a fragment, probably from a throne. Possibly it is from a throne once in place in Structure J-12 on the Acropolis. It would fit there very nicely if reconstructed to a length of about 2 m. A slab of about the depth of this one was almost surely removed from Structure J-12 during rebuilding operations there. If Miscellaneous Sculptured Stone 9 is part of that, it came here after the sixth and last major period of Acropolis activity had been begun. However, 2 m seems a considerable length for the thickness and depth of the fragment (11.5 and 65 cm respectively). However this may be, if Morley's reading is correct and the date a contemporary one, the fragment came here after 9.11.10.0.0.

The fragment is thought to be from the seat of a combination bench-and-leg throne. This interpretation stands, whether it is from Structure J-12 or not. The reasons are that it shows part of an inscription on one edge, the adjacent edge, at a right angle, being plain; the inscription turns a somewhat rounded corner and doubtless proceeded across a mostly missing front; the glyphs show that the stone must have been placed horizontally, as in known thrones; the back edge is rough-tooled only, as expected for the postulated type of throne.

Morley's drawing of the inscription (1938:3:83) does not reveal the fact that a hand and winged Cauac sign, and a bird head, which occupy the surviving portion of the front edge, are well preserved, while all the glyphs

on the end are badly weathered. Nor does it show that a deep groove has been cut or weathered across the end, the long side of the fragment, but not across the short front portion. These factors suggest what is obvious anyway, that the fragment was here set with its long edge in the face of a wall. Once placed in such a position, the hand and bird signs would be buried in mortar and thus protected. The form of this stone will be illustrated in describing Structure J-12, where the possibility of its coming from that structure will be discussed.

Being satisfied that the fragment was used as building material here, one would like to be sure in which phase of construction it was used. Unfortunately it was not seen *in situ* by myself, but it was found by the same reliable workman who discovered the marker. Instead of calling me he set it aside until I should pay him a visit, which happened an hour or so later. There is no reason to doubt his account. It lay flat on the southerly end-field, about at the position marked 1 in Figure 20. It was noted at the time, from the workman's description, that it was found about 1 m from the Unit Ca wall, about 1.5 m forward of the termination of Unit Aa. The long sculptured edge was parallel with the Unit Ca wall and facing it, the glyphs upside down. This I think is a very likely position if the stone had been placed fairly high in the Unit Ca wall (here about 1.5 m high) and the upper part of that wall had fallen outward as a unit. Momentarily continued cohesion of stones below it might have caused the upper ones to move outward as well as downward, as if on a pivot; they

would, in such case, tend to land on their edges, and some might have rolled over on what had been their upper surfaces. Thus the originally exposed edge might come to face the wall. Barring some interfering force, that edge would tend to remain parallel to its original position. That a part of the upper portion of the wall did fall out, instead of disintegrating a stone or two at a time, is indicated by what remained. At this point it was found leaning sharply outward. The uppermost remaining stones, if loosened, would fall on their edges (Fig. 8.23).

If we attempt to derive the stone from the Unit Aa construction we must account for fifty percent more of horizontal motion from a height which may not have been any greater, though of this we are not sure. The fact that it landed with long edge parallel to the Ca unit must then be laid to chance. This is certainly not impossible.

We cannot claim certainty, but such probabilities as exist indicate that the original structures, labeled K-6-C, rather than the secondary changes of Phase A, date from after the break-up of this monument; that is, accepting Morley's question-marked reading, from after 9.11.10.0.0.

A further circumstance is noted for what it is worth. Surviving concrete remnants of the bench-tops were soft. Concrete had completely disappeared at more exposed parts of these tops and everywhere on the exposed tops behind the benches. The complete disappearance of crushed stone where exposed and underlain by pure rock fill recalls the situation on the later additions to Structure R-11. But it is in strong contrast to the preservation at equally exposed parts of the earlier R-11 units.

Function

The fact that the structures are twins, their symmetrical placement to form the alley, and their benches, leave no doubt as to the ballcourt function, just as in the case of Structure R-11 in its earliest phase at least. Here as there the secondary changes do not affect the inner playing surfaces. But here the same known changes are all made to both structures. Therefore the presumption seems reasonable that they were considered appropriate to a still-functioning ballcourt. One is therefore led to suggest that similar changes be looked for at courts of other sites, though of course they may be only expressions of local ideas.

In considering whether the additions of Phases B and A were merely esthetic in purpose, the following factors may be noted. It is difficult to see any other reason for the changes of Phase B, provided we are correct in our reconstruction of them. If the additions of Phase A rose full height, no appreciable further esthetic change resulted, as seen from the rear, but the area at the top was considerably enhanced. As seen

from the ends, the change is asymmetrical for each structure, but symmetrical when looking at them as a pair. If the last additions did not rise to full height, they amounted to provision of terracing at the rear, and a carrying of the terraces somewhat around the ends. Such an arrangement would mark a departure from the apparently severely plain design of Phase B. If the Phase A additions rose to full height, they added materially to the depths of the tops, but there is no sign here, as there was at Structure R-11, that this might be to give more space for subsidiary platforms or buildings on the tops.



Figure 8.24 Southerly outer corner of Unit Ca exposed by cutting through debris of Unit Aa, lowest stones of which remain in foreground.

The figures on the marking panel confirm the ballcourt function, although the ball seems to have been absent, and they seem to be dancing with some tasseled round object in the hand, perhaps a rattle, rather than playing ball. That they are ballplayers is a reasonably certain deduction. Their comparative nakedness, the thick heavy belt, and the knee-pad indicate it. It appears to me that the arrangement of the loin-cloth contributes to the ballplayer interpretation. Fortunately it is quite clear that we are presented with front and rear views of the same articles of dress (Fig. 8.22). From the two together we can deduce that beneath the belt the cloth was drawn very tightly around the waist. It was pulled up tightly between the legs. If the ends were allowed to hang down as flaps, which seems probable but not certain, these were kept short. All these details seem suitable for a participant in this strenuous game, though I do not know of historical accounts stating that the loin-cloth was specially adjusted for the game. These accounts do, however, make it clear that various special articles of dress were worn for protective purposes.

Future Work

If at the site again I would measure at short intervals the exact heights of bases of all playing surface walls. Failure to do so has not, I am sure, resulted in a significantly false picture in our drawings. But if it were found that there is a consistent and considerable slope from one end of the alley to the other, this would be worth knowing. Assuming that the now disrupted or disintegrated alley surface conformed, it would slow or speed a rolling ball, depending on its direction. If, on the other hand, the alley was found to be level with tolerable accuracy, and this turned out to be true generally of ballcourts elsewhere, we might conclude that the Maya had some way of more or less accurately leveling large surfaces, perhaps by trial and error with water poured into channels in preliminary surfaces, and took the trouble to use it for ballcourts.

The presence or absence of the rear projection in Figure 8.17 could be determined with very little work. A pit should be sunk to bedrock. If this showed a cross-section, similar to that found near Altar 1, only about 40 m distant, the evidence against an early dating of this court would be augmented.

Any attempt to connect this court stratigraphically with the stela of Structure K-5-1st would probably fail, because of rising bedrock and lack of plaster-surface survival. Terracing just east of Structure K-6b (see site map), if followed in both directions with suitable additional trenching, might yield some relative dating information as between the ballcourt and Structure K-5, but it probably would not help in dating the court in terms of the Maya Long Count (Tables 8.12, 8.13).

Masonry Notes

Fills

Determined satisfactorily only for the cross-section of Unit Ca. Here the fill was pure broken rock, uninterrupted, from bottom to top, by floors or working surfaces. Fill walls were not encountered, but they were not carefully looked for and could have been easily missed.

Walls

Tabular stone throughout. Little more can be said of the badly fallen walls of the A units. Exposures of B units suggest a preponderance of small slabs in some parts, but a more block-like character elsewhere. Specialized larger corner stones, including a long block, may be seen in Figure 8.25. Here there is a distinct suggestion of in-and-out bonding.

Concrete

None survived in good condition, but the surface of concrete bench-tops could be followed near the stop-surfaces. Crushed stone remains found everywhere at field level, but had completely disappeared from main structure tops.

Plaster

None found surviving except the remnant on the marker panel; presumed to have covered all surfaces (Table 8.13).



Figure 8.25 Corresponding corner of Unit Cb and lowest stones of Unit Ab. Note in this figure and in Figure 8.24 that corners of units Ca and Cb fail to reach base surfaces; stones of Units Ba and Bb may be seen in situ.

SWEATHOUSES

— 1. RECOGNITION OF SWEATHOUSES AT PIEDRAS NEGRAS: —
 DIAGNOSTIC TRAITS AND TERMINOLOGY, *Linton Satterthwaite*

Preliminary Remarks

The practice of building special structures of one sort or another for sweating is widespread among aboriginals and peoples of Western culture in at least the northerly portions of both Old and New Worlds. It must have a considerable antiquity in various regions, and it seems clear from documentary sources that the sweathouse belonged in catalogs of Precolumbian traits within Mayan as well as non-Mayan regions of Mesoamerica.

Unfortunately the really early historical accounts of sweat bathing in Mesoamerica, so far as known to the writer, give little information as to the actual structures used, and the best do not refer to regions where Maya or other Mayan languages were spoken, lowland or highland. They describe what might have been introduced into the Mayan regions by non-Mayan speakers, perhaps in comparatively late pre-conquest times.

Though no adequate study of the distribution of sweathouses seems to be available, a cursory search suggests that they are today in use among Mesoamerican Indians of many different cultural and linguistic affinities, including highland Mayan-speakers of Guatemala, but not by groups further east and south. This being the apparent modern situation one might reason that sweat-bathing in Mayan regions (perhaps excepting the Huasteca) was introduced in Postclassical times, and that the ruins of such buildings are not to be expected at a Classical lowland site such as Piedras Negras, nor on early horizons in the Guatemala highlands.

When we began excavations, what little was known of actual ruined sweathouses at other sites tended to support this view. Nevertheless the buildings of eight mounds described in the immediately subsequent sections of this report are now considered to show that this functional type was present and important at the local time of abandonment. Findings in one of the mounds also show that, by that time, the type had had a fairly long history here.

Plan of Presentation

In order to justify the foregoing conclusions specific traits must be isolated and defined, and in doing this comparisons

must be made and a minimum use of documentary and other source material is necessary. On the other hand, the buildings themselves can be most easily described as wholes on the assumption that the reader is familiar with special terms for, and functional interpretations of, specific details. Accordingly the mound-by-mound descriptions appear in subsequent sections, while this present section may be regarded as an introduction to them, and at the same time as a summary of sweathouse data at the site, though comparisons are not limited to the site nor to ancient times.

Included here is a sub-section *Sources* in which a *Bibliographical Note* covers published material referred to in the text only by author's name and year, but with page references for other than short articles. That by Cresson (1938) is similar to this introductory section which may be regarded as an expansion of Cresson's paper, necessary if we are to recognize the full range of modern survivals of ancient traits and, conversely, if we are to understand the full range of variation in ancient sweathouse-indicating traits. Also under *Sources* data are presented respecting three modern sweathouses of highland Guatemala, unpublished heretofore, and unknown to Cresson. Quotations are also supplied from certain important published sources unlikely to be found except in large or specialized North American libraries.

In order to get a picture of what separable traits may surely combine to form sweathouses, the modern and historical data are first analyzed, and traits are isolated. Terms are adopted for them under four chief headings, as indicated in the Table of Contents. Then, turning to the Piedras Negras structures, various additional features are discussed in a similar manner.

Having determined on a long list of traits which seem to pertain to sweathouses, some ancient, some modern, and some both, their linkages into complexes are stated in tabular form as a basis for our conclusion that sweat-bathing played an important role at Piedras Negras.

Before passing to detailed mound-by-mound descriptions, the matter of recognizing new examples of sweathouses before excavation is discussed. Also included is a review of the present known archaeological

distribution of the type, in more detail than as noted above.

Though frequently referred to in this introductory section, figures illustrating the Piedras Negras sweathouses are grouped at the ends of the respective sections in which they are described and discussed in detail. It is supposed that a reader with a general interest only will make use of these illustrations, paying scant attention to the accompanying texts. However, the potential importance of the type is thought to justify recording and often discussing all known details. In Section No. 2 these are given for Structure N-1, the simplest of the two sweathouses which are more or less completely known, this being the one where the sweatroom was excavated with some idea of what to expect. The next section deals with six other structures which can be identified as sweathouses, but each are very incompletely known. The final section deals with the more complex of the two well-known buildings, Structure P-7-1st-A, and with partial reconstructions of earlier sweathouses on the same spot. In the latter, inferences are founded on what has been learned at the other mounds. The somewhat involved textual discussion dealing with the early periods and phases at Structure P-7 is felt to be necessary to justify the sequence visually summarized in Figures 9.41-9.46, since this sequence is the chief basis for concluding that sweathouses went through a considerable period of local development. Two confusing factors were operative at Structure P-7, destruction by ancient Maya and probably by modern wood-cutters on the one hand, and on the other hand failure to excavate more fully below the latest building, due to lack of time.

Note

Probably the first valid recognition of ancient Maya sweathouses is to be credited to Morley, though one need not accept all his identifications. The evidence for use of the interiors of certain bench-like constructions at Quiriguá as sweatrooms is at least equivocal (Morley 1935), and I am sure that an examination of them will convince anyone that they were not designed expressly for that purpose. Before this, Lothrop had suggested the sweathouse function for the diminutive post-Classical shrines of the East Coast of Yucatan (Lothrop 1924). There seems to be no positive and convincing evidence of such a function for these, when all circumstances are considered. The case is otherwise with two post-Classical T-shaped buildings at Chichén Itzá. Ruppert (1935) gives the plan of one of them. Morley first diagnosed these as sweathouses because both included a small chamber with vaulted ceiling springing from a level abnormally close to the floor, while that one of the two buildings which was sufficiently preserved showed ventilating holes. When he showed these buildings to the writer in 1935 it was agreed that the small chamber of Structure P-7-1st-A at Piedras Negras probably was a sweatroom, since, like one of the Chichén Itzá

structures at least, it contained a sunken area, and its vaulted ceiling also sprang from abnormally low walls, and especially because, though ventilators seemed to have been absent, there was good evidence of some sort of fireplace within. It was agreed that we should investigate in other suspected mounds at Piedras Negras, and that the unexcavated T-shaped building at Chichén Itzá ought to be explored. The sweathouse function of the latter was confirmed by excavation by Ruppert in 1936 (Cresson 1938; Morley 1936).

The Piedras Negras building which thus first seemed to be a sweathouse, Structure P-7-1st-A, had previously been misinterpreted. The sweatroom was entirely within an enclosing large building, a double-range affair with very wide spans roofed by semivaulting in which beam-and-mortar construction is combined with vaulting. To account for what he saw without excavation Maler postulated an enclosing building of eight instead of three rooms (Maler 1903). The mistake was noted by Mason (Mason, Satterthwaite and Butler 1934) but in the same article the writer confused matters by comparing the small chamber to the East Coast shrines; then, suspecting a sweathouse but being over-cautious, he called the building "Type X" (Satterthwaite 1936), though Mason had reviewed the question in a semi-popular article (Mason 1935). Cresson's subsequent study of modern examples removed the need for a non-functional designation. It is fair to note that both Mason and Cresson made good use of Arreola (1920). Arreola's modern sweathouse can be more fully understood if Gamio's account, which illustrates the same example, is utilized (Gamio 1922).

Sources

Note

Satterthwaite here provides of listing of bibliographic references pertaining to the Mesoamerican sweathouse. These have been included in the References at the end of the volume. Ed.

Additional Modern Data

Besides the above publications, some of which deal with modern sweathouses, use will be made of my own notes on three modern examples in the highlands of Guatemala, seen in 1937. These notes are inserted here, as a logical place under Sources. For anyone approaching the subject of sweathouses for the first time a prior reading of the quotations which come next in order is recommended.

Aguacatán

Figure 9.1 presents the physical features from sketches and measurements, and Figure 9.7 is a photograph. Little specific information could be obtained other than that this is a sweathouse; that is, I was led to it on asking to

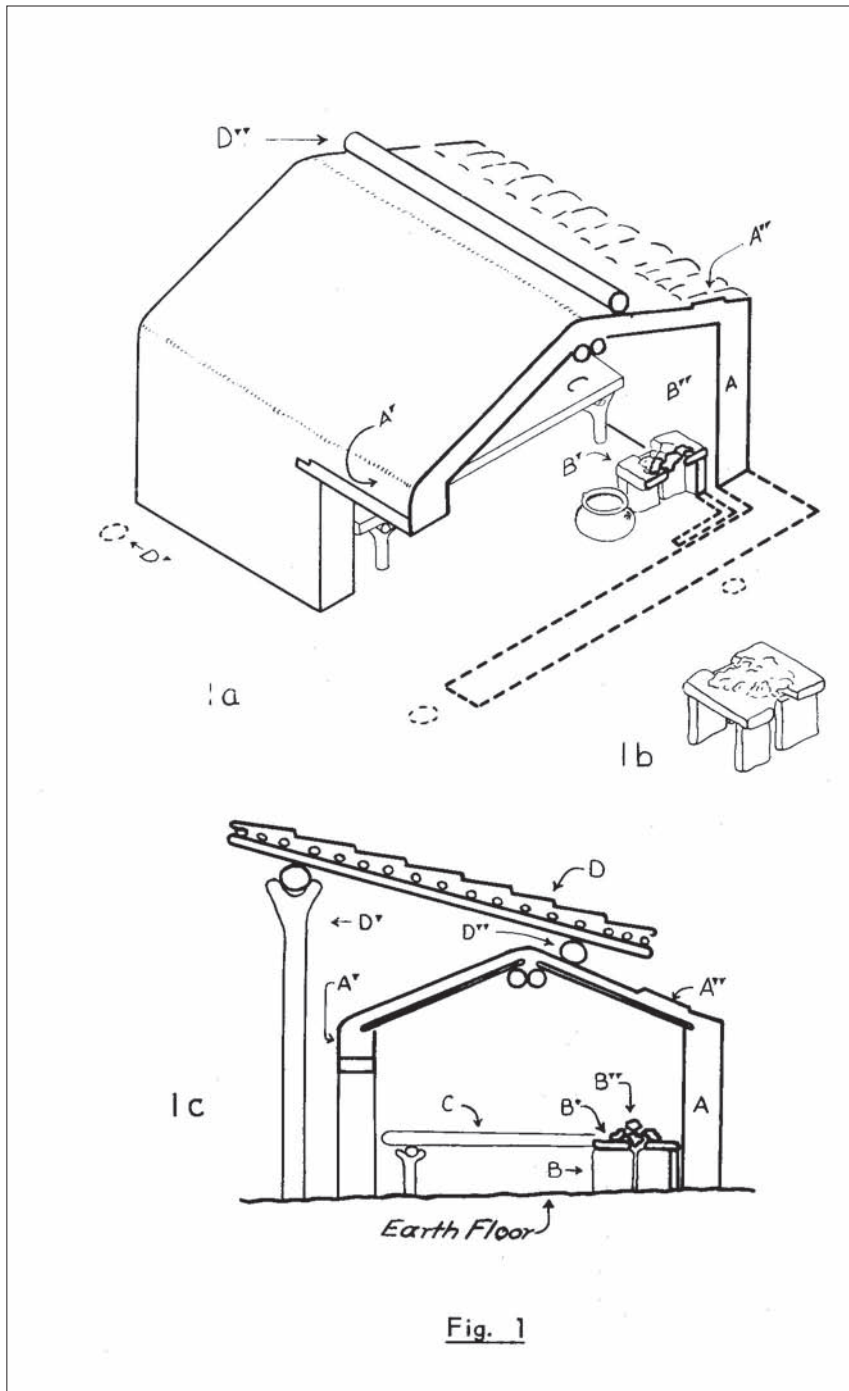


Figure 9.1 Isometric section and drawings: sweat house at Aguacatán, Guatemala. a. modern sweat house at Aguacatán, Guatemala; isometric drawing combined with cross section; b. isometric drawing of firebox and steam screen; c. cross section including protective roof.

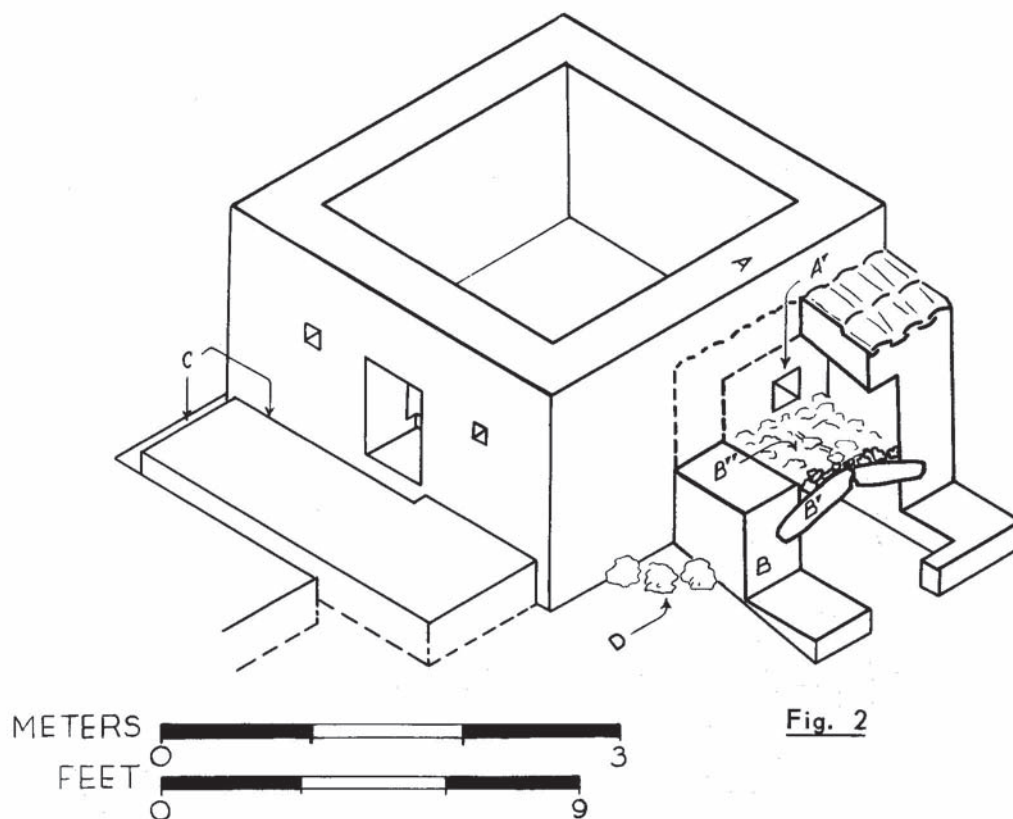


Fig. 2

Figure 9.2 Modern sweat house at Tepoztlán, Mexico, based on Cresson (1938) (isometric drawing combined with cross section; stones at D form extra fireplace for heating water; drain at C reaches narrow, low doorway.

see a *baño de sudor*. The *olla* shown in the drawing was in places indicated, with water in it. The large mass outside the door (Fig. 9.7) is a carrying-net of corn husks, and loose husks lie on the ground before the doorway and in it; four husks lay on the bench (Fig. 9.1a) and were rayed into ribbon-like strips, except at the base. (Two of these were separately photographed.) The larger *olla* outside the door was smoke-blackened. My informant, a representative of the local police force, said that the husks were for beating or fanning the body, that the users wash with water afterward, and that the water runs out the door. The floor sloped down toward the outside. In the doorway, it was damp, if not elsewhere also. The use of water in quantity, and not for merely making steam, is thus indicated. My informant evidently was as not a local man and said he did not use the sweathouse. I cannot guarantee that he was not answering leading questions. The inside of the room was thoroughly sooty, the bench clean. There was ash in the slab construction labeled B,

and the irregular stones (B'') piled loose on its top (B') were fist-size and larger, and were fire-blackened.

La Farge and Byers (1931) note sweathouses on the other side of the Cuchumatán range, somewhat to the west of Aguacatán, and report that sometimes a permanent slab oven is built at the back, inside. One suspects that oven was a construction like this, and apparently it is not universal.

Chichicastenango no. 1

This is represented in Figure 9.4. The sweatroom (B) is entirely indoors, in a room (A') probably not intended for it originally, since it partly encroaches on one of two niches in a wall. In the drawing the imaginary horizontal cut to show the simple-rectangular plan of the sweatroom is lowered at one point, in order to make visible some tiles (B'') set upright in the floor within the room. These are behind an opening in the wall (B'), to one side of the doorway. There was a small hole or ventilator in the roof, which is not shown in the figure. I quote in full my notes



Figure 9.3 Modern sweat house at San Martín de los Pirámides, near Teotihuacán, Mexico, after Arreola (1920), showing sunken passage outside steam room (perspective drawing, not to scale).

bearing on use, obtained from a willing informant. I am no ethnologist and leading questions may have affected the replies, particularly the idea that the enclosing room is a place for rest, an idea already in my mind.

Informant: María Ventura Méndez, mother of owner, Octavio Pérez. Bath is placed in a large room; this is for use to rest and cool off after the bath, before leaving; about one-half hour in bath, about one-half hour outside. There is always somebody outside; water is put on the hot tiles, inside, for steam; assistant outside closes door with *petate* (mat) or *manga vieja* and closes ventilator with grass (*zacate*); the patient scoops down hot air (*sic*) onto her body with bunches of leaves (two kinds); informant makes it clear this is to increase heat to get hot air down; before leaving sweatroom, they wash themselves with a little water from same bowl and a cloth; very little (water) used in this. The enclosing room contains nothing else and informant says it is for use as indicated above.

I have little doubt that a fire was built around the upright roofing tiles (B''), or between them and the opening (B'), but I failed to note location of the fire. The draft probably proceeded inward through the opening, and out through a ventilator in the roof and/or the door. Failure to show any sort of fireplace on my plan makes it fairly certain that this consisted of nothing more than rough stones, if that. The maximum inside height of the room was 1.5 m, the room being arched, possibly domed. Since the walls are recorded as one brick thick, and this thickness is given as about 30 cm, it is certain that they are of adobe brick, but I failed to note construction of the roof. A cross section sketch shows it somewhat thinner than the walls, with a small ventilator fairly high up in the roof, its interior orifice close to maximum height, though not at center. The depression indicated in the figure is described in my notes

as a little drain about 5 cm deep and 10 cm wide, cut into the hard dirt floor. Boards (C and C') keep the user out of the mud, and are arranged in the figure as on a sketch plan made on the spot. Since those at the back are specifically labeled boards and not bench, I have no doubt they lay on the floor as shown, though my notes do not say so, or show them in cross section.

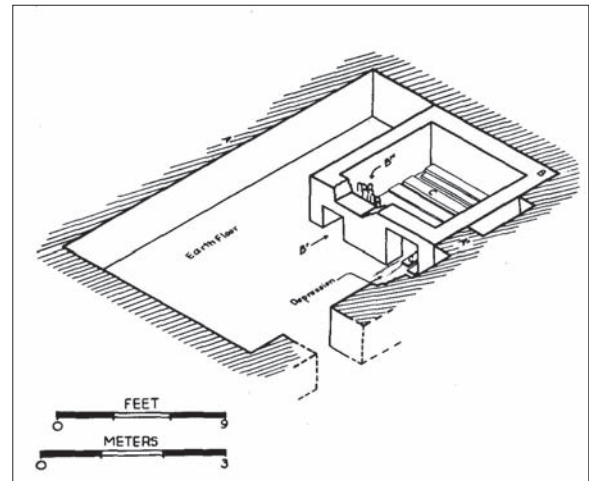


Figure 9.4 Modern sweat house No. 1 at Chichicastenango, Guatemala (isometric drawing combined with cross section showing plan); steam-screen of roofing tiles at B''.

Chichicastenango No. 2

Shown in the photograph (Fig. 9.6). This was the sweathouse of a neighbor. No information was gathered concerning it. One sees an opening corresponding to B' in Sweat house No. 1, but it is filled with three stones.

A well-defined smudge above these suggests that a fire was built inside, behind this opening, and that the draft was outward, between the stones. I include this merely to suggest a possible reversal of the direction of the draft, as compared with Mexican examples in which the draft is led horizontally through an opening in the sweatroom wall, and probably also as compared with the neighboring Sweathouse No. 1. Wide variation in methods of heating and filling the room with steam seems indicated in this single neighborhood of one highland Maya town.

Early Post-Conquest Accounts

The purpose of the ancient sweathouse was apparently a curative one, a matter of health; but the cure was partly magico-religious in character. Because of the latter factor, though modern examples are placed in dwelling-house areas as adjuncts of the home, their presence in ancient main ceremonial areas such as those at Piedras Negras is not surprising.

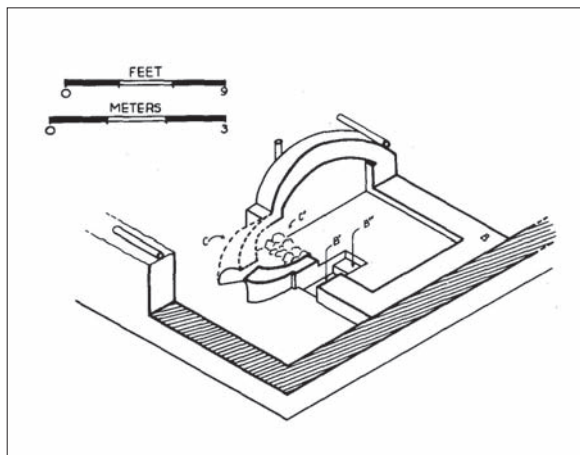


Figure 9.5 Modern sweat house No. 1 at Milpa Alta, Mexico (isometric drawing combined with cross sections, based on Cresson 1938); note sink at B', stones as fire screen at C'.

The following extracts will, I think, justify the proposition that sweat-bathing in this area was a matter of cure by ceremonial as well as by physical means, and that a considerable body of traditional lore probably governed its particular uses. They also show that bathing with water was a practice associated with the sweathouse.

Landa (Maya)

Speaking of Maya women, Landa says: "They took baths very often in cold water, like men ... all naked in the well where they went for water for this purpose. Besides this they had the habit of bathing in warm water and by the fire, but this was seldom and rather on account of health than of cleanliness" (Tozzer 1941). Tozzer says of

this passage that it "seems to refer both to the warm bath which some of the present Mayas prefer and to the vapor or sweat bath used in many parts of the New World for therapeutic and religious purposes."

Motul Dictionary

This defines *zumpul-ché* as bath for women after childbirth and other sick persons to cast out the cold that they have in their bodies (Mason 1935).

Sahagún (Aztec)

Translating from the 1938 edition, we have the following sixteenth century testimony of this important authority: "In this land they use baths for many things and, to make the bath called *temazcalli* useful for the sick, one heats it very well, and with good wood which does not make smoke. It is useful primarily for the convalescents from some sicknesses, in order that they may more quickly recover; it is useful also for pregnant women near to childbirth, because there the midwives perform beneficial acts (*las hacen ciertos beneficios*) in order that they may bear better. They are useful also for recovery of recently delivered (women), and to purify the milk; all the sick receive benefits in these baths, especially those who have little vigor (*nervios encogidos*) and also those who purge themselves repeatedly (*se purgan después de purgados*); also for those who fall down, or from a height, or were beaten, or maltreated ... Likewise it is useful to those afflicted with itch or pustules; there they wash themselves, and after washing they apply medicines suitable to those infirmities; for these it is necessary that the bath be very hot."

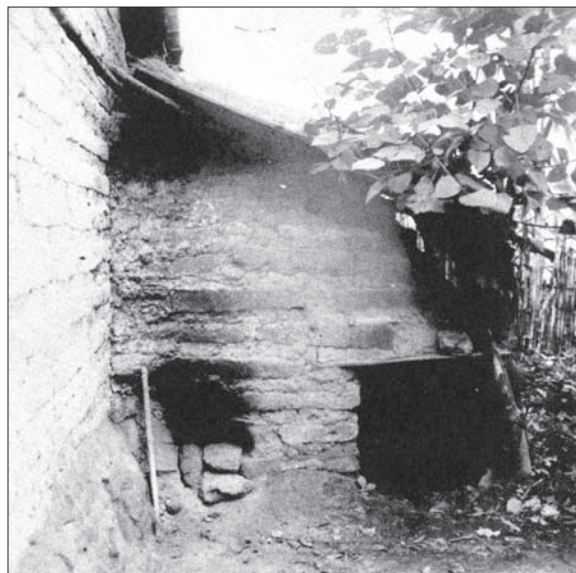


Figure 9.6 Modern sweat house No. 2 at Chichicastenango, Guatemala, showing smoked area above opening plugged with stones.

Elsewhere Sahagún paraphrases a midwife, addressing the parents of a pregnant woman: “address yourself to the mother of the gods, who is she of the medicines and curers, and is mother of us all, she called *Yoalticitl*, who has power and authority over the *temazcales* which are called *Xochicalli*, in which place this goddess sees secret things,” and answering, the parents say “and put her in the bath which is the flower of our señor whom we call *Temazcalli*, where is and where cures and helps the grandmother who is the goddess of the *temazcalli* named *Yoalticitl*” (Book 6, Chapter 17). In pregnancies the midwife had her duties within the bath and, “after coming out, she would touch the abdomen, and would do this many times, though outside the bath, and this they called *palpar a secas*; and because it is customary to strike bathers with maize leaves boiled in the water of the bath itself, sometimes the midwife would order this not to be done, when the pregnant woman was bathing.”

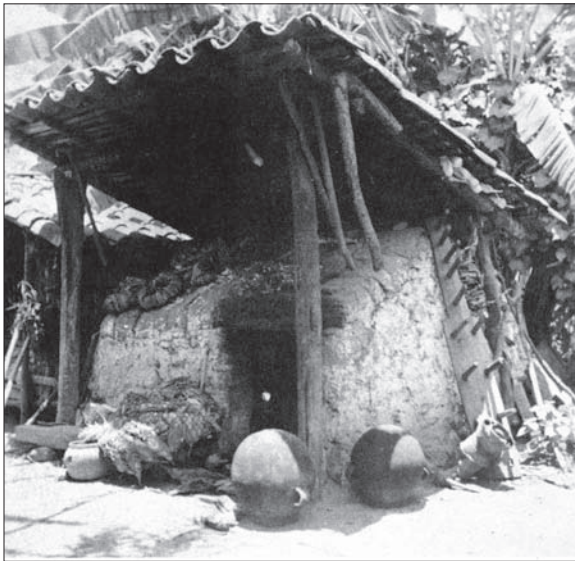


Figure 9.7 Modern sweat house at Aguacatán, Guatemala, showing protective roof, water jars and bundle of corn husks.

It seems quite clear that in ancient times in Mexico the *temazcalli* was a place of curing where heat was important, and that bathing with water was practiced, along with ceremonial invocations to a special deity. There is a hint that the water was heated more or less, depending on what was to be cured.

Codex Magliabecchiano (Aztec)

The gloss describing the bath-house pictured in Codex Magliabecchiano (reproduced by Arreola and also by Mason and by Cresson) is freely translated by Mason as follows: “This is a picture of the baths (*baños*) of the Indians which they call *temaxcalli*. At the door is an Indian who

was the mediator for illnesses. When an ill person took a bath he offered incense, which they term *copal*, to this idol, and stained his skin black in veneration to the idol who was called *Tezcatlipoca* and was one of their major gods. Many Indians, men or women, stark naked, took these baths and committed nasty and vile sins within.” This picture and the statement are apparently assignable to the sixteenth century.

They do not require us to believe that the pre-Columbian *temaxcalli* involved steam-bathing, as does the modern one, any more than do the quoted passages from Sahagún or of Landa. The picture shows water within the bath chamber, a bundle of firewood, a man with faggots in his hand, and what we shall call a fire chamber built against the bath chamber. This is round and domed at the top, suggesting Spanish influence at work, though presumably not long after the Conquest. The fire chamber has an opening at the bottom from which flames issue, and an opening at the top, from which neither flames nor smoke emerge, suggesting by the contrast that it has been closed. Tongues rising from it and from the bath chamber are interpreted by Arreola, with apparent justification, as indications of heat. The fire chamber corresponds in all essential respects to that illustrated and described by Clavigero and (apart from the opening at the top) to round varieties reported in present-day Mexico, where steam is produced.

Terms Sweatroom, Bathroom, Steamroom

Unless a Conquest-time source can be found definitely mentioning the use of steam, since this is not used universally in the modern sweating complex north of Mesoamerica, it seems advisable to use sweatroom rather than Cresson’s steamroom, as a more inclusive and less definite term, and not to apply steamroom to an ancient chamber until actual evidence of use of steam is considered conclusive. Similarly the modern Mesoamerican sweatrooms (of the steamroom sort) seem also to be bathrooms, where bathing in water is customary. Very probably the ancient sweatrooms were steamrooms and bathrooms, but archaeologists should look for evidence of such use, and, in adopting terms, not merely assume that the modern complex stretches back beyond the Conquest with no significant change.

Later Accounts

Clavigero (Mexico)

Arreola reproduces Clavigero’s illustrations of a dome-shaped sweathouse, and quotes from his account of it. The following quotations are from Cullen’s English translation, in which the Italian *ipocausto* is translated as “vapor bath.”

“Among the means which the Mexicans employed for the preservation of health, that of the bath was very

frequent. They bathed themselves extremely often, even many times in the same day in the natural water of rivers, lakes, ditches and ponds. Experience has taught the Spaniards the climate ... The Mexicans, and other nations of Anahuac, made little less use of the bath *temazcalli*. Although in all its circumstances it is deserving of particular mention in the history of Mexico, none of the historians of that kingdom have described it ... The *temazcalli*, or Mexican vapor-bath, is usually built of raw bricks. The form of it is similar to that of ovens for baking bread, but with this difference, that the pavement ... is a little convex, and lower than the surface of the earth ... Its greatest diameter is about eight feet, and its greatest height six. The entrance ... is wide enough to allow a man to creep in. In the place opposite to the entrance there is a furnace (*fornello*) of stone or raw bricks, with its mouth outwards to receive the fire, and a hole above to carry off the smoke. The part which unites the furnace to the bath, and which is about two feet and a half square, is shut with a dry stone *tetzontli* or some other stone porous like it. In the upper part of the vault there is an air hole, like that of the furnace. This is the usual structure of the *temazcalli*, of which we have subjoined a figure; but there are others that are without vault or furnace, mere little square chambers, yet well covered and defended from air."

Cresson's Sweathouse No. 2 at Milpa Alta (his Figure 4) is round and dome-shaped, but the others are rectangular, and the rectangular form was presumably the only one in Precolumbian times. It may be noted that his rectangular examples, like the round one, show the furnace attached to the sweathouse proper. But Clavigero refers to rectangular examples without a special furnace. He seems to imply that something like our modern Guatemala highland examples existed in Mexico a century and a half ago.

Clavigero's remarks on the use of the bath seem to apply specifically to his illustrated round type, but many details presumably might apply to either type. The lack of a furnace does not preclude presence of a fire, and stones heated by it. "When any person goes to bathe, he first lays a mat within the *temazcalli*, a pitcher of water, and a bunch of herbs, or leaves of maize. He then causes a fire to be made in the furnace, which is kept burning, until the stones which join the *temazcalli* and furnace are quite hot. The person who is to take the bath enters commonly naked, and generally accompanied for the sake of convenience, or on account of infirmity, by one of his domestics. As soon as he enters, he shuts the entrance close, but leaves the air-hole at top a little time open, to let out any smoke which may have been introduced through the chinks of the stone; when it is all out he likewise stops, up the air-hole. He then throws water upon the hot stones, from which immediately arises a thick steam to the top of the *temazcalli*. While the sick

person lies upon a mat, the domestic drives the vapor downwards, and gently beats the sick person, particularly on the ailing part, with the bunch of herbs, which are dipped for a little while in the water of the pitcher, which has become a little warm. The sick person immediately falls into a soft and copious sweat, which is increased or diminished at pleasure, according as the case requires. When the evacuation desired is obtained, the vapor is let off, the entrance is cleared, and the sick person clothes himself, or is transported on the mat to his chamber; as the entrance to the bath is usually within some chamber of his habitation." A little later on it is stated that "when a very copious sweat is desired, the sick person is raised up and held in the vapor; as he sweats the more, the nearer he is to it." Evidently a steam-cloud was formed which did not reach all the way down to the floor.

We are told that this type of bath has been used regularly in several disorders, particularly fevers occasioned by costiveness. The Indian women use it commonly after child-birth, and also those persons who have been stung or wounded by any poisonous animal ... the *temazcalli* is so common that in every place inhabited by the Indians there are many of them."

Stoll's Account for Highland Guatemala

Translating Stoll, we have the following for a region closer to our site, though more distant from it in time than was Clavigero's.

"Besides ordinary river bathing, the Indian steam bath called *tuh* in Quiché or *temazcal* (*temazcalli*) in Mexican, played in olden times, as today, an important role in Indian hygiene. In all of the numerous villages which still maintain Indian customs, one finds usually bake-oven-like (*Backofenformige*), dome-shaped buildings, the diameter and height of which amount to several feet. They are built of stone or mud bricks; the entrance opening is so small that a human being can just crawl through. In the interior opposite the entrance are a few stones serving as a hearth (*Herd*), where fire is lit, the smoke of which escapes through a hole located in the dome. Three plates filled with water are placed simultaneously on the hearth (*Ofen*), two of them on the side of the fire so that the water may be heated, the third, however, at some distance from it so that the water may not become too hot. When the fire has burned down, one or several persons crawl naked into the *temazcal*. They extinguish the coals with water and thereby develop steam which fills the oven (*Ofen*), since its escape has been prevented by the closing of the entrance opening and of the hole in the dome. The bathers carry with them thin twigs of just any (kind of) plant which they dip into the plates of hot water and with which they then beat themselves or one another in order to stimulate the breaking out of sweat. In this steam-bath they remain approximately twenty minutes. The

described procedure is the one common to the Pokonchi Indians of Tactic, but I do not believe that considerable variations of the same occur elsewhere.”

“At present this steam bath is principally used against cramps (*calambres*), rheumatic pains, fever, and other illnesses, but the Indians use it very frequently without being sick at all. In olden times it was the custom for the recently delivered woman with her newly born baby to take a steam-bath on the fourth day after delivery. For this reason, newly delivered women were called *ah-tuh* in Cakchiquel. The *tuh* is usually a dome-shaped building, but square sweat-ovens with flat roofs occur, such as the one from Tactic shown in Figure 3” (Stoll 1886:162-163).

Particular Modern Traits: Terms

Drainage and Entrance Arrangements

The following items of interest can be gleaned from examples discussed by Cresson and Arreola. Arreola’s drawing (Fig. 9.3) labels our sunken passage *desague*, a drain; and Cresson tells us that a narrow channel (labeled C in Figure 9.2) carries the water at Tepoztlán, i.e., it is a drain. He also found a drainage passage at Milpa Alta. But for his Milpa Alta example no. 1 he shows a sunken area within the steamroom and its doorway, without outlet to the outside, which he calls a drain or sink-hole for water, its lowest level consisting of dirt through which water can seep (Fig. 9.5). There are evidently a variety of arrangements for carrying off surplus water, and one could guess that the patient is actually bathed in the steamroom with water, as well as in the steam. This Cresson found to be the case at Milpa Alta. Speaking of Sweathouse 1 there, he says the sink-hole “is necessary, not to carry off water used in making steam, but because the person ... also washes himself with hot water and soap.”

Arreola’s photograph shows the patient entering on hands and knees: her back is above the level of the top of the doorway, if anything, though she is kneeling in the *desague*. I think it is fair to deduce that this is a sunken passage as well as a drain, functioning to make ingress and egress easier.

We may deduce from Gamio that the doorway in Figure 9.3 is about 70 cm high. In Figure 9.2 the door scales to about that height. Here the lowering of the floor in the doorway (below the inside floor level), and for a short distance further in, presumably has the same function: it not only carries water from within to the drain proper, but provides a sunken area which must facilitate use of the very low doorway. This would not be so, if the lowered area were not full doorway width, or nearly so. I think, therefore, that we should distinguish

between drain and sunken passage but must remember that the latter may also operate as a drain. Where, as at Piedras Negras, a sunken passage reaches to the place of an interior fire, it would presumably also be useful in keeping ashes off the floor proper. In effect it then cuts the floor into two bench-like parts.

Cresson described the example of Figure 9.2 as having a very shallow sunken passage which extends just inside the door. Where the sunken area in the doorway extends only a little beyond the walls of the sweatroom, in either or both directions, I think we might better speak of a sunken doorway, and by, “sunken passage” imply that one is taken a considerable distance inside (or outside) the sweatroom, at the lower level. But if we have the sunken passage, we automatically have the sunken doorway. We must make fine distinctions if we want to make comparisons of maximum value, and if we want to know as exactly as possible the range of variations to look for while digging.

In Figure 9.5 there are two levels in the sunken area, the lower (B') being the sink-hole described by Cresson. This I think we can better call merely a sink. It might have been provided with a hole to an underground drain. Such an arrangement would be by no means unlikely to occur to an ancient Maya architect, and the hole part of Cresson’s term might be needed for an actual hole. The sink here, it seems to me, occupied only the area B'; it certainly may be considered as cut into the bottom of a sunken passage, which otherwise would have its level at B" throughout. The sink, surely, by its added depth, makes passage through the doorway easier, and it is curious that it does not extend all the way to the front. In Cresson’s second Milpa Alta sweathouse, not illustrated here, the sink is a square sunken area of less width than the sunken passage, it is definitely a feature distinct from the passage itself.

In the Guatemala case of Figure 9.4, the floor is of earth, and this slopes down toward the front, presumably for drainage. Boards are laid in the entrance and across the back (C, C'), presumably to keep the patient out of the mud. There was a narrow depression leading out of one side of the doorway, indicated in the figure. This may doubtless be styled a drain, designed to minimize mud at the approach to the door. No such depression was noted at Aguacatán (Fig. 9.1), but the floor there also sloped forward. A drain cut in mere earth would be impermanent, and its presence or absence might depend on individual care in keeping it open.

Clavigero’s floor was a little below ground level and his sketch suggests a sunken doorway, which would not, however, have acted as a drain. The floor was somewhat convex, perhaps to drain the water to the peripheries, and thence to the sunken doorway acting as a sink.

From these examples we can conclude that neither the permanently constructed open drain, the sink, not the sunken passage are essential features; but when present

they appear to be valid sweat-bath criteria, since they are found with sweat-baths and have useful functions there. The absence of all three does not necessarily preclude attention to drainage, which may be by a mere slope to the door.

Drain, Sink, Sunken Doorway, Sunken Passage

I will use *drain* (open or covered can be added if necessary) for a sloping channel obviously intended for draining off water, when this is evidently the only function (Figs. 9.2 and 9.4). *Sink* will be applied to a small area in which water would collect, or could seep, or be otherwise carried downward (Fig. 9.5). *Sunken doorway* will apply to the sinking of the doorway area below the level of the sweatroom floor (Fig. 9.5). If the sunken area extends an appreciable distance inside the room and/or through an area outside it, so that one may walk a step or two in it after passing the doorway, it will be called a *sunken passage*, a feature necessarily accompanied by a sunken doorway (Figs. 9.3 and 9.9).

Peripheral Down-Slope

Definite slopes of floors toward doorways are fairly characteristic in temples and palaces at Piedras Negras, and doubtless elsewhere; presumably they were for drainage of rain water blown in through the doorways. Such a slope, as noted in the Aguacatán sweathouse, ought not to be considered as indicating the sweathouse function, though, with a small low single doorway it might be considered to confirm it. It is too general a trait in ancient Maya buildings to have function-indicating value. However, a convex floor, as indicated by Clavigero, would be unexpected in ancient Maya buildings.

Peripheral Down-Slope is suggested to connote such a floor in a round room, or in a rectangular room where there are noticeable slopes downward to the bases of all the walls, or to some of them. The connotation is that water would collect or run out along the walls, rather than spread out and remain on those parts of the floor where a patient would lie, or run off across those parts.

Such slopes may have been present at Piedras Negras in Structure P-7-2nd-F. See Figure 9.48, where the upper of four buried floors curves smoothly down in a direction away from the sunken passage, and probably to the base of a since removed (or largely removed) wall (Unit 22? in the figure). The final floor in this same figure shows a reversal of direction in this down-slope, which certainly cannot be considered a sweathouse essential.

Heating and Steam Producing Arrangements

Draft Holes

Cresson uses “ventilator” for holes in the sweatroom wall which help to let out the smoke. These are labeled *respiradero* on Arreola’s drawing (Fig. 9.3); that is, vent,

breathing hole. Since ventilator is already in use in the archaeological literature for much larger vents, I shall here call them draft holes, which does not preclude a ventilating function, but emphasizes their small size and the consequent fact that they can easily be closed. It is quite clear from the accounts that during the heating process these holes, when present, assist in creating a good draft at the fire, and in the right direction. A sweatroom must be one of the most ill-ventilated rooms imaginable, when occupied, and it is quite clear that the holes are used as ventilators in the ordinary sense, that is, to clear out foul air, for a short time only. Cresson’s investigation showed conclusively that these openings are not essential in the Mexican region studied, and I also found that they may or may not be present in the Guatemala highlands.

Steam Screen

Gamio’s account makes it clear that the room is ready for use when smoke (and of course hot air) has passed for some time from the fire through a screen (*cortina*) of stones and out through the doorway and the draft holes; it has by then heated the screen of stones and the walls of the room. If I understand him correctly, water is now sprinkled on the hot walls by agitating wet leaves, which produces steam (*vapor*) and hot water; as the temperature drops, “from time to time a little water is thrown on the curtain of *tezontle* (a particular porous stone) where the heat has been conserved, so that it is immediately transformed into steam.”

All of Cresson’s examples provide the equivalent of this *cortina*. This may be nothing more fixed and permanent than a collection of rough stones on the floor of an opening connecting the steamroom with the fire, as in Figure 9.5. Using screen for Gamio’s *cortina*, and meaning thereby any arrangement of stones or other non-inflammable elements such that flames, smoke or hot air must pass over and more or less through them, I have adopted here the term steam-screen. The implication is that such an arrangement functions to store up heat for use in producing steam after the patient enters and the fire has died down.

Cresson notes the possibility that a steam-screen may consist of neatly placed stones more or less filling an opening in the sweatroom wall. We see this in the Guatemalan example of Figure 9.6, where the draft apparently is outward through it. Presumably such a definitely screen-like arrangement, such as this, is what suggested the term *cortina* to Gamio. The screen here may be said to be a vertical one. Cresson contributed a variant in which the stones are held as a horizontal layer above the fire and not to one side of it. The steam-screen is supported by slabs leaning together and presumably without a tight fit, and forming a sort of upper chamber in the fire chamber (B) in Figure 9.2). Perhaps the

supporting slabs should be considered as part of the screen.

Note in this figure that the fire chamber is based at a level lower than the sweatroom floor, so that the connecting opening A' (which we shall call a *flue*) can receive hot gases after they have passed through the screen. They must enter the sweatroom, just as in the simpler arrangement of Figure 9.5, at floor level, presumably at the level of the patient.

The horizontal arrangement of the steam-screen appears again at Aguacatán, but this time inside the steamroom (Fig. 9.1). There is no fire chamber other than the steamroom itself (A); but the stones (B") are supported on a box-like construction of stone slabs (B), open at the front and semi-open at the top (B'), on which the stones forming the steam-screen are piled. The steam is thus generated above floor level. However, recalling Clavigero's note on varying distance of the patient from the ceiling, note that here a wooden bench (C) is provided for the patient. The steam is generated at the patient's level, as in the other cases when he lies on the floor.

Fire chamber

Cresson used "fire chamber" for the *hornilla* or "furnace" of the Mexican writers, who are referring to special constructions attached to the steamroom, and he used the same term for fire-containing constructions inside the Piedras Negras examples, which we had reconstructed with closed tops. I think a distinction will be useful here. I shall use fire chamber where the construction, round or rectangular, has a roof or top of its own, closed except (possibly) for a draft hole. This would include feature B in Figure 9.2, which has two levels and a horizontal steam-screen, as well as simpler round or rectangular variants with the steam-screen at one side (as in Figure 9.5).

Firebox

In Figure 9.1, the Aguacatán steam-screen is held horizontally over the fire, in this respect as in Figure 9.2; yet, apart from the steamroom itself, there is nothing which can properly be called a chamber. I should like to term this whole slab construction, drawn separately in Figure 9.1b, a partly covered firebox, or a firebox with partly open top. In the figure, the firebox is labeled B, the top B1 and the fire-screen on it B".

The reason for a term which does not include the top is a practical one: in ruins one may, as at Piedras Negras, encounter the lower elements but be unable to say whether there was a solid top, making the firebox part of a fire chamber, or whether there was a partly open top through which the flames and hot gases could pass (as here at Aguacatán), or whether it had a top at all. A firebox, then, as we shall use the term, is a fire-containing stone or masonry construction of vertical or more or-less

vertical surfaces, open or with an opening at the front or at one side. Obviously, unless it is in fact part of a fire chamber, it would have to be inside the sweatroom to be effective for heating that room itself, something the Middle Americans seem to have considered essential.

If placed inside, after the fire has died down steam could be made by sprinkling the coals and the insides of the firebox. If there is a partly open top, this also would become very hot and could function, along with a steam-screen placed on it, to store up heat for steam production.

One may reason that a solid top on an inside firebox, forming a fire chamber, would reduce the total area of really hot surface available for this purpose. On the other hand, it would throw the heat forward through the opening and perhaps result in a more even heating of the sweatroom walls. I do not see how one can be sure, without more evidence than has been collected here, whether fire chambers, with the solid top, may or may not occur inside the sweatroom; but the Aguacatán example shows definitely that interior fireboxes with open tops and fire-screen may occur.

Here, I think, is a good illustration of the need for a precise terminology, even if a clumsy and prolix one. La Farge and Byers (1931) tell us that in the Jacaltenango region "sometimes a permanent slab oven is built at the back, inside." Stoll speaks of a "few stones" successively as a *Herd* and as an *Ofen*, while still later an often refers to the sweatroom or sweathouse as a whole. One would like to know whether these interior fire containing arrangements correspond precisely to the Aguacatán example or not, but one can hardly be sure. Lacking evidence that complete fire chambers (with solid tops) may occur inside sweatrooms at Piedras Negras, in reconstructions we have assumed partly open tops in all our figures except Figure 9.47, where a complete interior fire chamber is alternatively suggested.

Neither a firebox or fire chamber seems a necessity in the highland area. La Farge and Byers note the slab oven as sometimes occurring; obviously it may be absent. Lothrop (1928) speaks of a "pile of stones" in sweathouses at Zutugil villages. These are inside and are heated in a fire. Apparently the fire itself is inside, but no special arrangement for it is noted.

Fireplace

In Figure 9.4, modern roofing tiles, set on end (B") apparently serve, like Lothrop's pile of stones, as steam producers. The tiles are probably set in or next to a mere fireplace, which can be taken as the minimum requirement in or near any sweathouse. If there is not at least a fireplace there can be no sweathouse. More than this, the fire chamber, firebox or fireplace of a sweathouse should show evidence of large and continued fires,

something more than smoked surfaces and burned areas which could result from burning incense. These latter occur in temples at Piedras Negras, but (usually at least) on the column altars only.

Extra Fireplace

I think it is obvious that if warm or hot water is desired it could be heated in the same fire as that which heats the sweathouse. Gamio indicates this at Teotihuacan. It would be a simple matter to heat water in the *olla* of Figure 9.1 by placing it on the firebox or on the stones of an ordinary fireplace. Of course, this particular *olla* may be the third one, mentioned by Stoll as at some distance from the fire. There were others outside (Fig. 9.7). However, at both Milpa Alta and Tepoztlán, Cresson found special outside fireplaces, apart from the fire chambers, for heating water. At the latter site this is indicated as D in Figure 9.2. Presumably this occurs when the fire chamber is so designed that *ollas* of water cannot be conveniently placed in it; such a fire chamber design might add to efficiency for its primary purpose. However this may be, I think there is no particular reason for expecting an extra fireplace for heating water when there is already a fireplace or a firebox in the steamroom, and none was noted with Guatemala examples. In the case of Figure 9.4, the enclosing room was definitely noted as containing nothing but the steamroom.

Cold-Air Entrance or Flue

If the exterior opening of an exterior fire chamber is in a fairly thick wall and is fairly small (as in Figure 9.5), it may serve a double purpose. It is a means of access to the fire, which must be built and fed; but once this is started, it will tend to establish a horizontal current in the entering cold air. In the cited example this would appear to be of some importance. In any case, this entrance functions as a cold-air entrance, and if one wishes to claim that arrangements have been made to give direction to the entering current, it might perhaps be called a cold-air flue. In Figure 9.4, the small opening B' is presumably designed for feeding the fire and to assure a good draft at the presumed fire behind it. If so, although it is in the sweatroom wall itself, it is also a cold-air entrance, perhaps a cold-air flue. Webster defines "flue" as "an enclosed passageway for establishing and directing a current of air, gases, etc.; an air passage."

Hot-Air Entrance or Flue

In Figure 9.2, it must be that when the sweathouse is ready for use, water is sprinkled on the steam-screen B through the opening A'. The small size of the opening, relative to the thickness of the wall, must make this difficult, rather than easy. However, the smallness must result in delivering the steam in the room at floor level, and as it enters, it must be moving horizontally. While

the heating is in progress, this opening must deliver hot air, smoke and combustion gases in the same manner. It is certainly a hot-air entrance, perhaps a hot-air flue, during the heating process, though later it may function as a steam entrance or flue. One may speculate as to whether a small hot-air entrance like this is due to European influence. One is tempted to compare it with the smoke pipe of a modern central heating furnace, which leads to the chimney, and consider that the sweatroom functions, while being heated, as a chimney. But the absence of ventilators and the lowness of the single opening, the doorway, makes such a comparison seem very forced. Certainly, this small opening, whether merely a hot-air entrance or a flue, contrasts strongly with the situation in Figure 9.5. There, the fire chamber (C) may be considered an extension of the sweatroom itself, and there is no special opening or entrance connecting them.

Heat and Steam Retaining Arrangements

Smallness and Lowness of Sweatroom

From the quoted accounts, and especially from Gamio's description of steam-making, it appears that the walls of the sweatroom itself are required to be heated. Obviously, the smaller the cubic capacity of the room, the greater the sweating effect for a given amount of heat and of steam produced, and Middle American sweatrooms may be expected to be smaller than would be suitable for ordinary occupancy. Since, archaeologically, one is likely to know the ground-plan but not the entire cross section, it is desirable to consider two components, so to speak, of smallness. Applying that term to what can be known from the ground plan alone, it will serve our purpose to consider whether a given room exhibits both smallness and lowness, or perhaps only one of these characteristics. The modern examples of Figures 9.1 to 9.7 all show both of these characters. With these two terms we can admit that Morley's supposed sweatrooms at Quiriguá are exceedingly low, but not so small as we should expect for this function.

Narrowness and Lowness of Single Doorway

In all the modern cases the sweatroom doorway is much lower than what can be considered normal for rooms to be entered by adults. This may be inevitable, because of the lowness of the ceiling of the room, but apparently the doorway may be somewhat lower than thus required (Figs. 9.1 and 9.3). Abnormal lowness, whatever may be the immediate reason for it, is worth distinguishing as a separate trait, because in a ruin the door height but not the ceiling height may be known. For comparisons, where the aperture is not everywhere the same height, as in Figure 9.5, the minimum is taken.

One may know the width but not the height of the doorway, and therefore narrowness will be used here in a similar sense, that is, a narrow doorway is one abnormally narrow in comparison with the general run of doorways intended for use by adult people. It may not be narrow in relation to its own height.

In classifying for these traits a normal standard of comparison is implied, and, without general knowledge of all kinds of buildings at a site, modern or ancient, there may be border-line cases. In the trait table covering modern and ancient sweatrooms, the highest doorway classified as being low is 1.3 m in height (a figure possibly too high by 20 cm); and door widths are considered not to be narrow, i.e., abnormally narrow, if 80 cm or more in width. However, a maximum width of 1 m in the Piedras Negras sweathouse series is in fact abnormally narrow by comparison with the usual exterior doorways of local temples and palaces, and very narrow interior doorways occur in some palaces. Narrowness of a doorway suggests a sweatroom only if it may have been combined with lowness, and when there are no other doorways.

Limits of Size

In order to get some preliminary idea of variations in the sizes of sweatrooms and their doorways, available dimensions from our short modern series are given [in Table 9.1], along with corresponding ones for the three ancient Piedras Negras examples for which we have the room dimensions. The doorway dimensions for San Martín are according to Gamio, and those for Tepoztlán and Milpa Alta 1 are scaled from Cresson's published drawings.

The difficulty of heating a sweatroom must have varied with the area enclosed by its walls, other factors being equal, and so I have arranged the rows of dimensions in the order of increasing interior area. The ancient examples are thus thrown to the bottom of the tabulation. Within modern

and ancient groups considered separately there is wide variation in area covered. As between the groups, the smallest of the ancient series is decidedly larger than the largest of the modern series, while the largest ancient example is three times the size of the largest of the modern series.

These differences in size, as measured by interior area, are sufficient to justify a demand for clear evidence that the ancient rooms were sweatrooms, and the question arises as to whether we should call them small. The intermediate position of Structure P-7-1st is pertinent in this connection. The evidence that it served the same function as the largest of the series, Structure N-1-1st, is so convincing that, we believe, we can safely stretch the degree of smallness shown by the modern examples so as to include all three of these ancient ones, classifying them also as small. We must remember, however, that "smallness" alone is no sufficient sweathouse indicator.

The proper connotation of smallness in this connection is that the room is not too large to be heated successfully for sweating. The modern examples in our series are in temperate highland country, the ancient ones in the tropical lowlands where larger rooms could presumably be properly heated with the same amount of fuel. Moreover, fuel and ready labor to gather it were undoubtedly more plentiful at ancient Piedras Negras. If necessary, presumably more fuel was burned in the ancient structures, and presumably they are larger in order to accommodate more persons at one time. Being hard by temples, palaces, ball courts and monuments, these ancient buildings probably had to serve many patients being ministered to by special priests on particular days of trade and ceremony. There is no reason to expect them to be so extremely small as the modern privately owned ones near dwellings. It is quite likely that smaller ones also existed in the peripheral areas of the site, and in tributary villages, for use of permanent residents.

Table 9.1 Metric Dimensions for Archaeological and Ethnographic Sweat Houses

	Sweat-Room (Interior) Length	Depth	Max. Height	Area (sq. m.)	Doorway Width	Doorway Height
Modern						
San Martín Teotihuacán	?	?	?	?	0.5	0.7
Tepoztlán	1.6	1.8	1.1	2.9	0.5	0.6
Chichicasteñango 1	1.8	1.8	1.5	3.1	0.6	0.6
Milpa Alta 1	2.0	2.0	1.1	3.6	0.5	0.6
Aguacatán	2.4	2.1	1.2	4.9	1.0	0.9
Ancient Piedras Negras						
Str. P-7-1 st -B	3.3	2.2	2.7	7.3	0.8	1.1
Str. J-17	4.0	3.0	?	11.8	0.8	?
Str. N-1-1 st -B	4.8	3.3	?	15.6	0.7	1.0

Table 9.2 Comparative Trait Table of Ethnographic Sweat Houses

	Agua catán	Chichicaste nango	Tepoztlán	Milpa Alta I	San Martin
A					
Drain*		X	X		
Sink*				X	
Sunken Doorway*			X	X	X
Sunken Passage*				X	X
Peripheral Slopes*					
Plaster Passage Drain*					
B					
Draft Hole*		X			X
Steam-Screen*	X	X	X	X	X
Fire Chamber*			X	X	X
Firebox*	X				
Fireplace*					
Extra Fireplace*			X	X	
Cold Air Entrance*		X	X	X	X
Hot Air Entrance*			X		X
Sherd Wall*					
Sunken Firebox					
Firebox Sill					
C					
Smallness of Room*	X	X	X	X	X
Lowness of Room*	X	X	X	X	X
Narrowness of Doorway*		X	X	X	X
Lowness of Doorway*	X	X	X	X	X
Sweat Room Door Sill					
Curtain Holders*					
Air-Tight Ceiling*	X	X	X	X	X
Vaulted, Low Walls*					
Semi-Vaulted, Low Walls*					
Flat Ceiling*					
D					
Bench in Sweat-Room	X				
Niche in Façade			X		
Protective Roof	X		X		
Enclosing Building		X		X	
Large Stone Lintel					
On-End Construction					
Bench in Enclosing Building					

Note: Certain presence of trait is symbolized by X; some physical evidence for it symbolized by P; where a single element served several phases the symbol is repeated after the underlined symbol, underlining indicating a first appearance (Strs. N-1 and P-7 only); many blank spaces indicate lack of evidence, not known or probable absence of the trait; starred traits considered clearly suitable for sweathouse function.

Such little data as we have on the heights of the ancient rooms suggest that at the center of the rooms they were not so low as the modern ones, but there is good evidence that a limit on the ceiling-height was in the architect's mind. This also would affect the problem of heating.

Apparently the single ancient doorway could be somewhat higher and wider than in any in our small modern

series, but not very much so. The higher Piedras Negras doorways were sunken, and secondary lessening of the amount of the sinking eventually reduced the heights. As a working hypothesis we can assume that the above tabulation covers or nearly covers the full range of the dimensions to be expected in ancient private or public sweathouses, though knowledge of ancient private ones is for the future.

Air-Tight Ceiling

Chambers for sweating, with or without steam, must be designed so as to prevent escape of hot air or steam through the roof. Skins or textiles on wooden frames are sufficient, but in masonry sweatrooms of Middle America it is a safe assumption that the roof and hence the ceiling will be of masonry, or else at least a ceiling of plastic material such as adobe will be provided, as in certain modern examples considered here. In the trait list air-tight ceiling covers any modern variety of such a ceiling, without differentiating one method of construction from another, and without considering small openings which could be easily closed. At Piedras Negras separate trait status is accorded to three sorts of roof which provided, or may have provided, air-tight ceilings for sweatrooms. Of these, the vaulted and semivaulted roofs on low walls not only provided low ceilings, but presumably they provided airtight ones. In some cases we suspect entirely flat ceilings for the sweatroom though this has not been proved. Because these rooms were in enclosing buildings the originally plastic material supported by the roof-beams might have been adobe rather than lime-concrete. With any of these known or suspected roof-types the ceiling would be air-tight unless special openings were provided.

Miscellaneous Traits

Benches in the Sweatroom

It is evident that a bench inside the sweatroom might be intended to keep the patient nearer the ceiling and the steam collected there. Remembering Clavigero's remark on varying the patient's height, one might expect movable benches of perishable materials to be used; these would not be found archaeologically. The wooden bench in Figure 9.1 is permanently fixed. Perhaps, therefore, masonry benches in the sweatroom should be considered as a possibility, though I do not know of any. Besides increasing the severity of sweating (for a given room), they might, one would think, make it easier for the ministrations of the attendant. Sunken passages at Piedras Negras produce a bench-like effect by dividing the floor into two parts, raised above the passage floor. In the example of Figure 9.9 a patient might lie at full length close to the edge of the bench thus formed; but in other cases, for instance in Figure 9.46 or 9.57, the space near the passage is too confined for this.

Exterior Niche

The Codex Magliabecchiano drawing shows a face over the sweatroom doorway, presumably of a deity. While Cresson describes small niches in the steamroom wall as used for holding soap (as in Figure 9.2), one suspects a niche might anciently have functioned for holding objects

of religious veneration; a modern example seems to be shown in Figure 9.3, where a cross may be seen above the doorway. Niches in the façade of a supposed sweatroom may perhaps be considered as contributing evidence of that function, and we find them in the one Piedras Negras example in which the façade is known above doorway height. They are placed on either side of the doorway, too high to be easily reached (Fig. 9.62). Any thing which may have been placed in them was apparently movable.

Protective Roof

Where the ceiling of the sweatroom is of adobe, there may result an exposed adobe roof-surface, as in Figure 9.1. Where there is much rain such a surface is unsuitable for unprotected exposure to the weather. Instead of laying a weather-resistant roof-surface directly on it, a separate roof may be provided. In the cited example this is of tile, and it is in part independently supported. Completely separate roofs of thatch are shown by Stoll (1886) for the Pokomchi, by Blom and La Farge (1927) for the Tzeltal, and by La Farge and Byers (1931) in the Cuchumatán mountains.

Where this additional roof is little larger than is necessary to prevent erosion of the sweatroom below it, I will call it a protective roof. In the case of the Tzeltal sweathouse just mentioned, the roof is entirely supported on its own posts, and overhangs the sweatroom somewhat on all sides. If the size of that roof should be greatly increased, it would still protect the sweatroom, but it would be reasonable to suppose that it then had some additional function, whether or not it was provided with walls. The roofed area could be said to enclose the area of the sweatroom. Enclosing Buildings need to be distinguished from mere protective roofs, since they seem to have been characteristic at ancient Piedras Negras, even where a known vaulted-masonry roof of the sweatroom itself could easily have been weather-proofed with polished plaster.

Enclosing Building

In considering this feature as a separable trait, we may first try to get some notion of what its function may be. The modern sweathouses appear to be adjuncts of dwellings. Clavigero (1817) says: "The desired evacuation being achieved, steam is let out, the door is opened and the patient appears; or if not, they carry him out on the mat or on the mattress to a piece (of furniture?) nearby, since always there would be some habitation in the neighborhood of the bath." Gamio tells us that the cure is not completed with the bath; "on coming out (the patient) is clothed completely and then she is bound, putting a great quantity of cloths called *muñecos* on the abdomen. All these operations proceed alternating with prayers and *persinados* which give a certain religious aspect

to this custom. But the series of trials (*ajetreos*) of which the recently delivered is the object does not end here: to prevent that the blood *se coma al estómago*, and to avoid also *mal de ojo* or some infirmity of this sort, it is necessary to take a regular quantity of mezcal with salt” (translating Gamio 1922.) Another more elaborate medicine is prepared, which the patient “takes to supplement the effects of the bath and which has the virtue of giving force and vigor.”

The point sought to be made by the above quotations is that part of the curative complex is (and probably was anciently) performed outside the bath. During the good weather post-bath ministrations could theoretically be administered out of doors, but unless the patient was taken to a nearby dwelling a roofed area adjacent to the sweatroom would surely be convenient. This actually occurs in Cresson’s Sweathouse 1 at Milpa Alta, where walls in addition to those of the sweatroom itself provide a sort of small room, open at one end; while Sweathouse 1 at Chichicasteñango is placed entirely within a room of the dwelling. Originally that room was probably not meant to contain the sweatroom, since the latter blanks out the lower part of a niche in its wall, but it seems to be actually used in connection with sweat-bathing only.

In the above two modern examples the sweatrooms are partly or entirely surrounded by what we shall call enclosing buildings. In order to allow for a wide variety of designs which may provide for the same basic function, it will be useful to define this term somewhat loosely. As used here the enclosing building may be partly or wholly defined by outer walls, and may or may not be cut up into one or more rooms (Figs. 9.9, 9.25 and 9.46); or it may consist of no more than a roof with supporting elements, as was probably the case in the structure of Figure 9.8. The minimum connotation of the term is that the enclosing building provides a roof continuous with that of a small room, or one which covers that of the small room; and that this roof covers one or more areas adjacent to the small room, these areas being large enough for activities outside the small room, though near it.

Thus defined, the term is broad enough to include the open front galleries which give a T-shape to the Chichén Itzá sweathouses, and to include a possible reconstruction of rooms at the sides of the sweatroom in Figure 9.27, leaving the door of the sweatroom opening out-of-doors. One imagines, however, that there was usually, if not always, a roofed area in front of the sweatroom.

Needless to say, ancient enclosing buildings thus defined did not always serve sweathouses. The term is equally applicable to temples at some sites, notably at Uaxactun and Palenque, where the main temple room encloses a miniature building best called a sanctuary or shrine. It happens that at Piedras Negras both temples

and palaces have been thoroughly sampled, and here all known enclosing buildings seem to have been integral parts of sweathouses.

Additional Traits at Piedras Negras: Terms

Drainage and Entrance Arrangements

Plaster Passage Drain

The shallow depression in Figure 9.4 shows that drainage provisions may be very rudimentary, yet present. If this depression had been in a plaster floor, it would have been permanent. In the earliest phase of the earliest period of Structure P-7 at Piedras Negras, a similar depression in plaster was found in front of the probable remnant of a firebox. Though approximately as wide as the sunken passages which later overlay it, its depth (about 5 cm) is too slight to justify classifying it as a sunken passage. It slopes appreciably downward toward the outside of the probable sweatroom, as evidenced by Unit 34x in Figure 9.57. A part of one side of this depression is indicated in the figures as 34'.

This we shall call a plaster passage drain, connoting thereby that it was probably full doorway width, and, being in the plaster only, it is very shallow, relatively permanent, sloping, and so placed that it will drain off water. Unlike a sunken passage, it is too shallow to be of any appreciable use in entering the doorway or in sweeping out ashes. The fact that it is here probably full doorway width is no argument against drainage function, I think, since a flat surface in the doorway would seem to be desirable; passage is inserted in the term to distinguish it from the narrow drain of Figure 9.4.

Heating and Steam-Producing Arrangements

Sherd Wall

This is a wall of potsherds laid in mortar. In the one sure case, it forms the rear wall of the firebox and slopes outward somewhat, like a very steep half-vault (H” in Figures 9.11 and 9.12). Here it is quite thick, but one suspects that sherd walls may have sometimes formed a thinner, veneer-like element (reconstructed in front of 6”, and rising from 6’ in Figure 9.57). The sherds are thick ones for the most part, with rims of rim-sherds selected for exposure in the face.

Three functions, each entirely compatible with sweathouse function, suggest themselves. This feature may be merely to protect the stonework behind, which here is of necessity limestone. This seems unlikely to be the real purpose, as the sides of the same firebox are

Table 9.3 Comparative Trait Table of Archaeological Sweathouses (N-1, S-19, J-17, O-4, S-2, S-4)

	N-1-2nd	N-1-1st-B	N-1-1st-A	S-19	J-17	O-4	S-2	S-4
A								
Drain*								
Sink*							X	
Sunken Doorway*			X		X	X		X
Sunken Passage*	P	X	X	X	X	X		X
Peripheral Slopes*								
Plaster Passage Drain*								
B								
Draft Hole*								
Steam-Screen*								
Fire Chamber*								
Firebox*	P		X		P		X	
Fireplace*								
Extra Fireplace*								
Cold Air Entrance*								
Hot Air Entrance*								
Sherd Wall*					P		P	
Sunken Firebox		X	X		P		X	
Firebox Sill	P	X						
C								
Smallness of Room*		X	X	X	X	X	X	X
Lowness of Room*		X	X					
Narrowness of Doorway*		X	X		X	X		
Lowness of Doorway*			X	X		X	X	
Sweatroom Door Sill		X	X					
Curtain Holders*								
Air-Tight Ceiling*								
Vaulted, Low Walls*								
Semi-Vaulted, Low Walls*		X	X					
Flat Ceiling*								
D								
Bench in Sweatroom								
Niche in Façade								
Protective Roof								
Enclosing Building		X	X	P	P	P	P	P
Large Stone Lintel		X	X	X	X	X	X	X
On-End Construction		X	X				X	
Bench in Enclosing Building			X		P			

Note: Certain presence of trait is symbolized by X; some physical evidence for it symbolized by P; where a single element served several phases the symbol is repeated after the underlined symbol, underlining indicating a first appearance (Strs. N-1 and P-7 only); many blank spaces indicate lack of evidence, not known or probable absence of the trait; starred traits considered clearly suitable for sweathouse function.

not lined with or formed of sherd walls, and as a result were very badly cracked and calcined. The slope might be to throw heat forward, and it might be that limestone walls, considered sufficiently durable if vertical, would soon actually fall if sloping. A third possibility is that this wall is for steam production. One imagines that sherds might store more heat than limestone; if so, selection

of this special material may correspond to the apparent insistence on a special type of volcanic stone in modern Mexico for steam-screens.

Sunken Firebox

One in which the floor of the box, on which the fire is built, is below floor level of the sweatroom. This is the

Table 9.4 Comparative Trait Table of Archaeological Sweathouses (R-13, P-7)

	R-13	P-7-4th-B	P-7-4th-A	P-7-3rd	P-7-2nd-F	P-7-2nd-E
A						
Drain*						
Sink*						
Sunken Doorway*					P	P
Sunken Passage*	X			X	X	X
Peripheral Slopes*						
Plaster Passage Drain*		X				
B						
Draft Hole*						
Steam-Screen*						
Fire Chamber*						
Firebox*		P	P	P	P	P
Fireplace*						
Extra Fireplace*						
Cold Air Entrance*						
Hot Air Entrance*						
Sherd Wall*						
Sunken Firebox					P	P
Firebox Sill				P		
C						
Smallness of Room*	X	P	P		P	P
Lowness of Room*						
Narrowness of Doorway*						
Lowness of Doorway	X					
Sweatroom Door Sill						
Curtain Holders						
Air-Tight Ceiling*						
Vaulted, Low Walls*						
Semi-Vaulted, Low Walls*						
Flat Ceiling*						
D						
Bench in Sweatroom						
Niche in Façade						
Protective Roof						
Enclosing Building	P	P	P		P	P
Large Stone Lintel	X					
On-End Construction						
Bench in Enclosing Building						

Note: Certain presence of trait is symbolized by X; some physical evidence for it symbolized by P; where a single element served several phases the symbol is repeated after the underlined symbol, underlining indicating a first appearance (Strs. N-1 and P-7 only); many blank spaces indicate lack of evidence, not known or probable absence of the trait; starred traits considered clearly suitable for sweathouse function.

arrangement in the three fireboxes examined (H' in Figure 9.10, E' in Figure 9.34, 6' in Figure 9.57). A reasonable postulated function for this detail is that it would make it easier to keep the floor space occupied by the patient clear of ashes; when, as here, it is associated with a sink or sunken passage, draft to the fire would perhaps be increased.

Firebox Sill

In two of the above cases, although sunk below general floor level, the firebox floor was originally above the sunken passage level, with a sill at the opening to the firebox (Figs. 9.11 and 9.57). Feeding or fanning the fire would be a little more convenient, since the operator could be lower with reference to the fire and hence in

a stratum of air cooler and less dense with smoke than otherwise.

Sweatroom Door Sill

In both the above cases, the postulated advantage was nullified later by raising the sunken passage level to firebox floor height, with provision of a new sill at the doorway (B in Figure 9.11; 1 in Figure 9.57). This had the effect of reducing the height of the doorway. Why this should be done is a matter of mere speculation. If, as we believe, there were no ventilators, the change would presumably reduce the rate at which warm air passed out the top of the doorway and cold air in at the bottom. Perhaps it would tend to absorption, by the walls and ceiling, of a higher percentage of the heat produced, and so reduce the necessary amount of woodcutting with stone tools. This would be a factor of more importance to the ancient than to the modern Maya.

Heating and Steam-Retaining Arrangements

Curtain Holders, Apparent Absence

In sweatrooms, of all places, one would expect arrangements for closing the doorway. Curtain holders, in the form of depressions crossed by slender stones, and similar devices which survive if the wall survives, are known at other sites, but have never been found here. The sculpture on "Lintel" 3 suggests that curtains were, or might be, hung on the outside of palace doorways, supported from holes in the medial molding. No such holes were in the molding of the supposed sweatroom of Structure P-7, where they would have survived. Some other method of closing the doorway may be presumed, but it might be well to be on the lookout for curtain holders in ancient Maya sweat houses.

Vaulted Ceiling with Low Wall

The vaulted type of ceiling is not used by modern Mayan peoples, but was common among the ancient ones. It seems ill-suited for sweatroom construction because there is a structural limit to the flatness of its slopes, hence a minimum height to which the half-vaults must rise before the gap between them can be bridged with capstones. Presence of ordinary vaulting, with capstones, may, therefore, be thought to weigh against sweatroom function. Two factors may tend to minimize this disadvantage. The maximum ceiling (capstone) height can be reduced below what is normal by abnormally low walls below the vault spring. Besides this, the cubic amount of enclosed space can be reduced by half-vaults sloping in from all four sides instead of merely from two. Both of these mitigating factors are present in the supposed steamroom of Structure P-7-1st, the only one encountered with ordinary vaulting.

There was, undoubtedly, a certain amount of space at the top of this room which, because of its height, would contain hot air and later steam which would have little effect on a patient, unless fanned down with a good deal of effort. I have made an approximate calculation of the enclosed space above the vault-spring of this room, which, on the average, was about 72 cm above the floor. If a steam cloud filled this space, with its bottom at vault-spring level, its volume would be about 6.9 cubic meters, the area of its bottom about 7.1 m. This means that the bottom of the steam cloud would be at the same level as with a flat ceiling with walls about a meter higher, that is, a total of 1.7 m.

This latter height, which cannot be determined from one cross section only, is what should be compared with heights of known sweathouses with flat or nearly flat ceilings. For comparison with the Aguacatán example, we may take the height of the walls there, 1.2 m and add one half of the additional height to the ceiling at center, getting a comparable figure of 1.3 m. In order to produce a low-lying cloud of steam at a given height above the floor, the P-7 chamber would require the average thickness of the cloud to be about 42 cm more, per unit of floor area.

Semivaulted Ceiling with Low Wall

Semivaulted has been applied by us where wooden beams, instead of capstones, bridge the gap between the half-vaults, forming a beam-and-mortar element in the roof. It could cover protected beam-and-adobe vault-supported roofs, if such existed. Existence of this combination of the two roof types is considered established on the enclosing building of Structure P-7, where it seems to have been adopted to permit a wider span than would be feasible with complete vaults, the material of the roof being lime-concrete.

Such a roof could also be used to permit a lower ceiling with a given span, and so would appear suitable for steamroom construction; and it might combine this effect with a span wider than seemed possible with complete vaulting, or with beams only. We have reconstructed it in Figure 9.35, because the span there is probably somewhat wider than in the other figures on the same page, and about the same as in Figure 9.10. The span in Figure 9.10 is somewhat greater than in any known complete vault at the site. In addition, the soffit slopes in this structure are very steep. The vault-spring is ill-defined, but the existence of the slopes was quite certain; it is equally certain that they were not carried up to form a completely vaulted ceiling, which would have left more débris than was found. We have considered that presence of the slopes rules out the logical possibility of a thatch roof. Walls only 50 cm high (in the room of Figure 9.10) obviously indicate that lowness was desired.

Table 9.5 Comparative Trait Table of Archaeological Sweathouses (P-7)

	P-7-2nd-D	P-7-2nd-C	P-7-2nd-B	P-7-2nd-A	P-7-1st-B	P-7-1st-A
A						
Drain*						
Sink*						
Sunken Doorway*	P	P	P	P	X	X
Sunken Passage*	X	X	X	X	X	X
Peripheral Slopes*						
Plaster Passage Drain*						
B						
Draft Hole*						
Steam-Screen*						
Fire Chamber*						
Firebox*	?	P	P	P	X	X
Fireplace*						
Extra Fireplace*						
Cold Air Entrance*						
Hot Air Entrance*						
Sherd Wall*						P
Sunken Firebox	P	P	P	P	X	X
Firebox Sill						
C						
Smallness of Room*	P	P	P	P	X	X
Lowness of Room*					X	X
Narrowness of Doorway*					X	X
Lowness of Doorway*					X	X
Sweatroom Door Sill						X
Curtain Holders*						
Air-Tight Ceiling*						
Vaulted, Low Walls*					X	X
Semi-Vaulted, Low Walls*						
Flat Ceiling*						
D						
Bench in Sweatroom						
Niche in Façade					X	X
Protective Roof						
Enclosing Building	P	P	P	P	X	X
Large Stone Lintel					X	X
On-End Construction					X	X
Bench in Enclosing Building			P		X	X

Note: Certain presence of trait is symbolized by X, some physical evidence for it symbolized by P; where a single element served several phases the symbol is repeated after the underlined symbol, underlining indicating a first appearance (Strs. N-1 and P-7 only); many blank spaces indicate lack of evidence, not known or probable absence of the trait; starred traits considered clearly suitable for sweathouse function.

Flat Ceiling

This type of ancient Maya roof seems obviously the most suitable to sweatroom construction, provided the span is not too great without semivaults. It has been restored on five of our examples, without ignoring any available data, but could not be positively proved. However, in all cases

postulated as sweatrooms, except for Structure P-7, the roof was certainly not completely vaulted, which leaves either semivaulting or beam-and-mortar roofs as the only reasonable alternatives.

Independently of the calculation respecting a hypothetical steam cloud in the Structure P-7 room, flat

or semivaulted ceilings had been reconstructed for the others at 2 m above the floor. There is nothing precise in this reconstructed height, as it is based on debris depth only. The true height might be something more, but also it might be a good deal less. In all cases, including the vaulted one, it can be said, roughly, that the Piedras Negras rooms were, in effect, probably substantially higher as well as larger than that at Aguacatán.

Considering that the Piedras Negras rooms cover a larger area and possess much larger fireboxes (presumably they were designed for at least two patients at a time), this amount of extra height does not seem unlikely. In the non-vaulted or semivaulted examples it would permit attendants to pass freely about while erect, and there is no presumption that the ancient Maya ruling class was content with such tiny bake oven-like rooms as are the present Indians.

One may doubt whether these larger and higher rooms could be made as hot as the smaller modern types, but there is little doubt that, with their large fireboxes and possibly fire-screens as well, they could be more or less filled with steam for a considerable period of time. Disregarding space occupied by part of the firebox and probably by several persons, the enclosed space above floor level was never more than, roughly, 30 cubic meters (for the semivaulted Structure N-1 as reconstructed). It may always have been considerably less. This probably extreme figure is about four times the cubic content of the Aguacatán example, which I calculate roughly at 6.9 cubic meters. Fireboxes which may easily have been arranged to store four times as much heat as that at Aguacatán were probably capable, I think, of keeping up steam in the largest Piedras Negras example for the same length of time.

Miscellaneous Traits

Large Stone Lintels

These may be mentioned as a local characteristic tending to confirm the placement of our supposed sweathouses in one group. Without exception, the sweatroom doorway was bridged by a heavy stone lintel, a feature entirely absent in palaces, and present in one temple only.

On End Construction

The entire front of the firebox in Structure N-1 (Fig. 9.16) up to the level of a lintel over its opening, consisted of slab-like massive stones set on end. In Structure P-7 both jambs of the door-like firebox opening were of single, large stones set on end (Fig. 9.64); and in Structure S-2 this was the case with one of the two sides of the corners of the opening (Fig. 9.34). This on-end sort of construction is thus found in all three of the fireboxes known, but is completely unknown elsewhere at the site,

unless we equate it with sloping veneer on one ball court and one terrace.

Benches in the Enclosing Building

These occur in the two enclosing buildings in which they have been properly searched for (Figs. 9.9 and 9.46 illustrating Strs. N-1 and P-7-1st-A), and probably in a third, where some half-hearted trenching was done (Fig. 9.26). In Structure P-7-1st two of the benches seem to have been thrones, of the type found in palaces at this site. Those in Structure N-1 seem suitable for post-bathing ministrations, but we have no real evidence as to their function.

Sweathouse Identification at Piedras Negras

Having analyzed out a large number of traits in modern, and in ancient Piedras Negras sweathouses, their various known combinations into complexes are now presented in the [Comparative Trait] Table [Tables 9.2–9.5]. The process of trait analysis has been pushed to the limit, principally with the objective of maximum usefulness as a guide in future excavations. For some of these traits it is their linkages into complexes which make them valid function-indicators.

To facilitate recognition of such combinations as seem to be valid primary or secondary sweathouse criteria, the traits are grouped in the table as follows:

A. Traits clearly suitable for drainage of a room (other than a mere sloping floor), and others associated with them.

B. Traits clearly suitable for heat and/or steam-production, and others associated with them.

C. Traits clearly suitable for heat and/or steam retention, and others associated with them (including possibilities which should be looked for though apparently absent in the series covered by the table).

D. Miscellaneous traits associated with those listed under A, B or C.

Those traits considered to be “clearly suitable” in providing for the function implied by the letters A, B or C, are starred. If a building shows enough starred traits in each of the lettered groups to convince one that drainage, heat production, and heat retention were the objectives, it is convenient to say that it exhibits an “ABC” complex. Among the five selected modern examples, four show this “ABC” complex, while that at Aguacatán shows only a “BC” complex. This series of modern examples is very small, but it is widely distributed geographically. We can probably safely assume that ancient Maya sweathouses should show the “BC” complex as a minimum. This would include Morley’s Chichén Itzá examples, but rule out his Quiriguá ones, as well as East Coast shrines.

Table 9.6 Summary Tabulation of the ABCYZ Complex

N Phases						
4	N-1-1st-B & A; P-7-1st-B&A	A*	B*	C*	Y*	Z*
1	S-2	A*	B*	C*	Y*	?
2	J-17; P-7-2nd-A	A*	?	C*	Y*	?
3	O-4; S-4; R-13	A*;	B	C	Y*	?
6	P-7-4th-B; P-7-2nd-F, -E, -D, -C, -B	A*	B	C	Y*	?
1	S-19	A*	?	C	Y*	?
1	P-7-3rd	A*	B	?	?	?
1	P-7-4th-A		B	C	Y*	?
1	N-1-2nd	A	B			

In the tables, the presence of traits establishing these complexes in the modern examples is indicated by the letter “x” which signifies its presence without any guessing or inference. In one case, at Sweathouse 1 at Chichicastenango, the presence of the enclosing building is thus indicated in Group D, though it is a room apparently first built for some other purpose. That is apparently not the case with Sweathouse 1 at Milpa Alta. Let us represent this particular miscellaneous trait by the letter “Z,” in view of its importance in ancient examples. We have, then, among the modern ones, the complexes ABC, ABCZ and BC.

Turning to those boxes of the tables which cover ancient structures at Piedras Negras, we may first consider those mounds and phases where the evidence is most satisfactory, i.e., those columns where there are “x’s” only, or where a “p” for merely some physical evidence does not affect the certainty of provision for drainage and heat production and retention (i.e., where the “p’s” do not affect the certainty of complex ABC). We find this complex, clearly proved by adequate physical evidence, in five columns, those applicable to the one known phase of Structure S-2 and to the last two phases of Structure N-1 and of Structure P-7. Complex ABC is thus surely present at three of the eight mounds, and in five of the twenty phases.

The particular drainage and heat-producing arrangements listed respectively under “A” and “B” are unsuited to aboriginal dwellings and are known to be absent in local temples and palaces, near which we find these mounds. Some of the features starred under “C,” such as smallness of room, have been found in such ancient ceremonial buildings. This we find in the temple, Structure J-4-1st-A, and in the palace, Structure J-6-1st. In the latter case the vaulted roof also springs from very low walls. But in neither of these cases is the doorway narrow or, so far as known, low, features

which undoubtedly were essential for heat or steam retention. So, disregarding the extra phases, we can not only say that at three of the eight mounds we have the ABC complex; we can also say that none of the separable complete linkages of traits justifying any of the separate constituents of this complex are found in temples or palaces. The latter are defined by what seem adequate criteria of their own.

We can be doubly sure, then, that the ABC complex in three of our eight mounds served the same function as it does elsewhere today, since even its separate parts cannot be reasonably assigned to other ancient functional types of building.

Two of these three sweathouses, Structures N-1 and P-7 (in the latest two phases of each) were certainly placed in enclosing buildings, and showed the Complex ABCZ. Much more than at Milpa Alta, where we have the most satisfactory ABCZ complex, it is here clear that the enclosing building was important, and was especially designed for use with the sweatroom (Figs. 9.8, 9.9 and 9.46). This “Trait Z” was evidently firmly linked to sweathouses at Piedras Negras, since it is unknown for local temples or palaces. The enclosing building stands on the same platform which supports the sweatroom, so the platform can be described as oversize with respect to the sweatroom, though it is not oversize with respect to the enclosing building. In all phases at all mounds covered by the table, we either have an enclosing building, or else a building platform which was oversize with respect to a small masonry-walled room. Let us represent the known enclosing buildings together with their platforms by YZ, and use Y alone for those platforms which are surely oversize with respect to the sweatroom, and which theoretically may have been actually oversize because enclosing buildings have not been proved for them. Our three best-established sweathouses then show the complex ABCYZ or ABCY, with a probability that all three could

be properly symbolized by the full ABCYZ. Trait Y, the separately considered oversize platform, is just as absent from temples and palaces as is the combination YZ. So a linkage of either Y or YZ with A, B or C is a satisfactory secondary sweathouse indicator (Tables 9.2 to 9.5).

We now turn to those columns of the tables which cover earlier and less well-known phases at Mounds N-1 and P-7, as well as single phases at five other mounds, where digging was less extensive. Here we encounter many blank spaces, which may mean nothing more than lack of recovered physical evidence; and there are a good many P's, which mean that some physical evidence for a given trait was present, though it would not be convincing if considered in isolation. In the row pertaining to enclosing buildings, this evidence is the certain presence of the oversize building platform, so for the P's in this particular row we can substitute Trait Y as sure. Making this substitution, the complete tables are summarized below in terms of the ABCYZ complex, the group letter being set down where any physical evidence for a trait of that group was noted. Since this leaves the reader in the dark as to where the physical evidence may be weak, stars are now applied to the group letters where the physical evidence is sufficient to be convincing. The various phases are grouped in descending order with respect to the fullness of such evidence (Table 9.6).

The question-marks in this summary tabulation indicate entire absence of observed physical evidence. Those in the second column (B, for heat-production traits) are entirely due to a decision to stop digging at the mounds concerned when the sunken passage had been linked to a narrow low doorway in a small room on a platform which was oversize with respect to that room. The question marks in the third column (C, for heat retention) in each case reflect less than a complete search for remnants of a sweatroom which probably had been torn down by the Maya to make way for a new one. Lack of physical evidence in this column automatically calls for question marks in the fourth and fifth columns. Sizes are such that, in these two cases, Y? and YZ would belong in these columns if we had physical evidence of the small rooms called for by the AB complex. It is clear that if we had full physical evidence, it would eliminate the theoretical doubts as to the complex ABCY (and probably as to complex ABCYZ) in all phases of all mounds except one; in that, special drainage arrangements were apparently lacking, and the complex BCY (probably BCYZ) applies. This single case (P-7-4th-A) is very early at its mound, but not the earliest, which shows the only example of the plaster passage drain.

Our conclusion is that in all known phases of the eight mounds, sweating and bathing with water were the primary functions. Sweating was provided for by special masonry arrangements for a fire within a small masonry

room designed to retain the heat. This was placed on a building platform oversize with respect to the sweatroom itself. The platform certainly served an enclosing building in the late phases at two mounds, and probably did likewise in all phases at all mounds. Special provision for drainage of the sweatroom was characteristic, and probably universal after an early period of indecision in this regard.

Mound Interpretation

Orientation

I have not attempted to assemble data on orientation of modern sweathouses. So far as one can now tell, the orientation of ancient ones followed the prevailing plan for neighboring structures. Ruppert's figures show that one of the two sweathouses at Chichén Itzá faces northwest like the nearby Caracol, while more intimately associated buildings face southeast; the other (Structure 3 in Square E3) faces east, and is next to Structure 4 facing south (Ruppert 1935). At Piedras Negras these buildings may face northwest, southwest, northeast or southeast. Presumably, if attention to the cardinal points entered in to ancient Maya sweat-bathing, it did not require special orientation of the building itself. Orientations will probably not help in recognizing ruined sweathouses.

Mound Form

The sweatroom being small, and not very long in relation to its depth, it is likely to leave a small distinguishable squarish or roundish mound. This alone is not a sufficient function-indicator, as proved by examination of Structures K-1 and K-3 at Piedras Negras. But here at least, if the small mound is centered on remains of a relatively long, low platform, toward the rear if the platform is also relatively deep, the probability is that it is the ruin of a sweatroom which had been supplied with an enclosing building. Illustrations of this mound type are supplied by Structures N-1, S-2 and S-4, as depicted by Parris before excavation (second edition of map, Morley 1938, Pl. 202). Of course, if enough visible wall survives, or contours suffice to prove that the centered mound is the ruin of a small and not long room, so much the better. These two situations obtained at Structures O-4 and R-13 when Parris drew them.

If one observes a ruined platform without any clearly distinguishable additional small mound centered upon it, it would not be safe to say it is not the ruin of a sweathouse. The sweatroom may often have been built of perishable materials in ancient times, so far as we yet know. Moreover at Structure J-17 the sweatroom is so large in relation to its thin masonry walls, probably without even semivaulting, that the central mound, if present at all, must have been very slight. We did not record a

Table 9.7 Scheme of Temporal Sequences (Structure N-1)

Str. N-1-2nd(earliest)	Building platform, probably with sunken passage	Unit M
	Firebox sill	Unit L
	Piers of enclosing building (postulated without physical evidence: sweatroom, some wooden posts, thatched roof)	Unit J
Str. N-1-1st-B	Sweatroom walls	Unit I
	Firebox with new sill, remnant of its rear wall	Units H, H', K
Str. N-1-1st-A (latest)	Sherd wall in firebox	Unit H''
	Masonry rear and side walls of enclosing building, probably base-walls	Unit G
	Benches	Units F, E, D, C
	Raising of passage floor in sweatroom	Unit B
	Low supplementary platform, stepped-front	Unit A

longitudinal section here, and we excavated before Parris drew his map. Caution in deciding that one does not have a sweathouse is indicated in another case, that of Structure S-19. Here the sweatroom mound was conspicuous. But the platform immediately adjoins another, and it required a carefully controlled longitudinal debris profile to show that the mound was centered between humps presumably representing ruined end-walls of an enclosing building.

It is reasonably clear, I think, that absence of small, squarish, centered mounds on oversize platforms on maps of sites in other parts of the Classical Maya area is

no sure guarantee that sweathouses were confined to the Usumacinta region. Where this type of mound is known, however, it appears to be a fairly sure sweathouse indicator. However, in using this criterion, the dimensions and proportions of the supposed sweatroom mound must be considered. The known ancient sweatrooms are somewhat longer than deep, but not much longer. Thus there is little reason to suspect that Structure O-3 is a sweathouse, because the debris indicates a relatively long narrow room, similar to the excavated Structure F-3 (see map, Figure 1.1).

Table 9.8 Scheme of Temporal Sequences (Structure N-1)

Str.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	Fig.	
N-1	9.10b	9.10b	9.10b	9.10b	9.10c	9.11	9.11	9.11	9.12	9.13a	9.13a	9.13a	9.13a	*
-2 nd	M	M		M	M	M								
							L							
-1 st -B										J		J		
			I					I	K			I		
				H										H
						H'	H'							H'
-1 st -A								H''	H''					
										G	G		G	
													F	
		D	D								E			
										C		D		
	A				A		B	B						

*Not illustrated: *Jamb* of firebox (H) rests on sill (H').

Locations at a Site

It may be said of the Chichén Itzá sweathouses, and of most of the eight known Piedras Negras ones, that they are in somewhat retired positions, but closely associated with major buildings. At neither site is there reason to doubt that these sweathouses formed parts of ceremonial architectural complexes. One of the Piedras Negras examples, Structure N-1, is the main center of interest at one end of a plaza serving temples and palaces, and containing a ball court and carved stela and altars. This is in sharp contrast to the humbler and smaller modern examples, which seem to belong with dwellings.

One supposes that proper examination of peripheral areas, characterized by low mounds, will show ancient dwellings there, and it seems likely that if sweathouses occur in the ceremonial center, they will appear in more modest form in the house-mound zones also. At Piedras Negras this may be confidently predicted on the basis of mound-form in two such zones (Strs. N-7 and K-23 on map, Figure 1.1). In these two mounds, not excavated, the supposed sweatroom mounds are about the size expected, the platforms shorter than most known bases for enclosing buildings of sweathouses. But the platforms (as indicated by the debris) are not much shorter than this component during the earlier periods of Structure P-7 (Figs. 9.41-9.43). The larger and more imposingly placed enclosing buildings may have evolved from a smaller variety which never went out of use in dwelling areas.

The mound-form of Structure O-29 suggests that it be added to the eight examples of large sweathouses as of time of abandonment. It is hard by the East Group Plaza, and quite close to Structure O-4, though at a lower level than the latter, facing on a ravine. It is closely associated with only one other mound, a low platform without the supposed sweatroom mound on it. The latter might be a dwelling, but we know nothing about it, apart from its approximate dimensions. There also appears to be a possibility that a sweathouse was present as part of what we have designated Structure P-6, though the map does not show a special hump of debris which raises the question.

Distribution Elsewhere in the Maya Area

It is not improbable that in ancient times sweat-bathing was practiced in two contexts at the same sites in comparatively large structures of a public or semi-public nature, within the ceremonial precincts, and in less elaborate buildings (or even in temporary constructions) near the dwellings. Failure thus far to investigate "house-mounds" is a sufficient cause for ignorance of probable simpler types at ancient sites, corresponding more closely to modern ones; and scanty attention to low mounds within the ceremonial parts of most sites may

account for the present lack of evidence for presence of the more elaborate variety. With the latter established on a Mexican-influenced and on a classical Maya horizon in the Maya lowlands, and with the modern practice extending into the Mayan highlands, there seems little ground for presuming a restricted distribution of sweat-bathing within the ancient Maya lowlands. It should be searched for wherever one digs, allowing perhaps for the possibility that some regions may have failed to adopt the more elaborate large type. The present evidence for a general distribution in Maya country is scanty, and of uneven quality. Most of what little I have collected has been referred to under Preliminary Remarks, and is covered in more detail here.

East Coast Yucatan(?)

Lothrop (1924) notes that some of the East Coast shrines have only one doorway and could have served as sweathouses. Smallness and lowness in this district do not necessarily connote the sweathouse function, since these characteristics occur with four-door structures which, as he notes, could not very well have imprisoned the heat. Until some additional evidence is found, it appears necessary to allow for the suggestion respecting one-door shrines, but to consider it very doubtful. For instance, as shown in Lothrop (1924), the placement of the shrine of Structure 1 at Tancah corresponds quite closely to that of the large upper building of the Castillo at Tulum, presumably a temple, certainly not a sweathouse, though the Tancah shrine is exceedingly small and low, and has but one doorway. This is no lower than is required by the miniature scale of the building. The same source shows that Structure 3 at Xelha has a single low doorway, less than two feet high. This shrine is on a low platform, as are the supposed Piedras Negras sweathouses. But the interior dimensions seem too small even for a sweathouse. They scale to something close to 0.9 m by 1.3 m.

One other east coast shrine may be cited as an example. This is Structure IX at Coba, for which Pollock gives full data (Pollock 1932). It is small and low, interior dimensions being 1.2 by 1.6 m, with a maximum height of 1.4 m to capstone of the vault. The single doorway is 58 cm wide, its height restored as about 50 cm. Thus it could serve the sweathouse purpose. But much of the floor space is occupied by a low rectangular altar, and absence of evidence of fire is specifically noted.

We have seen that modern sweatrooms may be placed indoors, and one should not assume *a priori* that anciently they could not have been placed in pyramid-supported temples. At Uaxactun we find an indoor structure in this position, which is small in all dimensions and has a single small low doorway. But again, the actual dimensions are too small for the sweathouse function. Smith gives the doorway as 53 cm wide and 60 cm high,

which is reasonable for such a purpose; but the interior dimensions of the tiny room are only 0.6 m by 1.3 m by 0.6 m high (Smith 1937).

I think it is fair to conclude that mere smallness and lowness of a building and of its single doorway, indoors or out, are not safe positive criteria for sweathouse identification, unless accompanied by other criteria. One of these must be evidence of fire, more extensive than burning of incense.

Quiriguá(?)

Morley has seemed to identify two hollow benches in Structures 2 and 3 at this site as probable sweatrooms. The only evidence is the finding of smoke-blackened boulders in one of them by Morris (Morley 1935). The assumption is that these were heated outside and then introduced for steam-making purposes. I submit that this is not enough. In 1937, I crawled into what I believe is the bench of Structure 3 referred to. The entrance, according to my measurements, is about 55 cm wide by 60 cm high, which agrees well enough with modern sweathouse doorways. But one enters a long passage or chamber of the same slight width as the doorway. This, scaling from the published plan, is about 10 feet (3 m) long (and 1 m high as measured by me). At the interior end it turns a corner and leads shortly to a tiny chamber 0.9 m by 1.5 m by 1.2 m high, through a doorway 0.5 m wide and 0.6 m high.

Either of the doorways agrees well enough with known steamroom doorways, but the dimensions of neither of these chambers seem to fit the picture. More than this, the outer chamber or passage is too long for efficient steam saturation. The inner chamber could not be more inconveniently arranged for passing hot stones in from the outside, to say nothing of getting a really sick person to and from it. I submit that archaeological existence of sweathouses in the Motagua drainage is not established by these two hollow benches at Quiriguá, extremely interesting as they are. After all, Morley says only that “both constructions had originally served the same purpose, probably as sweat-baths.” It would be difficult indeed to prove that any given confined place was never used for the purpose.

Chichén Itzá

Morley's two sweathouse identifications at this site rest on firmer foundations (Morley 1936). Excavated by Ruppert and as yet unpublished, Cresson notes with permission the presence of the sunken passage and fire chamber, built onto the sweatroom as in his Mexican cases (Cresson 1938). Unlike them, the fireplace opens only into the sweatroom. When Morley showed these two to me he pointed out abnormally low walls and, in the only example well enough preserved to show it, the low single

doorway and ventilators. Interior arrangements were not then uncovered. Tozzer has suggested that the structure at the cenote may have been a sweathouse (Tozzer 1941). It is, apparently, so much destroyed that definite proof could hardly be expected.

El Chile

The existence of a sweathouse at this Middle Usumacinta site, between Piedras Negras and Yaxchilan, is to be strongly suspected. On pausing there in 1934, I noted a small and apparently isolated building, which seemed to be partly submerged below the surface of the ground. The front showed a doorway 50 cm wide, capped by a stone lintel 12 cm thick. This is not particularly thick, but its length, 1.1 m, qualifies it as larger than necessary for the narrow doorway. Its under side was only 35 cm above the ground, and about 80 cm below the ruined top of the front wall. My estimate on the spot was that the outside dimensions were about 4.8 m length by about 4 m depth. The depth of the lintel, 70 cm, suggests interior dimensions of about 3.4 m by 2.6 m, which compares with an average of 3.5 by 2.2 for our Structure P-7. The debris at El Chile suggested a fallen vault, but this was very uncertain. I thought no more of this structure until 1937 when Pollock, on seeing our Structure P-7, then considered to be a sweathouse, opined that he had seen a structure of similar function at El Chile. I have no doubt that it was the same building referred to in my notes, and that it was a sweathouse. Since the bottom of the doorway lies somewhere below the present surface, where wash from higher ground is indicated, remains of a non-vaulted enclosing building may be completely buried.

Anyone desiring to visit this site would be advised to ask that he be taken to a spot on the left bank known as Palo Blanco, where a species of opening in the bank will lead him directly to it. Maler's name El Chile ought to be retained, but he took it from the site of a *montería* some distance upstream, already abandoned in his time.

Guatemala Highlands

Shook has excavated a possible sweathouse on the Pacific slope of Guatemala, shown by the ceramics to be contemporary with a site called El Paraíso, which was occupied during Late Classic and post-Classic times (Shook 1947). So far as known to the writer no such archaeological evidence for the antiquity of the trait has been encountered in the highlands proper, but apparently Mayan words suggest that the sweathouse is no recent importation there.

The following apparently non-Nahua words apply to modern baths with steam, in Mayan-speaking country on the southern periphery of the Initial Series area, that of our site: Tzeltal, *pus* (Blom and LaFarge 1927); Jacalteca *i'ka* (La Farge and Byers 1931); Pocomchi *tuh* (Stoll

1886). The *Diccionario Pokomchi-Castellano* in the Berendt Collection of this Museum applies *tuh* to an *hornilla* where *se bañan y toman baños calientes*, which seems to take the sweathouse in the northern Guatemala highlands well

back in time. It seems to me that the variety of terms, paralleling the variety of Mayan languages, also argues for some antiquity of the sweat-bathing custom there. A search in linguistic material might enlarge the list.

2. STRUCTURE N-1, *Linton Satterthwaite*

Preliminary Remarks

Details of this sweathouse are presented first because it is the simpler of the two for which we have something approaching complete information. Certain features make it especially interesting. The enclosing building shows widely spaced elements which are apparently the ruins of slender square masonry piers. In the final phase these were connected by thin masonry walls, which may have been mere base-walls carried higher with perishable materials. The roof of the enclosing building thus outlined was probably of wood and thatch during all phases; yet even so its support seems to require that the piers were supplemented by wooden posts at the front and sides, as suggested in Figures 9.8 and 9.9. No sculptural decoration was encountered, but platform units were not extensively investigated. The structure was apparently in use at the time of abandonment. Though in a very important position in the West Group Plaza (Fig. 1.1), its appearance then must have been vastly different from that of vaulted palace and temple buildings on that plaza, though similar to that of the nearby Structure O-18. The latter also exhibits the slender piers, and was probably roofed with thatch. Structure N-1 is also especially important to us because only here was the sherd wall in the firebox definitely established, and here is the best evidence for the combination of vaulting and the beam-and-mortar roof over the sweatroom.

No walls showed in the mound. We had not inferred the sweathouse function from Parris' schematic delineation of the mound contours, though we might have done so (see Morley 1938:5, Plate 202). Carefully measured debris sections made later did not justify the tiny central hump which Parris shows. If this is eliminated, the correspondence with his mounds S-2 and S-4, on the same edition of the map, is more complete. As soon as a central trench revealed the narrow doorway and heavy lintel of the sweatroom, we concluded that we had a sweathouse. Without this foreknowledge, much information regarding the firebox would have been missed.

Ruin, except close to floor level, was complete. Finishing plaster had largely disintegrated except in the sweatroom. Here it was well protected by deep debris,

and easily followed. Presumably it could have been used to determine whether there was a time interval between finishing the platform and construction of the steamroom, but this approach was neglected. The excavation, in 1935, was in charge of Cresson. Measurements for the plan and sections (using triangulation and leveling instrument) and some of the follow-up notes were made by the writer, and I am responsible for gaps in recoverable information.

Unit Designations and Temporal Sequences

Deep cuts to determine the maximum number of phases represented in this mound were not made, but a minimum of three phases is required for the units uncovered. In the scheme of sequences adopted we have held to this minimum. In reality there may have been a larger number of phases. The table of Temporal Sequences (Table 9.7), together with the Stratification Table (Table 9.8), explain sufficiently the unit designations on the drawings, and the necessity of at least three phases. Horizontal Stratification is almost exclusively represented, but in no case is there real doubt as to which of two juxtaposed units was the earlier. The grouping of the three phases into two periods, and assignments of some units to one rather than to another period and phase, seem reasonable, but judgment uncontrolled by stratifications has had to be used. The application of H as the label for a sherd wall believed to post-date Units H and H' and of K to a unit postdating one labeled J violates our usual rule in choosing such designations. Correcting for these inconsistencies did not seem worth the considerable trouble.

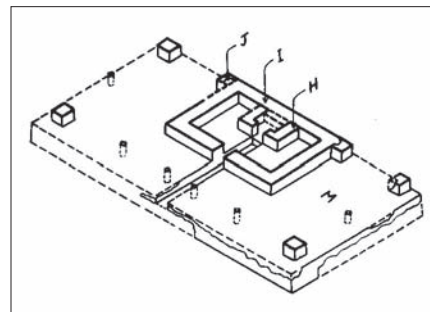


Figure 9.8 Isometric reconstruction of Structure N-1-1st-B (building platform and piers surviving from time of Structure N-1-2nd).

As elsewhere in this report the Stratification Table lists available controls proceeding downward with advancing time, the indicated stratification of lettered units in a column being illustrated in the figure designated at the top.

Remarks on Drawings

Figures 9.8 and 9.9

Because of the unusual character of the enclosing building, special attention is directed to the hypothetical character of the wooden main posts suggested in these drawings. As a general rule in this report, broken-line reconstructions show something known elsewhere on the building concerned, or at least known somewhere at the site. Post-holes in a plastered concrete floor are known in the earliest Acropolis period, but have not actually been seen in association with either piers or thin walls, here or elsewhere. The holes were looked for here along the left front, with negative result. But the floor was completely disrupted and the evidence could easily have been destroyed. On the other hand, the absence of piers where the posts have been postulated seems well established, since the bases of piers survived at the corners, as well as under the protecting debris of the sweatroom, and similar

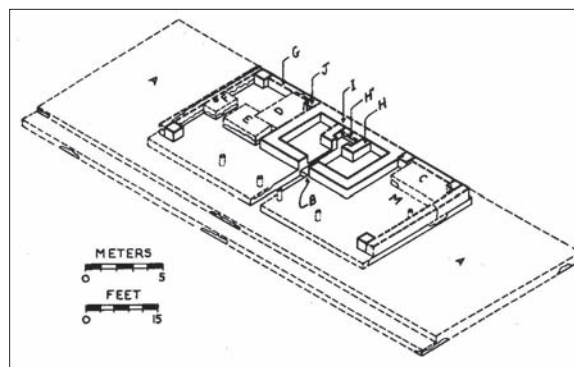


Figure 9.9 Isometric reconstruction of Structure N-1-1st-A (with elements surviving from prior phase).

No top surface had survived on any of the benches (C, D, E, F) shown in Figure 9.9. They may have been somewhat higher than they are shown.

Figures 9.11 and 9.12

Figures 9.11 and 9.12 show an entirely hypothetical reconstruction of the top of the firebox, which had completely fallen. That of Structure P-7

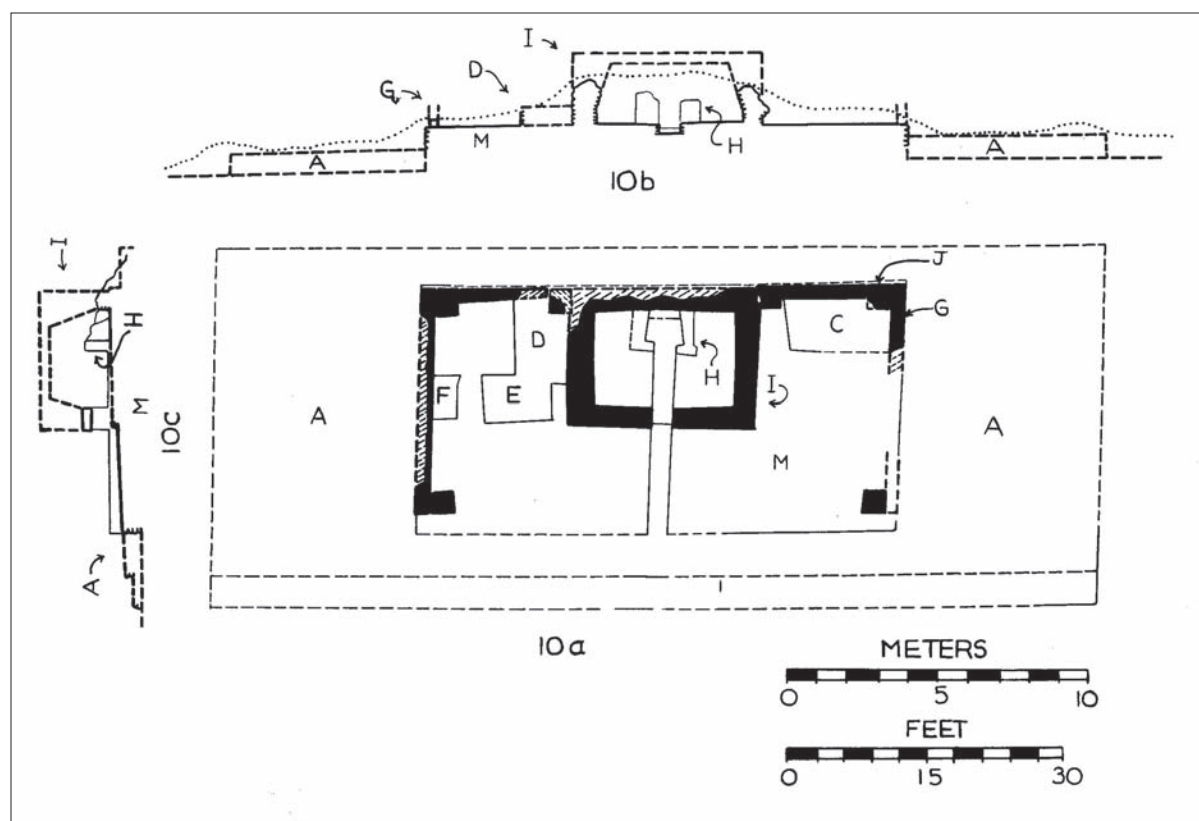


Figure 9.10 a. Plan of Structure N-1-1st-A; b. longitudinal section of Structure N-1-1st-A with firebox in elevation; c. cross section of Structure N-1-1st-A at center.

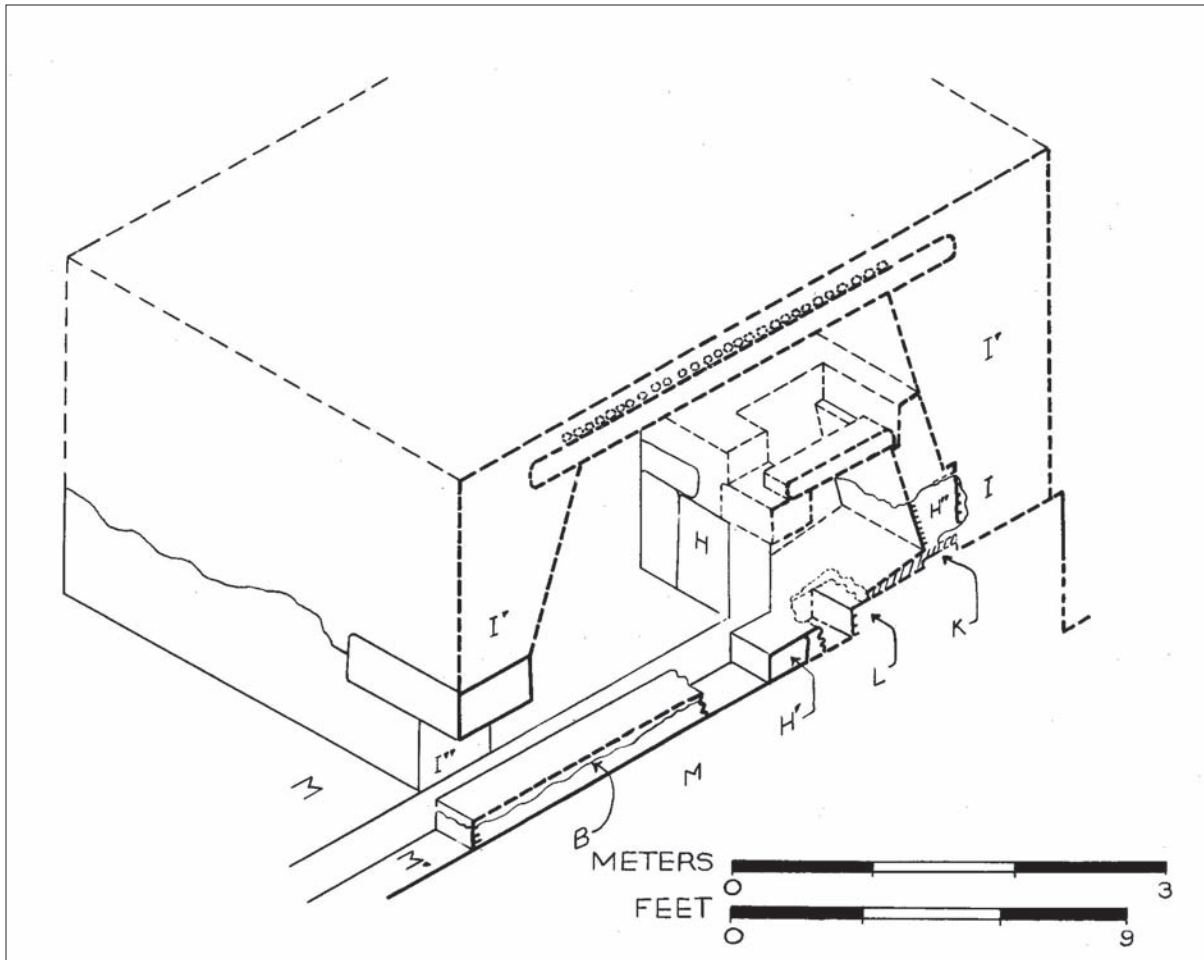


Figure 9.11 Isometric reconstruction of sweat room and firebox of Structure N-1-1st-A combined with cross section at center, all phases so far known on this line.

(Fig. 9.57) has been used as a guide, but this is basing one reconstruction on another. No firebox yet reached by excavation survived to the top. The design adopted for the tops of these fireboxes embodies the use of horizontal slabs as seen at Aguacatán (Fig. 9.1). The minimum length of slabs for such use here would be about 9.8 cm. A number of slabs were measured as they were taken from the debris which filled the box. The thickness ranged from 5 to 11 cm and the maximum length recorded is 60 cm. Two slabs, one of them 50 cm long, touched the floor and probably did not come from the semivaulting of the sweatroom, unless the firebox was entirely open at the top. We failed to attempt fitting to see if some of these slabs were fragments of longer ones, broken during the collapse. The reconstruction is provided as something to look for in future digging, and is not a well-established design here or elsewhere.

Discussion by Periods and Phases

Structure N-1-2nd (earliest)

This period is not represented separately in the illustrations. It has been assumed that the enclosing building and its platform, as shown in Figure 9.8, are survivals from this N-1-2nd period. The sweatroom and firebox of this N-1-2nd period, it is supposed, had been replaced by new ones by the time of Figure 9.8. Apart from those components, Figure 9.8 illustrates what has been assigned to the earliest period we have distinguished.

Building Platform (Unit M)

Under our assumption, this early unit was the same low platform as that shown in Figure 9.8 as of a later time. However, it is possible that it was shorter, and

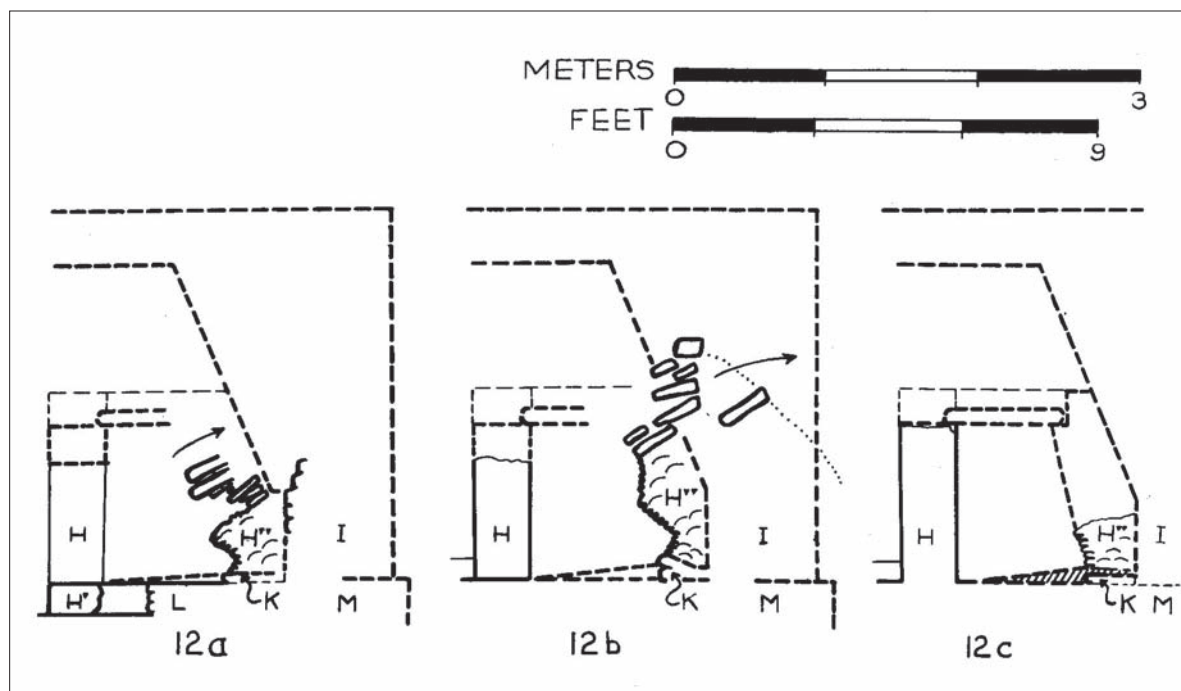


Figure 9.12 Cross sections through firebox, Structure N-1-1st-A, with what is known of earlier phases.

even somewhat less deep, in the N-1-2nd period, the dimensions in the next period being increased by additions. The history of the sweathouse P-7 makes these possibilities more than mere logical ones (cf. Figures 9.8 and 9.42 which are at the same scale). Trenches to determine the matter were not dug. However, even if originally smaller, such a condition might pertain to a still earlier, unrecognized, phase, and not to that here being considered. The presence of the sunken passage in this phase is implied by the sill, presumably of an old firebox, described below.

Enclosing Building (Unit J)

The evidence for this building consists of the ruined bases of six slender masonry piers (J) those shown (with other features assigned to the next period) in Figure 9.8. These are square in cross section, about 75 cm to a side, and are noticeably more slender than those of Structure O-18. The scant amount of debris (Fig. 9.10b) and all other tests prove absence of vaults here, as on Structure O-18. For the support of a roof, wooden posts, or piers since removed, must be postulated at certain points during this period, as in the later ones of Figures 9.8 and 9.9. In addition, there was presumably a centered rear pier or post. While a beam-and-mortar roof can be imagined by postulating interior wooden supports, a thatch roof seems more likely.

We should consider the possibility that the piers never rose to roof height, and were merely bases for

wooden main posts. As such, why should they be provided for some posts and not for others? While slender by comparison with piers at the site in general, they could surely have been carried to a height of 2 m or so without loss of stability. They were in good condition to a maximum height of 40 cm. This is as much as one would expect, whatever the original height. None showed a top surface. The simplest interpretation makes them, in effect, masonry posts for roof support. Remains of these piers may be seen in Figures 9.13, 9.15, 9.21, and 9.23.

Once the surviving sweatroom (labeled Unit I in Figure 9.8) was in place, the supposed central support and the surviving inner piers at the rear were surely unnecessary for roof support. The distances between nearest faces of rear corner piers and the sweatroom are about 3.6 m. Spaces of this length surely could have been bridged by roof timbers of moderate thickness. That the local Maya would have thought so is indicated by the slightly greater width of the doorways in the early temple K-5-3rd. The wall of the sweatroom (I) overlaps one side of the left of these inner rear piers (see Plan, Figure 9.10a). The situation was probably similar at the other inner rear pier, but our record is faulty there. The junction of wall and this pier is shown in Figure 9.23.

The functional meaninglessness of the inner rear piers when the known sweatroom was in place, plus the overlapping of the latter, provide the chief evidence on which we have assigned the structure of the piers (Unit J)

to a period earlier than that of the sweatroom. Cresson's field sketch indicates that the masonry of the sunken passage is discontinuous with that of the jambs of the doorway, as required if the sweatroom is a later construction. This is not actually stated, but is partially confirmed by photographs. An additional factor considered is the fact that the sweatroom does not consistently follow the quite accurate parallelogram formed by piers and passage.

Firebox Sill (Unit L)

Labeling the structure of the piers and posts the "enclosing building" during the N-1-2nd period implies the existence of a contemporary sweatroom, removed to make way for that shown in Figure 9.8. While no physical evidence of this was encountered, evidence of an earlier firebox associated with a sunken passage was not entirely lacking. Unit L (Figs. 9.11, 9.12a, and 9.20) is apparently the sill of an old firebox, the front further to the rear than that of the known firebox. Neither notes nor the photograph make it clear that the sunken passage once reached back this far. But without the passage the sill is inexplicable. There may have been some stone-robbing in the next period, and one stone attributable to the side of the passage may be seen in the photograph. The sill is fabricated of several stones, and is not a monolith, like the later one.

The position of this sill is such that one would expect the rear wall of a hypothetical firebox to have been in the area now covered by the supposedly later sweatroom wall (i.e., by Unit 1). Investigation did not extend this far. We are perfectly free to imagine an earlier firebox, as well as an earlier sweatroom, to go with the known early sill. The sill implies a contemporaneous sunken passage, since it is too far to the rear to be part of a typical stepped-top platform.

Sunken Passage (in Unit M)

The passage, assumed to date from the beginning (on the basis of the foregoing evidence), slopes slightly downward toward the front, at least in the major portion of its length, i.e., from the firebox sill of the next period. It certainly would have drained off any water which reached it. The passage is about 70 cm wide. During this period and the earlier phase of the next the vertical depth of the passage was measured as 32 cm, near the surviving firebox, and about 40 cm at the surviving sweatroom doorway.

Structure N-1-1st-B

In our adopted scheme of sequences, this phase witnesses the installation of the known and presumably new sweatroom and firebox, without any unnecessary changes in the platform and enclosing building of the earlier period. The new units (I and H) combine with the older ones (M and J), as indicated in Figure 9.8.

Sweatroom (Unit I)

The presence of semivaulting, though crude and steep, is shown by the cross section of Figure 19.10b. Figure 9.22 shows the inner face of the right (southeast) wall, with semivaulting on it. The photograph shows that there was no consistent selection of slabs instead of blocks, for use above the vault-spring. The slope, beginning about 50 cm above the floor, was quite definite, and noted on both right and left walls. At the front the surviving vaulting had started to fall inward as the low wall itself leaned outward. The cross sections of Figures 9.12a and 9.12b suggest strongly the presence of the soffit slope on the rear wall, though destruction was here far advanced. Despite the rudeness of this vaulting, and the collapse of its upper part everywhere, all this evidence of the existence of soffit slopes is too much to attribute to coincidence, though at any one point the observed cross section might seem attributable to chance and to movement as ruin progressed. The use of blocks as well as slabs in the sloping portion corresponds with the practice in the unused chamber above the sweatroom at Structure P-7.



Figure 9.13 General view, enclosing building and sweat room from right rear corner, surface of supplementary platform (Unit A) in extreme foreground. Note remains of benches, piers, and probably base walls; man with rod stands in sunken passage outside (front of) sweat room.

We are surely dealing with semivaulting only, and not with the ruin of a completely vaulted room. That the slopes could never have been carried high enough to be capped with slabs should be clear from the cross section of Figure 9.10b and from Figure 9.14, which indicate the quantity of debris. The precise height reached can only be guessed, with what controls are available. The highest point at which the vault-facing stood intact was 1.2 m above the floor, but the interior hearting of the vaults stood to a maximum of 1.5 m, about at the surface of the mound. In the reconstruction we have added 50 cm to this, giving a ceiling height of 2 m which, one imagines, is too high rather than too low. The soffit slope, as indicated by a section in good condition (on the right wall) is taken as 15 degrees.

As reconstructed, the space spanned by the beams is about 2.5 m, the maximum required in the reconstruction

of the enclosing building of Structure P-7 (Fig. 9.47). There the evidence is quite satisfactory for a concrete roof on wooden beams supported by semivaulting. If we assume that 2.5 m was about the maximum unsupported span allowed for a beam-and-mortar roof, the presence of the steep vaulting here is perhaps explained. In both cases, probably, a solid roof with a span wider than this was desired. At the reconstructed height (with the known room depth of 3.25 m), the presence of the semivaulting here reduces the otherwise necessary span of the beams. But this reduction is not great, and the explanation is a dubious one. Of the fact that the roof was largely supported on beams laid across steep half-vaults there seems very little doubt. That it was concrete is suggested by the notation of much light-colored disintegrated mortar among stones and slabs in last 50 cm above floor.

Firebox

Figures 9.8 and 9.10 show the relation of the box to the sweatroom, and one-half of it is reconstructed in Figure 9.11 (H, H'). Attention has already been called to the fact that in the latter figure the top is entirely conjectural. A roof could as well be placed on what had survived.

Front and Side Walls (Unit H)

Figure 9.16 gives a good view of the front wall of the firebox. On the observer's left side of the opening it is formed of two very heavy slabs set on end; on the right side there were two thick slabs also, but that next to the opening has split, presumably from the heat. A heavy horizontal slab at the corner is *in situ*. A stone lintel undoubtedly had its bearing on the jamb slabs. The larger of two lintel fragments, fallen an angle, is shown *in situ* in Figure 9.17. In Figure 9.16 the two pieces of the lintel have been assembled on the sweatroom floor, to observer's right of the firebox. One-half of the front wall is shown in Figure 9.11, reconstructed as we believe it was originally.



Figure 9.14 Partly excavated sweat room and firebox, Structure N-1-1st-A; rod on sweat room floor, lintel in place at left; note sunken passage running from firebox sill to lower left of picture.

The on-end construction of the front of the firebox is in strong contrast to the side walls, which were fabricated of ordinary tabular stone. One can see that this was so in Figure 9.14 (outside of left wall) and in Figure 9.20 (inside of right wall, parallel to the knife lying on firebox floor). On the other side, though in very bad condition, the inner side-wall face may be said to have survived to a height of 86 cm, just a little higher than to top of the opening. These inner faces were vertical.

The opening was 73 cm wide and 82 to 83 cm high, as indicated by the jamb-stones. The ends of the lintel were somewhat irregular. On assembling the fragments the maximum length was found to be 98 cm, depth 34 to 40 cm, thickness 24 cm, a heavy lintel for the narrow span, but not so heavy as that of the sweatroom itself.

Evidence of intense heat within the firebox was very striking. The inner faces of front and side walls were burned to a chalk-like color and softness. On the sides many stones had been cracked into several pieces, and the pieces of one large block remained in place. The large monolithic left jamb-stone was split lengthwise, presumably by the heat, after it was in position, as already mentioned. The jambs were chalky along the inner edges only, as was the inner edge of the lintel and the exposed part only of the lower face. The outer edge was smoke-blackened. Black discoloration was also noted on the top of the sill in the firebox opening and on the plaster of the original sunken passage floor, as far distant as the sweatroom doorway. This latter circumstance suggests the sweeping out of ashes, which would contain charcoal. The surfaces of the inner faces of the jamb stones were scaling off, as was the underside of the lintel.

Excluding the rear wall from consideration for the moment, the evidence of intense heat was present in all expected places, and absent at all others. There can be no question that hot fires were built within this construction. It supplies us with what was before lacking definite proof that these components were not miniature shrines, unless offerings were made to intense fires themselves. They are properly labeled fireboxes.

Rear Wall (Unit K)

The hypothetical overhanging rear wall of the firebox in the reconstruction of Figure 9.8 is not the same as that shown in Figure 9.9, which seems to belong in the final phase. There are two factors suggesting that the original rear wall of the firebox was replaced by a new one (a sherd wall) in the next period. The first factor is the fact that the rear wall of the sweatroom itself showed no evidence of heat, so it must always have been protected. The second factor is the presence of Unit K, and evidence that it is older than the sherd wall. Unit K is a line of stones running across the firebox, one or two courses high (Figs. 9.12a and 9.12c). These are best explainable

as a remnant of an earlier rear wall of the box. Through much of its length the known sherd wall tests directly on this line of stones, and it might be supposed to be merely a base for the sherd part of the final wall. But at one place soft floor material ran in between the top of the sherd wall (Fig. 9.12c) completely burying the stones, and thus suggesting a difference in age. On the other hand Unit K seems too close to the early sill (Unit L) to have functioned with it in the earliest N-1-2nd period.



Figure 9.15 View similar to that of Figure 9.14, but from greater distance and after further excavation; man to left stands beyond right front pier of enclosing building; pier and remnant of bench at observer's extreme right.

Two sherds appeared as chinking elements in Unit K, a feature not unknown in ordinary masonry walls. We have no means of knowing with certainty whether this early wall extended to full box height with stone as the material or not, but we have a hint that it did. This consists in finding several calcined stones on the early passage floor, just in front of the firebox. Unit K is an obvious source for them. If stone throughout, this wall would correspond to Unit 6 at Structure P-7 (Fig. 9.57).

Floor and Sill (Unit H')

The floor was not paved with slabs. As found, it consisted in the main of crushed stone and what we can call earth, and at one point this was followed over Unit K and under the sherd wall (Unit H). This is indicated in Figures 9.11 and 9.12. A slope downward toward the front is necessary to connect the base of the sherd wall with the sill (Unit H'), but no precise surface could be followed. No such slope is required to connect Unit K with this sill. The sill, unlike the earlier one, was monolithic. This is a correspondence with late rather than early phases at Structure P-7. The sill runs slightly under the right jamb stone, and might conceivably have been placed in an early phase not recognized.

Structure N-1-1st-A

This final phase in the adopted scheme of sequences includes the addition of seven units affecting the platform, enclosing building, sweatroom, and firebox. These units (A to H") are added in Figure 9.9. In theory each could be assigned a separate phase, and arranged in any order of time, except that the four benches must follow the supposed base-walls. It is quite likely that these units were actually distributed through more than a single phase, but of this there is no proof.

Supplementary Platform (Unit A)

Little need be said of this new feature, except to suggest a comparison of Figures 9.8 and 9.9. The new platform encloses and partly submerges the old building platform at front and sides, and (apparently to a less depth) at the rear. The debris showed low humps along the side edges (Fig. 9.10b). These were visible to the eye, and symmetrically-placed masonry constructions on this platform thus seemed to be definitely indicated. However, investigation on the left (northwestern) side failed to reveal anything still in place.

There is nothing else to indicate that the very considerable additional raised areas of this platform may have been roofed, and presumably it was entirely in the open. The combination of building and supplementary platform is common with temples here, and seems to have been present during the earliest phases of the sweathouse P-7. Structure P-7-2nd-E combines similar wide lateral extensions with a probable enclosing building of similar pier-and-base-wall construction (Fig. 9.43).

Passage Modification (Unit B)

This unit of construction raised the floor of that part of the passage which lay within the sweatroom, introducing a sweatroom door sill (Fig. 9.11). This was fabricated of tabular stone, and appeared to be somewhat crude. It is assumed that the new passage floor was properly plastered, but the notes nowhere record that the floor surface was seen intact, like the floor of the sweatroom proper. Perhaps the new passage floor was of inferior quality. Its level is estimated as only 10 or 15 cm below the sweatroom floor. This is the maximum allowed by the sherds from Position 6 of the Object Table, if they were within the new unit; and about correct if the sherds lay on the surface of the new passage floor. A bare possibility exists that the passage, from firebox to doorway, was completely eliminated. But a similar secondary raising of this part of the passage occurred in Structure P-7 (Unit 1, Figure 9.57). That reduced the vertical depth of the same part of the passage, but did not eliminate it. The change at Structure P-7 thus affords a satisfactory control for our reconstruction here.



Figure 9.16 Looking down on sweat room; rod lies in original sunken passage (as in Phase B); base of sherd wall of Phase A still in place within firebox; fragments of lintel moved and fitted together to observer's right of firebox.

The new unit, as reconstructed, reduced the height of the doorway from 1 m to about 75 cm; the ventilating effect of the doorway was thus reduced by about 25 percent. At the same time, of course, the doorway became a less convenient means of entering and leaving the sweatroom. During this phase it appeared more like a square hole than like a miniature Maya doorway.

Sherd Wall in Firebox (Unit H')

The final back wall of the firebox was in bad condition, but much of it may be said to have survived, as shown in the three cross sections of Figure 9.12. In Figure 9.12c the remnant is reconstructed in broken line. Figure 9.19 shows the face of the surviving portion. In Figure 9.20 one end of it may be seen behind a knife on the floor, after the rest had been removed. Here, near the lower corner (to observer's left), a single small stone block appears in the face.

Otherwise the wall consisted of potsherds laid in mortar.

This peculiar wall was built against the back wall of the sweatroom itself, as may be seen in Figures 9.12a and 9.20. Apparently it was not bound to the side walls of the box. Its base was in line with, and in large part rested directly on, the supposed remnant of an earlier rear wall of the same firebox (Unit K). The stones of this latter had not been fully exposed at the time of Figure 9.19, but two of them may be seen, to the left of the folded rule.

I do not think the cross section of this wall, as reconstructed in Figure 9.12c, is open to much doubt.

It was clear that the semivaulting on the rear of the sweatroom had fallen inward, as one would expect. In the collapse, the sherd wall buckled throughout most of its length. Straightening out the section of Figure 9.12b yields a wall-height about equal to that used in the reconstruction of Figure 9.12c. The angle of the slope is based on a small remnant which had not buckled.



Figure 9.17 Front of firebox, large fragment of its lintel as found; at top, falling stones, probably from rear wall of sweat room.

Heavy rim-sherds were selected for the facing. They were placed horizontally and little or no mortar appeared in this face, which was exposed to the flames. The thinner inner portions of these facing sherds would be firmly gripped by the mortar, like the tapering type of vault

stones to be seen at Tikal, or like the boot-shaped vault stones of northern Yucatan.

The interior consisted of sherds laid in mortar, and this is merely suggested in Figures 9.12a-c. Precise drawings of sections of the interior were not made. But it was noted that rim and non-rim sherds occurred here, and that these were laid in a horizontal position. Where the wall had buckled, field sketches show the interior sherds tilted correspondingly. It was noted that convex sides of the sherds were generally placed uppermost.

This wall might be considered as a protective lining, and it did protect the sweatroom masonry behind it. But the masonry side walls of the box were exposed and their stones were consequently badly cracked and broken by the heat. One suspects that an overhanging rear wall, beginning at the floor level, may have been desired to throw heat forward, or for greater heat absorption. Such an overhanging wall, if of limestone, would collapse sooner than the vertical side walls.

Whatever its purpose, a wall of this sort is interesting because it is a previously unknown feature. We place it temporally in the final phase because Unit K seems to have taken its place in the prior phase. The positions of certain sherds confirm this relative dating. Few sherds were recovered, except within the firebox. Here (Position 8 in the Object Table), the remarkable total of 2,695 sherds was found. This figure includes 409 sherds found in position but removed from the wall and left at the site. A small number, perhaps a hundred or so, were left in position (Fig. 9.20). All the sherds removed from the firebox were given a single field number (W-37-6), but the lot taken from the intact remnant of the wall was kept separate and given the number L-70-107 at the Museum,



Figure 9.18 Longitudinal cut section through debris in firebox; note closely packed sherds in quantity, fallen from sherd wall still to be reached.

Cresson attempted to assemble complete pots, using the sherds of Position 8, that is, sherds surely or probably from the wall. Failure in this indicates that complete vessels were not left in the firebox, and that all the sherds in the firebox come from the sherd wall. However, one large simple-silhouette monochrome bowl was restorable, with about 75 percent of all pieces present. But to accomplish this, sherds from outside the firebox, in the sunken passage, were also utilized. Some of these were from Position 5, in the sweatroom doorway. These could not possibly have fallen from the sherd wall, but might have been in the upper part of the fill of Unit B, which raised the floor of the passage. Others were at Position 9. These may have been immediately in front of the firebox, but were probably at a level requiring that they be in the fill of Unit B. Still others were numbered L-70-107, showing definitely that parts of this vessel were utilized in the sherd wall.

The actual plaster surface of Unit B had, unaccountably, nowhere survived, or at least was not noted. Since the exact line separating debris from the fill of Unit B is not known, the dating of particular sherds as within its fill is somewhat hazardous. But the presence of sherds in the doorway of the sweatroom at Position 5, which fitted others in position in the sherd wall, makes it impossible to believe that they were left on the surface of Unit B at the time of abandonment. Presumably the sherd wall and Unit B were built as parts of one operation, and an excess of sherds, brought for the wall, was thrown in the fill as the passage floor was raised. The same inference explains why Cresson's sketches show sherds scattered quite thickly along the passage, 15 to 20 cm below the sweatroom floor, while the floor of the sweatroom itself was clean, except for a small lot of sherds at one spot (Position 7). It also explains the presence of several calcined stones on the original passage floor just in front of the firebox. They probably were thrown there when most of Unit K was removed, to be replaced by the sherd wall. They would not have been left there unless the floor of the passage was to be immediately raised.

Through ignorance of what to expect, surviving remnants of similar sherd walls were probably missed at certain other mounds. Some account of the signs which might have foretold them is therefore in order. As Cresson came into the firebox, quantities of closely packed large sherds appeared. These began in the firebox opening, and the deposit extended as high as the top of the jamb stones, even at the front. This latter circumstance suggests that our reconstruction of the wall may show it too low, if anything. Most fallen sherds were noted as nested, with about 1 cm of mortar between them. Figure 9.18 shows a cut-section through the deposit on the floor of the firebox.

The mass of fallen sherds appears in the foreground, while at the upper right and farther back the surviving remnant of the wall itself protrudes above the surface of the excavation.

If such a wall is suspected, a number of criteria suggest themselves as justifying painstaking excavation. These are: the presence of a large quantity of closely packed large sherds from several vessels, presence of thick rim-sherds, presence of disintegrated mortar, nesting of the sherds, and mortar adhering to them.

Enclosing Building

The additions to this building during Phase A did not involve so much labor as did the changes in the platform. Nevertheless, they had a marked effect on the character of the building, unless, as seems unlikely, it had earlier walls of perishable materials.

Base-Walls? (Unit G)

These walls, found at sides and rear, were in very bad condition (Figs. 9.13 and 9.15). For actual proof that they are base-walls, and did not extend as masonry walls to roof height, good preservation would be necessary. As found, it cannot be said that they showed level tops anywhere, nor had plaster survived, even on the sides. Walls of comparable thinness at Structure V-1-2nd, where they were protected by burial, were plastered; but there also tops were not seen. We do not have a proved example of masonry base walls at the site, but only remnants such as those here, which seem best interpreted as such, the interpretation being founded on their thinness. Measurements at satisfactorily preserved portions showed this as 42 cm (rear) and 40 cm (end). Such walls would not be expected to survive to a height of more than three or four courses of stone, as found, whatever the original height.



Figure 9.19 Surviving base of sherd wall at rear of firebox behind sherds of Figure 9.18.

A circumstance tending to confirm the base-wall interpretation is the fact that the end walls are placed outside the line of the piers, passing across them to form the corners of the enclosing building in this latest phase. If such thin walls rose to roof height, in a high wind they would have been very likely to fall, unless reinforced. This placement prevents the piers from exercising this function in respect to an outward fall. Along the rear the walls run between the piers, which could thus tend to prevent collapse in either outward or inward directions. But here this placement was required even for base-walls, since along the rear (but not at the sides) the piers were very close to the edge of the platform (Fig. 9.9). The differential placement argues for dating the walls as later than the piers in more than a mere constructional sequence, and also, perhaps, for the proposition that they were never full height. It is our supposition that wooden stockade or wattle walls, daubed with clay and presumably plastered, rose from the base-walls to the rear and end beams of a thatched roof.

The front was probably open, since no traces of base-walls could be found there. It will be noted from the figure (9.10a) that the front part of the left end wall could not be located either. This is where investigation of the platform began, and the apparent absence may be due to initial inexperience. The open front of the reconstruction should not be considered as absolutely proved, but we think it is highly probable.

Benches (Units F, E, D, C)

As noted already, tops of benches nowhere survived. The maximum surviving height of Unit D, at the face, was 65 cm, but its fill next to the sweatroom—protected by sweatroom debris—showed a minimum height of 72 cm. We have every reason to believe this is close to the actual height. There is no reason to suppose that the other benches were any lower, but they may have been.

Presumably Unit E was added to Unit D sometime after the former had been built and used. The notes show that the probability was recognized in the field, but the answer was not dug out. That most of the front wall of Unit C is missing is doubtless due to faulty digging.

Measurement

The measurements tabulated [in Table 9.9] apply to the enclosing building in its earliest form (Structure N-1-2nd). They were obtained at one time by scaling from the original drawing of the one-to-a-hundred plan, and indicate quite accurate measurement by the Maya when laying out principal points of the building platform and building.

The two columns give measurements surely intended to be equal, and the maximum discrepancy is only 15 cm. Careful attention to a symmetrical arrangement is very evident. If centered posts of about 25 cm. are

Table 9.9 Structure N-1-2nd Metric Dimensions

Depths (between outer corners of corner piers)	15.2	15.2
Lengths (between outer corners of corner piers)	7.5	7.5
Corners to Sunken Passage	7.2	7.3
Spaces between piers:		
Between corner piers, front-rear	5.9	6.0
Between corner piers, side-side	13.7	13.7
Between rear corner and rear inner piers	3.0	3.1
Between rear inner piers	6.1	

reconstructed at rear and sides, the spans of the roof-beams at the rear will be about equal to each other, but noticeably greater than the spans at the side. Apparently there was no single standard in this respect.



Figure 9.20 Interior of firebox seen through its front opening; floor dug out behind sill of Structure N-1-1st to show earlier sill (Unit L) behind it, at point of knife; remnant of sherd wall and right side wall above and left of knife in picture; masonry of rear wall of sweat room at upper right; whiteness of side wall due to brushing its calcined surface.

The plan (Fig. 9.10) shows the parallelogram outline, the sides failing to form right angles with front and rear by about 2 degrees and 2.5 degrees respectively. The Supplementary Platform of the final period (Unit A) is reconstructed in Figure 9.10 to correspond, but its corners were not dug out, and we are not really sure of this regular distortion in that period. It does not appear in the sweatroom (Unit 1). The front wall of this fails by about two degrees to be parallel with the front edge of the platform, though the left (northwest) side wall is more or less parallel with the left edge of the platform; the right wall fails to fit the parallelogram form by about 3.5 degrees. The two side walls measure 3.7 m and 3.9 m, respectively, showing a discrepancy of 25 cm in a rather short distance.

Proportions – Function

For the final period (Strs. N-1-1st-A and -B), the traits picked out in the Comparative Trait tabulation are sufficient to guarantee that sweat-bathing was the principal function. If this function goes back to the earlier period (Structure N-1-2nd) we must postulate a sweatroom and firebox which was removed to make way for those we encountered. This is not a very hazardous proceeding, for we have good evidence that precisely this occurred at Structure P-7, and here we did not dig for such evidence. Without this postulate, a sunken passage during this period is inexplicable. And if we assume that the passage was cut into the platform during the later period, then we cannot understand the presence of a sill at the correct level and horizontal position for a firebox sill, functioning with a passage.

Since we have no physical evidence of the early sweatroom itself, we cannot say that we have physical evidence that the platform was then over-size with respect

Table 9.10 Structures J-20, P-7-1st, and N-1-2nd Dimensions

Structure	Length	Depth	%
Str. J-20 (double-range palace)	15.9	7.7	48
Str. P-7-1st (double-range enclosing building)	19.6	10.0	51
Str. N-1-2nd	15.2	7.5	49

Table 9.11 Average Dimension Tables: Platform Units

Units	Height	Length	Depth	Slope
M (N-1-2nd)	1.0	16.0	8.2	V
M (N-1-1st)	0.4	16.0	8.2	V
A (upper level)	0.6	29.6	11.0*	?
A (step terrace)	0.3	29.6	1.0	?
A (complete)	0.6	29.6	12.0*	?

Note: Starred dimensions are approximations usually based on reconstruction; the letter V means approximately vertical.

to anything, nor that the early building of the piers was then an enclosing building. However, the proportions of platform and building confirm independently the other evidence that it was always the enclosing building of a sweathouse, on a platform oversize with respect to a sweatroom. The overall dimensions are within the limits indicated for enclosing buildings at other mounds, and so is the proportion of depth to length. This proportion, about 50 percent, is not expectable in local palaces, though it is a criterion which must not be used blindly. A comparison of dimensions of three buildings given in Table 9.9 warns against this: Length, depth, and a percentage index obtained by dividing depth by length appear in that order.



Figure 9.21 Pier and right (SE) building platform wall at right front corner, Structure N-1-1st-B.

Our Structure N-1-2nd building is smaller than the enclosing building of Structure P-7-1st, but the proportions are about the same. We have a closely similar index for a palace building of the same approximate size as Structure N-1-2nd. But like other local palaces of similar proportions, Structure J-20 is so placed that it could not have been much longer, and being of the double-range type, the depth could not have been much less. The special circumstance of its position at the site probably accounts for the index of about 50 percent in this palace, but there is no reason to suppose that lack of space operated to limit the length of Structure N-1-2nd or Structure P-7-1st. The evidence is good that enclosing buildings of sweathouses such as those of Figures 9.25 and 9.26 may show proportions within the range of the typical long palaces; but when the depth-length index rises close to 50 percent without space-limiting factors, we probably are not dealing with a palace. In the absence of a pyramid or other special temple indicators, we are probably dealing with the enclosing building of a sweathouse.

Dating

No inscriptions or sculpture of any kind were encountered. For the most part, sherds were of coarse, heavy utility wares which have not as yet been given chronological significance. Included, however, were sherds from the incomplete monkey bowls illustrated in Satterthwaite (1942a). Coming from within the firebox (Position 8 of the Object Table), they almost certainly had fallen from the sherd wall of Structure N-1-1st-A. The form and the

Table 9.12 Average Dimension Tables: Building Units

Units	Elevation			Table				
	Section	Table	W'	Length	Depth	Door Width	Door Height	Max. Lintel Dimensions
	W							
J (Enclosed Bldg.)				15.2	7.5			
J-G (same, later)				16.0	7.5			
I (sweat-room)	0.7	3.3	0.7	6.2	4.7	0.7	1.0	1.3x0.7x0.4
I (same, interior)				4.8	3.3			
H (fire-box)				2.2	1.5	0.7	0.8*	1.0x0.4x0.2
H (same, interior)				1.2	0.9			



Figure 9.22 Right wall and semi-vaulting interior of sweat room, Structure N-1-1st-B.

orange-bar decoration on the outside correspond to a find in the hearth below the elevated portion of the Throne Room of Structure J-6-1st, and to fairly common finds in surface debris. On the basis of this evidence the sherd wall need not be much earlier than the time of abandonment, but it could be some unknown time before 9.17.15.0.0, the date of Throne 1. Other sherds show the contemporaneity of the sherd wall with the modification of the sunken passage. Structure N-1-1st-A was clearly late rather than early so far as ceramics are concerned.

We have no means of knowing how long a period should be allowed for earlier phases. It may be noted that the pier-and-base-wall type of enclosing building may have existed during a fairly early phase at another mound (Structure P-7-2nd-E), but did not exist in the final period. Thus we have a hint that the enclosing building of Structure N-1-1st-A was an obsolete type which was due to be replaced, though it was still in use at the time of abandonment. The dogma that square masonry piers developed late in the history of Maya architecture does not apply here, for they were known in the doorway of the temple Structure K-5-3rd, a very considerable time before 9.12.5.0.0 (Tables 9.10 and 9.11).

Masonry Notes

Enclosing Building

Piers and base-walls of tabular stone, corner piers and all base-walls in very bad condition. Inner rear piers better preserved since better protected. Masonry of piers seems identical with that of larger piers in vaulted buildings (Figs. 9.13, 9.15, 9.23).

Sweatroom Walls

Tabular masonry, with slabs and blocks (Figs. 9.22 and 9.23); interior semivaulting perhaps contains higher percentage of small slabs, but blocks appear here also (Fig. 9.22).



Figure 9.23 Exterior face of wall of Figure 9.22, exposed by removing hearth of bench (Unit C); junction with pier of enclosing building.

Platform Walls

Tabular stone; blocks and slabs (Fig. 9.21).

Concrete

All floors undoubtedly concrete; well preserved in sweatroom only.

Plaster

White finishing plaster survived on floor of sweatroom and on floor of sunken passage at early period, where protected by Unit B. Fragments of plaster apparently in fill of Unit B, 3 cm thick, of pink color, with thin white finishing plaster added. Plaster or mortar fragments among sherds of sherd wall in firebox also of pink color, and pink mortar adhered to one sherd; mortar in place between others. Lime mortar undoubtedly used in interior of sherd wall.



Figure 9.24 Cut section through debris in sweat room; rod, marked in centimeters and decimeters, rests on sweat room floor, beyond partly excavated sunken passage; note absence of vault slabs in quantity; fallen debris, near camera, just right of rod, is in opening of firebox.

Fills

The fill of Unit B, a minor late and shallow addition, appears to have been solid. The character of Fills elsewhere was not investigated (Table 9.13).

Table 9.13 Structure N-1 Object Table

Position	Sherds	Figurines	Miscellaneous
1. Surface debris on Unit A at front center		W-37-2;-3; -4; -7	W-37-1 (bone fragments, probably animal)
2. Surface debris right of right (SE) wall of Unit A, near front corner	W-37-15		
3. On floor of sunken passage (Unit M), 1 m to 2 m forward of sweatroom	W-37-9		
4. About center of left (NW) part of Unit A, at floor level	W-37-11		
5. In sweatroom doorway, 55 cm below lintel, 5-30 cm from left (NW) jamb, in vertical or upside down positions (probably on, possibly in, Unit B).	W-37-14		
6. In sunken passage within sweatroom, 10 to 20 cm below sweatroom floor level (possibly on, probably in, Unit B)	W-37-10		
7. On sweatroom floor, near left rear (SW) corner.	W-37-8		
8. Within firebox, in debris or in position in sherd wall.	W-37-6		W-37-12 (sample of mortar from sherd wall)
9. Below Position 6, on or above original sunken passageway (high probability these are from fill of Unit B)	W-37-13		

3. SIX PARTIALLY EXCAVATED SWEATHOUSES

(STRUCTURES S-19, J-17, O-4, S-21, S-4, AND R-13)

Linton Satterthwaite

Preliminary Remarks

We have very incomplete data on the six sweathouses here considered, as compared with the previously described type-structure (Structure N-1-1st), and with Structure P-7-1st to follow. Six less-well-known sweathouses are here grouped together merely to save space. The apparently arbitrary order in which they are arranged in the title, and in assigning figure numbers, places them in the decreasing order of lengths of the mounds and presumably of enclosing buildings. If our reconstruction of Structure S-19 (Fig. 9.25) is correct in fundamentals, for which there is real evidence, we are dealing in that case with an enclosing building appreciably longer than the one selected as the type. We are also dealing with others of about the same length, and with one which must have been very much shorter, if there were enclosing buildings to fit the platforms. Despite the small amount of time spent on this series of mounds they already indicate existence of wide variation in size and proportion of the platform, and they show the presence of the sweathouse in various semi-retired parts of the site, from the Acropolis to the Southeast Section. (See map, Figure 1.1, Strs. S-19, J-17, O-4, S-2, S-4, R-13.)

In no case were walls showing, but the heavy lintels of all but Structure J-17 were visible at the surface of the hump marking the sweatroom. Cresson is responsible for the excavations up to the doorway of Structures S-19 and R-13. His work was done in 1936, when we knew what to expect. The writer had accomplished as much at Structures S-4 and O-4 in 1932, and in ignorance undoubtedly destroyed some evidence of the design at the bottom of the doorway of Structure O-4 (Fig. 9.38). Later Cresson proceeded through this doorway, but stopped when the sunken passage had been established in the interior.

In the cases of Structures S-2 and J-17, the center trench was continued to the inner side of the back wall. Much surviving evidence was surely missed here through ignorance of what to expect. For these two operations the writer is responsible. In each of these cases workmen were assigned to cut cross sections through the debris, to determine whether or not the roofs had been vaulted. Both mounds were far distant from the scene of major operations at the time (1932), and the workmen were allowed to proceed for several hours at a time between inspection visits. Special point is made of this regrettable

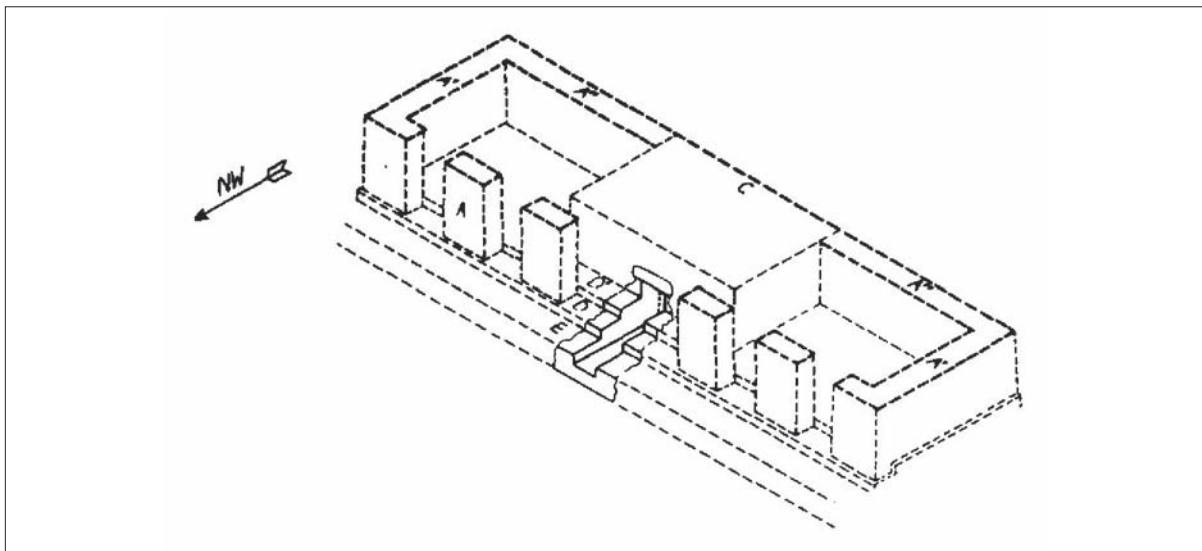


Figure 9.25 Isometric reconstruction of Structure S-19, showing supposed plan of enclosing building (thatch roofed?) with hypothetical flat airtight room over sweat room.

fact, because it explains the failure to find the firebox in Structure J-17, when the interior of the sweatroom was completely cleared. Sherd walls were probably missed at both of these structures. The peculiar nature of the J-17 room led to some desultory trenching in the mound outside the sweatroom, but time was lacking to make a proper investigation of what at the time seemed inexplicable without extensive and closely supervised excavation.

In general, and except for Structure J-17, information respecting these six structures is confined to what may be inferred from the contours of the mounds themselves, combined with that secured by a narrow transverse trench at center. Accordingly publication of plans is confined to the small-scale rectified ones on the map of the site (Fig. 1) and to those inherent in the isometric reconstructions of Figures 9.25 to 9.30. The true plans of what little was uncovered indicate the same failure to achieve true right angles which one finds in all buildings at the site.

Remarks on Drawings

A glance at Figures 9.25 to 9.36 will show that they are very largely imaginative reconstructions. It is important to remember that nothing not shown in solid line should be treated as an established feature from which one may reason in more than a tentative manner. We know nothing about the fireboxes in any of this group of sweatrooms, excepting only that of Structure S-2 (Figs. 9.28a, 9.28b, 9.34). Those shown for the other buildings in broken line are modeled on known ones in Structures N-1 and P-7, in order to show visually that available controls leave room for them. Except for Structure J-17, the precise dimensions of none of these sweatrooms are known. However, for the depths, in all cases we have either a precisely determined or a reasonably accurate profile of the mound at center, fixed in relation to what little was excavated, and this is given in the cross section drawings of Figures 9.31–9.36. The dimensions given of the lintels afford a certain control as to wall thicknesses, where these were not dug out. These controls agree everywhere in indicating sweatrooms with interior depths (front-to-rear dimensions) equal to or greater than the maximum found in buildings of other types (2.6 m in Structure J-11, a palace). Use of these controls, in each case separately, led to the particular room-depths reflected in the drawings of several sweatrooms.

In all cases the approximately known room-depths, and the vertical depth of debris, rule out the possibility of completely vaulted roofs on the sweatrooms. This was confirmed by absence of noted cap-stones. At Structure J-17 a carefully measured cross section of the debris even indicates absence of semivaulting (Fig. 9.32b). Here the source of the few slabs shown is presumably the wall itself (Fig. 9.37). In this sweatroom, if the roof

had been semivaulted, a large number of vault stones should have fallen inward and arrived at or close to the floor. Since this was undoubtedly a sweatroom and a thatch-roof is thereby ruled out, we restore a simple beam-and-mortar roof. The same is done in the other cross sections, except that in Figure 9.35 the semivaulted arrangement of Structure N-1 is assumed for Structure S-4, where the span was probably about the same. We can be reasonably sure that all roofs were flat and solid, as shown; but whether the indicated distinctions in respect to semivaulting are correct or not is uncertain.

In the cross sections as reconstructed, the ceiling heights are arbitrarily placed 2 m above the top of the sunken passage, or above the sweatroom floor (these latter levels usually being the same). This gives the same ceiling height as was adopted for reconstruction purposes at Structure N-1. It may not be correct, and very likely it is wrong to make these heights the same everywhere. No controls are available, except at Structure R-13 (Fig. 9.36). Here the outer side of the sweatroom wall survived to a height about 1.8 m above the top of Unit C', i.e., to within 60 cm of the top of the roof as reconstructed.

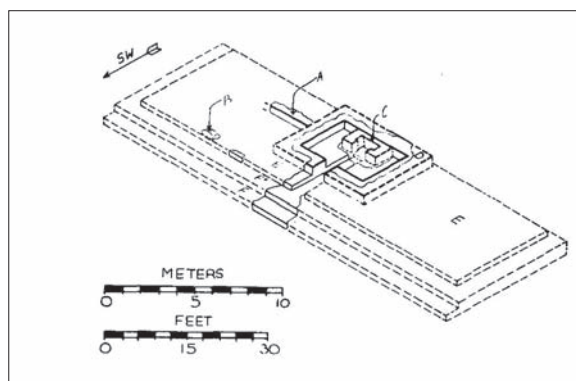


Figure 9.26 Isometric reconstruction of Structure J-17 (also see Figs. 9.32a and 9.32b; interior of sweat room completely excavated, firebox not recognized).

Except for Structure J-17 (Fig. 9.26), the lengths of the sweatrooms are much vaguer approximations than are the depths. End walls were not dug out, and the positions are estimated from Parris' schematic representations of the sweatroom mounds. The lengths as reconstructed may be wrong by as much as 1–2 m. There is little doubt, however, that they were somewhat greater than the depths, but not by a great deal. Sweatrooms which approach but fail to realize fully the square form were apparently universal.

Parris' mound representations are the basis for the reconstructed lengths of the platforms in Figures 9.26 to 9.30, and for the depths of these units in Figures 9.27 and 9.28. Though vague approximations, these seem valid

for comparative purposes. The faces of Units E and D of Structure S-4 in Figure 9.29 are located approximately by utilizing Parris' work, but the position of the rear of Unit C in the drawing is a mere guess. The degree to which carefully measured transverse debris profiles control reconstructed platform units such as these is sufficiently indicated in the cross section drawings themselves.

Having warned against too literal an acceptance of what is shown in broken line, it is desirable to note that absence of reconstructed enclosing buildings does not mean that sweatrooms stood in the open on large platforms, as Figures 9.26 to 9.30 seem to suggest. All of these platforms probably supported enclosing buildings. The blank areas on the platforms in Figures 9.27-9.30 merely reflect lack of time to examine them carefully, either by excavation or by debris profiles controlled with the instrument. Good evidence of enclosing buildings appeared where either of these approaches was applied outside the sweatrooms (Figs. 9.25 and 9.26).

Figure 9.25

The enclosing building of Structure S-19, though a reconstruction in its entirety, reflects a plan which could, in essentials, be read in the debris with the eye only. It is shown entirely in broken line because no surviving part of it was actually laid bare. The precise widths of piers and doorways, and the thickness of piers and walls, is conjectural; and it is not certain that the walls rose to roof height, as suggested in the drawing. Rear and right end walls were indicated by distinct ridges of debris, the left end wall by a less distinct one. Three of the piers were indicated by slight bulges which, like the walls, consisted of stone surrounded by soil probably washed from the hillside to the rear. Careful profiles were made with the instrument in 1934, when excavation was not permitted. We should offer this reconstruction with less confidence were it not for the fact that the plan of the adjoining Structure J-18 was fully worked out by the same method, and later confirmed by sampling excavations. There the indications were that the walls rose to roof height. The center section of Structure S-19 (Fig. 9.31) suggests a survival here to a height of about 1.3 m. Wall and pier thicknesses, and pier widths, are taken as equal to those of the neighboring structure. The piers may have been smaller. Experience at Structure N-1 indicates that thin base-walls, with either posts or piers, would not have left sufficient debris to show the rear and ends of the building. The reconstruction is probably not correct in all details, but it is not fanciful either.

The sweatroom dimensions utilized are controlled by a carefully measured longitudinal debris profile, as well as by the transverse one of Figure 9.31. The sweatroom left a central hump, with hollows on either side outlined

by rear and side wall ridges. The longitudinal profile will be given as part of a single line showing the vertical relationship of this mound to those of Structures S-18 and S-17.

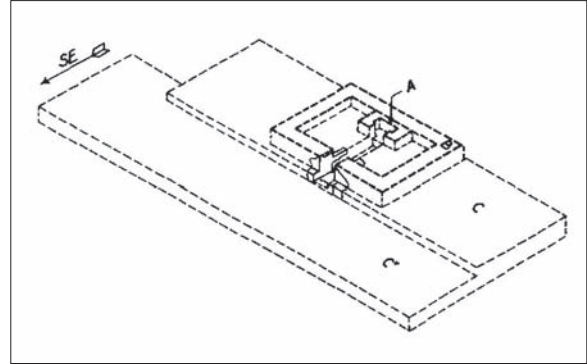


Figure 9.27 Isometric reconstruction of Structure O-4 (also see Figure 9.33; excavated trench penetrated only short distance into sweat room).

It is possible, though unlikely, that the front of the roof of the enclosing building was supported on posts instead of on piers. There seems to be no doubt that the side walls extended so far front that the roof supports must have rested on Unit D, rather than on D'. The positions of the low humps of stone supposed to be debris of piers indicate this also.

Figures 9.31 to 9.36

Most of the measurements reflected in these cross sections were made with rule, tape and plumb-bob, without the leveling instrument. Consequently most floors are shown as perfectly level. No significance should be attached to the fact that only at Structure S-19 (Fig. 9.31) is the floor of the sunken passage shown as sloping. It is possible to believe that the others sloped also, as is the case wherever the matter was ascertained.

The debris profiles in Figures 9.31, 9.32, 9.34, and 9.35 were made very carefully with aid of the leveling instrument so far as these are shown by dotted line. Extensions of some of these profiles, with lines formed of crosses, must be approximately correct, but depend on reading of photographs, or on memory. The entire debris profiles of Figures 9.33 and 9.36 are of this nature. For Figure 9.36 the notes show that the front wall survived to the maximum height shown for the mound, and that there was a deep depression marking the sweatroom, its bottom at the level of the top of the lintel. The writer's memory of this depression, surrounded by high ridges on all sides except over the lintel itself, is very clear.

All these debris profiles are on the center lines, or on lines passing close to the doorways.

Table 9.14 Average Dimension Tables: Platform Units
(Building Platforms, Probably Limiting the Dimensions of Enclosing Buildings)

Unit	Height	Length	Depth
D-D' (Str. S-19)	0.4	24**	6**
E (Str. J-17)	0.3	23**	6*
C (Str. 0-4)	?	17**	?
D-D' (Str. S-2)	0.6**	16**	6.5*
C (Str. S-4)	0.4	16**	?
C'(Str. R-13)	0.5	10**	8**

Note: Starred dimensions are approximations based on reconstruction; double-starred approximations are based only on observation of the extent and form of mound surfaces in relation to excavated portions of the structures.

Discussion by Components and Particular Features

Platforms and Enclosing Buildings

Structure S-19 (Fig. 9.25) indicates that the enclosing building may differ radically from those of Structures N-1 and P-7-1st in the matter of proportions (cf. Figure 9.25 with Figures 9.9 and 9.46). However imperfect our reconstruction may be, there is no reasonable doubt that it was decidedly longer and probably somewhat narrower than the N-1 building. The debris left little doubt that it was a single-range affair, and as such its roof-span is still very much greater than that of any single-range palace at our site. Whether or not we are correct in showing masonry walls and piers to full height, the roof was presumably thatched, though a beam-and-mortar roof should be considered a possibility. Complete vaulting is out of the question, since the minimum debris depth at either side of the sweatroom reaches a level only a few centimeters above that of Unit D', presumably the floor level. For the same reason, semivaulting on this enclosing building is unlikely, since that at Structure P-7-1st left fairly deep deposits.

If we restore a thatch roof, this building would present an appearance very similar to that of Structures S-18 and S-17 at its left. In elevation, if our reconstruction of piers is correct, this sweathouse may have looked like a typical non-vaulted palace.

It occurs to one that Unit D' may be a secondary raising of the floor. If so, our reconstruction of an original stepped-top building platform at the end is incorrect. This is definitely known only at Structure P-7-1st, with a double-range enclosing building. The extremely low placement of the sweatroom doorway, with reference to the enclosing building floor (Unit D'), may be compared with the situation at Structure R-13 (Fig. 9.36). Possibly

Unit C' of the latter building is secondary. In both cases the floor surrounding the sweatroom is higher than one would expect. But only at Str. S-19 does this suggest that one would not ordinarily pass directly from the sweatroom to enclosed spaces on either side, because only here does the raised floor come right up to the sunken passage. One is tempted to consider that at Structure structure-19 a sweatroom has merely been inserted in a palace, with a raising of the floor behind the piers. But against this idea is the fact that the depth is much greater than that of known single-range palaces, including the neighboring ones, which are not narrower because of vaulted roofs.

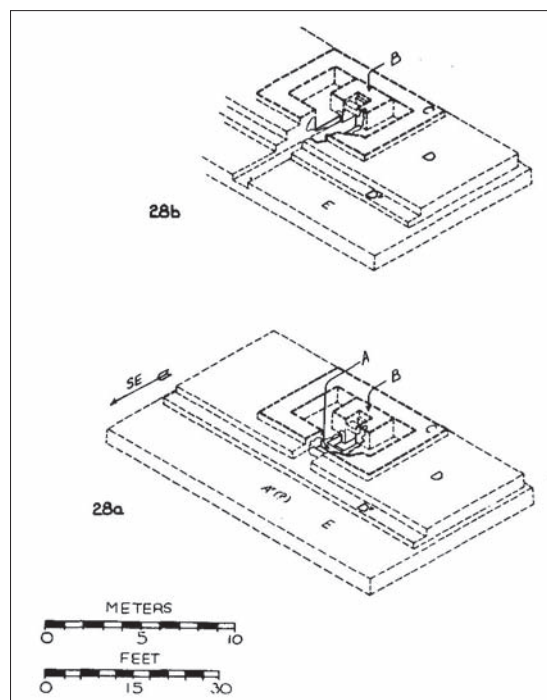


Figure 9.28 a. Isometric reconstruction: Structure S-2; b. isometric reconstruction: Structure S-2 (possible unproved early phase).

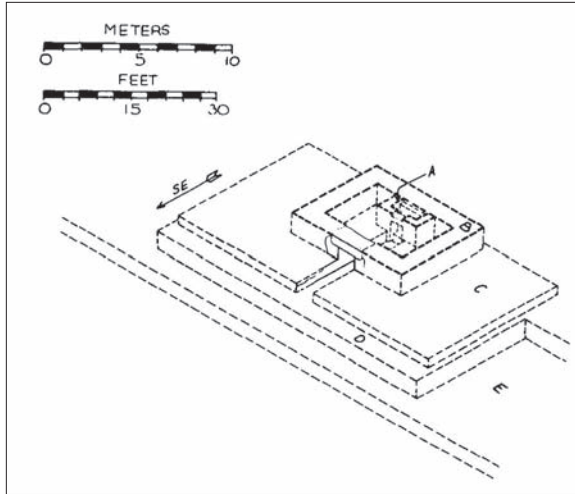


Figure 9.29 Isometric reconstruction of Structure S-4 (also see Fig 9.35; excavated trench outside and through doorway of sweat

Structure J-17 corresponds to Structure S-19 in providing ample room-space on either side of the sweatroom, but very little in front of it. At least, this is true if Unit E is a building platform, serving an enclosing building (Fig. 9.26). The remnant of wall labeled Unit B confirms the natural assumption that this is the case, as does Unit A, which is probably the face of a bench.

The debris on either side of the sweatroom was not noticeably lower, and in this respect this mound differs from all other sweathouses seen. A careful longitudinal profile was not made, but a cross section sketch about 3 m northwest of the sweatroom showed the same debris depth of about 1 m. Ridges and humps, giving the clue to the plan, were absent. It would be hazardous to assume that the roof of the enclosing building was of thatch, but the debris did not seem to be that characteristic of fallen complete vaults. The dimensions of the platform are such that a double-range enclosing building here is a possibility, and a line of stones which might be the base of a medial wall was encountered. They were not located accurately, and are therefore omitted in Figure 9.26. They seemed, however, to mark a rise in the floor-level, rather than a free-standing wall, the platform then being of the stepped-top variety. If this is correct, in the figure the base of Unit A would be raised accordingly. The recording here was too sketchy to be sure.

Structures O-4 and S-2

It is probably safe to assume that enclosing buildings existed wherever platforms suitable for them are present, and where evidence to the contrary is not available. However, for these two structures, without excavation one cannot safely decide even on the limits

of such buildings. In either case they may have been relatively long and narrow, corresponding to the rear and higher portions of the respective mounds; or they may have been much deeper, extending over the lower front portion of stepped-top platforms (Figs. 9.27 and 9.28). Unless the latter was the case at Structure O-4, there the sweatroom door was in the façade of the building as a whole.

At Structure S-2 the sunken passage is replaced by a sink (Fig. 9.28a), but it is not impossible that a normal sunken passage has been modified (Fig. 9.28b).

Accurate longitudinal debris profiles are not available. The existence of prominent humps marking the sweatrooms, and the known floor levels with reference to these, show that the debris depths at the sides are too slight for fallen complete vaults.

Structure S-4

This is the only one of the six structures here considered which could have had an enclosing building based at one level, and still have approximated that of Structure N-1 in size and proportions (cf. Figures 9.9 and 9.29). Its roof was not complete vaulting, by the same criteria as noted above. There was a suggestion in the debris that the corners may have been masonry piers as at Structure N-1.

Structure R-13

This mound introduces the possibility of an enclosing building with about as much roofed over area in front of the sweatroom as at Structures N-1 and S-4, but with little or no space at its sides (Fig. 9.30). The nearly square mound may, of course, mean that there was no enclosing building at all. Since a careful longitudinal profile was not made, the proportions suggested in Figure 9.30 should be viewed with caution, since an error of a meter or so here would be more significant than with the other longer mounds. The unique forward projections of the mound shown by Parris were not investigated. The mound also differed from all others in that the outline of the sweatroom was perfectly clear without excavation (Fig. 1.1). If there was an enclosing building its roof was surely not a completely vaulted one (Fig. 9.36).

Summary

Though this series of buildings is very imperfectly known, it is quite clear that enclosing buildings might vary greatly in dimensions and proportions, very much more so than could the heart of the complex, the sweatroom itself. We cannot say that enclosing buildings were certainly universal here, but the mounds indicate that they were, for sweathouses within the main ceremonial

precincts. If so, the sweatrooms were always placed at the longitudinal center of the enclosing building. Two generalized types of plan can be distinguished. In both there is ample covered space at the sides of the sweatroom, none to its rear. In one there is also considerable space in front of it, in the other there is little, and possibly some times none at all. A third type may have existed, in which there was ample roofed space in front, and little or none at the sides as well as behind the sweatroom, but this is very uncertain. At Structure P-7, still to be described, a sub-type of the enclosing building provides ample space at sides and front, and a roofed passage at the rear.

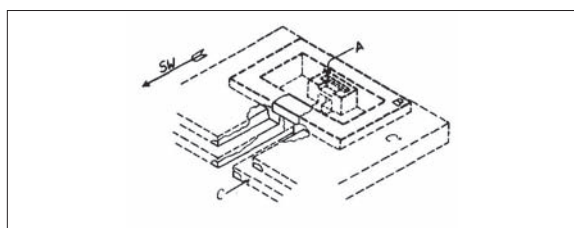


Figure 9.30 Isometric reconstruction of Structure R-13 (also see Fig. 9.36; excavated trench outside and up to front of sweat room only).

There is good evidence that no enclosing building was roofed with the complete vault, and no definite evidence that semivaulting appeared on any of the seven probable or certain enclosing buildings thus far considered. So far as very incomplete data are available, the absence of vaulted ceilings may reflect a requirement forbidding the relatively narrow rooms of the palaces and temples. Double-range enclosing buildings on stepped-top platforms, analogous to Structure P-7-1st, may have occurred within this group of

six, but are improbable in the two cases where excavation extended beyond the sweatrooms.

Sweatrooms

It was determined that all six sweatroom walls were of masonry, the thicknesses of front walls ranging from 72 to 90 cm so far as known. The record shows that while the front and rear walls of the sweatroom of Structure J-17 corresponded to the minimum thickness of 72 cm, one side wall was exposed and measured and was only 55 cm in thickness. Having failed to observe this at more than one point, and suspecting an error, the broken-line reconstruction of Figure 9.26 assumes a constant thickness throughout. We have a positive indication that side walls might on occasion be thinner, but distrust the evidence.

The cross sections of Figures 9.31 to 9.36 show, in all cases, less debris than would have been left by completely vaulted roofs, but plenty for the natural assumption that roofs were either beam-and-mortar or semivaulted.

The sizes of the humps of debris marking the sweatrooms indicate that they were all of approximately the same size as that of Structure N-1. In the case of Structure J-17, the interior dimensions are known to have been 3 m by 4 m. There is little doubt that the depth of the S-2 sweatroom was 3 m. The clearly defined ridges at Structure R-13 indicate a sweatroom somewhat longer and somewhat less deep, but not markedly so. There is no sign of the tiny sweatrooms of the modern examples noted in [the early part of this chapter], though they might have existed in the little-known peripheral house-mound areas. One may guess that the sizes of the sweatrooms in this series all represent approaches to the feasible maximum.

Table 9.15 Average Dimension Tables: Building Units (Sweatrooms)

Units	Section	Table				Façade		Table	
		W	R	W'	L	D		Door	Max. Lintel
C (Str. S-19)	?	?	?	?	?	4.3		0.8	1.1
D (Str. J-17)	0.7	3.0	0.7	5.4*	4.4*	0.8	?	1.6 x 0.7 x 0.3	
B (Str. 0-4)	0.8	?	?	?	?	0.8	1.1*	1.3 x 0.8 x 0.3	
C (Str. S-2)	0.9*	2.9*	0.9*	?	4.7	0.9	?	1.6 x 0.8 x 0.3	
B (Str. S-4)	0.9	?	?	?	?	1.0	1.3?	1.8 x 0.8 x 0.4	
B (Str. R-13)	?	?	?	?	?	0.8	1.1	1.5 x 0.9 x 0.5	

Note: Starred dimensions are approximations based on reconstruction.

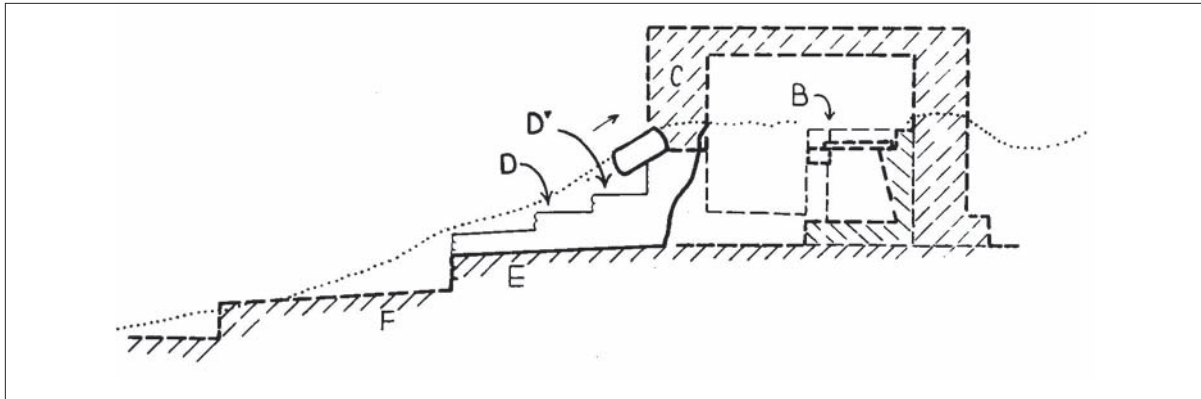


Figure 9.31 Cross section at center with reconstruction: Structure S-19.

Entrance and Drainage Arrangements

Door and lintel dimensions are known, except for the door heights in two cases (Table 9.15). Structure S-4 shows the maximum door-height of 1.3 m. It is barely possible, but unlikely, that this door was never higher than about 1.1 m. This is the height of the lintel above an apparently secondary passage floor. A raising of the floor by 20 cm, reducing the vertical depth of the passage, seems quite certain; but the material of this supposedly secondary floor extended at least to the façade of the sweatroom, yet a door sill was not seen. It is not impossible that the lower floor and the lower part of the passage walls pertain to an earlier sweatroom, a situation known at Structure P-7. In that case the maximum door-height of this group of six sweatrooms would be 1.1 m, still combined with a maximum width of 1 m.

All doorways are placed low with respect to the enclosing building platforms, and in five cases sunken passages permit placement of the threshold below the sweatroom floor level.

Structure S-2 is unique in providing a threshold above floor level, from which one descends by steps to a sink in front of the firebox (Figs. 9.28a and 9.34). Unfortunately the height of the lintel is not here known. It has been restored, in the figure, as giving about the same vertical relationship to the firebox as is found in all known cases, of which there are six. The result is an extremely low door opening. This arrangement might be a secondary modification of a normal design, though we failed to investigate the point. Figure 9.28b shows such a hypothetical earlier phase; while in the cross section drawing of Figure 9.34, Unit A, with a question mark, has been distinguished from Unit E, as the hypothetical original platform. This sweatroom certainly differed from all the others in respect to its entrance and drainage arrangements. No covered drain or escape hole from the sink to the platform hearth was noted.

The sunken passage of Structure O-4 was floored with slabs, a feature not observed elsewhere at the site. They appear to have been rough-worked for the purpose, two of those exposed being long and narrow like capstones, and extending clear across the passage (Fig. 9.38). The slab floor was covered with plaster.

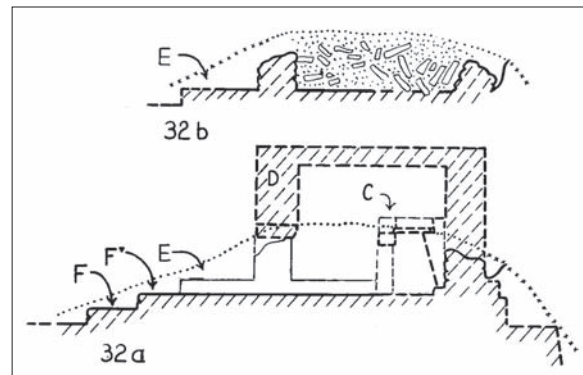


Figure 9.32 Cross sections of Structure J-17: a. at center, with reconstruction; b. near center with sketch of slabs in debris.

Only lack of information accounts for the perfectly horizontal floors shown in most of the sections, as has been mentioned. Floors of enclosing buildings and sunken passages presumably all sloped downward toward the front, as in the well-known structures N-1 and P-7. In two cases there are positive data confining such an assumption. In the case of Structure S-19 it was necessary to give the passage floor a perceptible slope in order to fit Cresson's measured heights for the steps of Units D', D and E into a carefully measured debris profile. Confirmation is also available at Structure S-4. Sketches show the sweatroom floor at the same approximate level as the floor outside. But the vertical depths of the passage

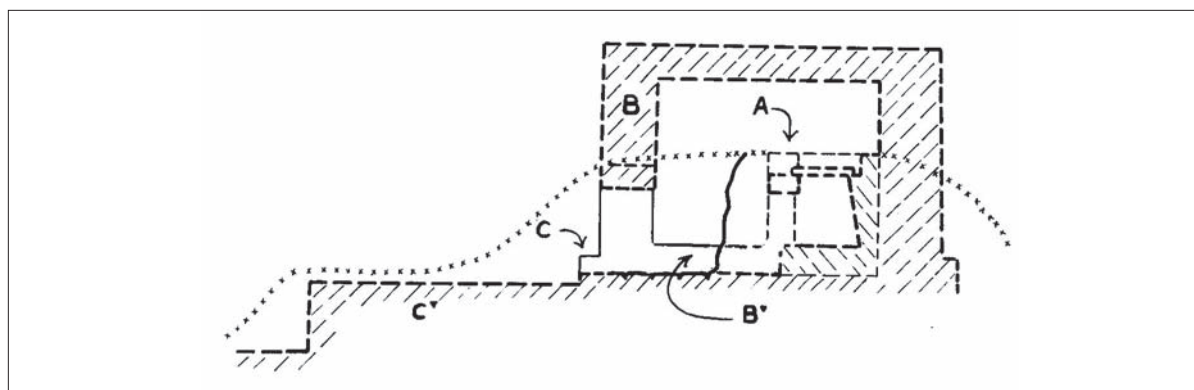


Figure 9.33 Center cross section with hypothetical reconstruction: Structure O-4.

were 29 and 42 cm inside and 52 and 60 cm outside, the doorway. The alternative figures refer to apparently secondary and original floors respectively. A slope of about 10 cm in 1 m is indicated, though it may have been actually less than this.

Passage Outside Only?

Structure S-4 presents an interesting detail. The inner left corner of the sweatroom doorway extends from the lintel to the floor of the passage, as shown on a careful scale drawing made by the writer in 1932. Stones of the masonry were sketched and show that the lower part of the jamb is continuous with the wall of the passage outside, to the front. Therefore, the passage, outside the sweatroom, was built at the same time as the sweat-room itself. The sketch does not show existence of the passage inside. However, on a check-up in 1936, Cresson draws it there also, and measures its height, showing its walls as flush with the jambs of the door. Probably he extended the old trench just a little. His sketch is a hurried one, merely meant to locate his measurements, and it shows no masonry details. Combining our observations, it can be said that, on one side at least, the passage wall inside the sweatroom was built after completion of the door and the passage wall outside.

This might be a mere sequence in the order of construction, but there are two reasons for doubting this. If the complete passage, inside and out, was part of the original plan, the observed careful construction of the inner corner of the doorway, between passage and sweatroom floor levels, was a waste of labor. Photographs show rather clearly that this did not occur at Structure N-1, nor at Structure J-17 (Fig. 9.37); and it certainly did not occur at Structure P-7. We thus have reason for believing that the original design at Structure S-4 called for the sunken passage outside the sweatroom only. Investigation was too sketchy to say definitely that, in the beginning, the sweatroom was operated without the

passage inside, and with its entire floor level below that of the enclosing building. But this is implied, the inner passage then resulting from a truly secondary raising of the sweatroom floor on either side of the area in front of the firebox. Originally, then, the doorway may not have been sunken in our particular sense, i.e., with reference to the floor of the sweatroom.

This sequence, in more than a mere structural sense, is not definitely established here, but we have a strong hint that it occurred. In such a design the operation of the sweatroom would be precisely the same as if the door and the sweatroom floor were at enclosing building level, without any sunken passage at all. The advantage of the latter would seem to lie only in keeping the enclosing building free of water and ashes. On raising the sweatroom floor, but continuing the passage through it to the firebox, these advantages would accrue here also, and in addition patients would be higher with reference to the fire and the roof. The possibility of such a sequence in design is therefore of theoretical interest.

The idea is advanced merely as posing a problem worth investigating at some future time. Cresson's data for Structure O-4 are also pertinent, but equivocal. There also the interior passage wall on one side ends against the inner corner of the jamb which descends to the passage floor level; the masonry on the other side is also discontinuous except at the very bottom, where passage wall and jamb are tied together by one stone. One cannot safely infer contemporaneity from a single stone, since truly secondary walls might on occasion be tied to original construction in this manner. An undoubted case occurs in the palace structure J-21. For the other three structures of this series of six, no data on the question are available.

Sweathouses were undoubtedly built with sunken passages inside as well as outside the steamroom, as part of the original plan. The question raised is whether there may have been an earlier period when the whole

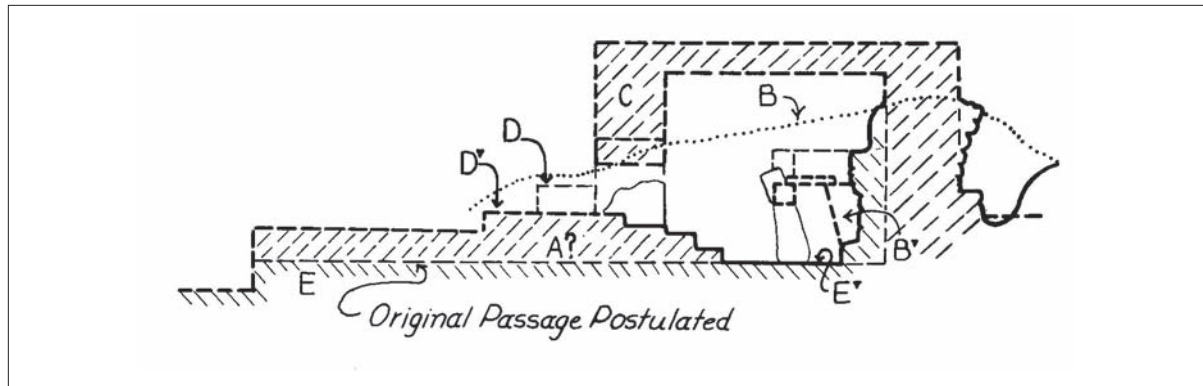


Figure 9.34 Cross section at center with reconstruction, Structure S-2.

steamroom floor was sunk to the level of the passage floor, so that the passage would then occur outside only.

Vestigial Outside Passage.

At Structure O-4 the sunken passage outside the doorway is almost non-existent, being only about 25 cm long. The operation of the sweatroom could hardly be affected if all its elements were to be raised together so as to place the floor of the doorway at the level of Unit C (Figs. 9.27 and 9.33). This remains true whether or not the enclosing building extended forward so as to rest on the lower platform Unit C', as well as on Unit C.

If the enclosing building was limited to the higher portion of the platform (Unit C) the shortness of the outer passage is explained: like others it reached outdoors, despite its shortness, because the sweatroom façade was in the façade of the enclosing building. But being so short, it might just as well have been eliminated by raising the sweatroom units, as suggested. The stratified series at Structure P-7 suggests strongly that a long-standing habit had been to place the sweatroom well back in a deep enclosing building and in such cases the passage outside the sweatroom seems to have a meaning. Its presence in such abbreviated form here may then be due to mere conservatism. It is implied that long narrow enclosing buildings were not early in a developmental series.

If on the other hand, the enclosing building here extended forward, out over Unit C', that was the lower front portion of a stepped-top building platform. Then the failure to sink the floor of the sweatroom doorway still further, so as to extend the passage across Unit C', is unique. Besides this, there are two factors indicating that the sweatroom was in line with the façade of a long narrow enclosing building, though this also would be an apparently unique feature. The lower Unit C' is much longer than Unit C, and may be merely a secondary step-terrace such as occurs before the temple Structure R-10. Another pertinent circumstance is that, among all

sweathouses investigated, only here is there evidence of stucco decoration above the doorway of the sweatroom. As a general rule, one expects sculptural embellishment on the outsides of Maya buildings, though of course such a rule is not universal.

Speculations of this sort have little present value. But if they are kept in mind they may be useful in planning excavations designed to demonstrate stratigraphically just what lines were actually followed in the evolution of this type of building.

Fireboxes

As stated under Remarks on Drawings, in this series we penetrated to the position of the firebox in only two cases.

Structure J-17

The inexperience of the workman who dug the trench here and the lack of close supervision are sufficient explanation for the fact that no part of the firebox was uncovered intact. Two circumstances show clearly that it was present. One is the fact that the passage walls are low and substantial so that they seem to have suffered little in the process of excavation, yet they stop short of the expected firebox location; the closest approach after excavation was 1.4 m from the rear wall. Another is that in the firebox area, and about at floor level and below, we were puzzled by large numbers of sherds. At the time (1932) I lacked the wit to associate this fact with the plentitude of sherds which had been found by Mason at Structure P-7. In Figure 9.32a, a sherd wall is reconstructed as rising from a low stone ledge which was present at the base of the sweatroom wall.

On the cross section drawing as made in the field, a special note shows that sherds were plentiful in what is now interpreted as the firebox region, and at sunken passage level. Apparently the firebox floor was at passage level, without a sill. Presumably the front as well as sides

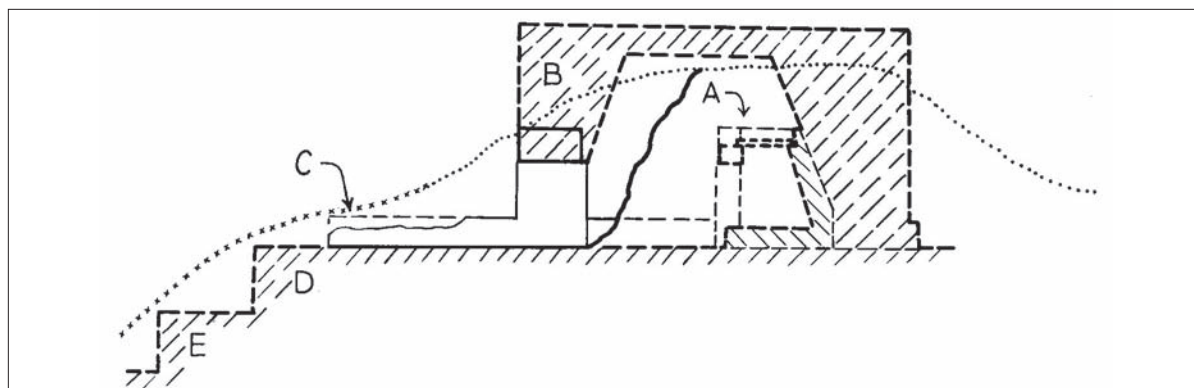


Figure 9.35 Cross section at center with reconstruction, Structure S-4.

were built of tabular masonry. Had the front of the box been of heavy on-end construction like that of Structure N-1, heavy slabs could scarcely have been missed, even with unskillful digging. If the walls had become badly cracked by the fire, like the side walls of the N-1 box, they would have been extremely difficult to identify and follow. Evidence of fire should have been present, but it was not looked for.

A firebox was undoubtedly present here. It may have been as large as, or smaller than, that of Structure N-1. It probably differed in lacking a sill and the on-end monolithic construction of that example.

Structure S-2

This firebox shows definitely that the firebox floor could be at passage level, or rather in this case, at sink level (Fig. 9.34). The interior width is about 55 cm. The interior depth, for purposes of comparison, is difficult to give, since the side walls are flush with the jambs of the opening. The presumed lintel over the opening was not found. If broken, its fragments may have been thrown out in ill-supervised digging. A large, somewhat tapering stone was set on end, to form the lower part of the left corner of the opening, but on the other side tabular construction is continuous from the outer corner of the opening to the rear wall. The distance from this corner to the rear masonry wall is 1 m, but at floor level a projecting ledge at the back reduces this dimension to about 80 cm.

In the reconstructions of Figures 9.28a, 9.28b, and 9.34 it has been assumed that the on-end corner stone supported one end of a lintel over the opening. This gives an opening height of 75 cm. This stone, by no means regularly rectangular, bulged a few centimeters, so that the opening at floor level was slightly less than the width of the box further in. However one reconstructs it, this box was appreciably smaller than that of Structure N-1 in its interior horizontal dimensions. The exterior ones were not ascertained.

Quantities of sherds were noted here, as at Structure J-17. The notes indicate that, in a later check-up by the writer, some of these were found still in the firebox, at and below the level of the rear ledge at its back. These were mostly fragments of heavy utility vessels, and all were mortar-covered. The debris at higher levels in the firebox had been noted as dark gray in color. The evidence for presence of a sherd wall, any surviving remnant having been destroyed in the digging, is convincing. Notes on the condition of the masonry, whether calcined by fire or not, are not available, but a sketch indicates that the side walls were either unusually small stones, or that larger stones had been fractured to smaller pieces.

The cross section (Fig. 9.34) shows the possibility that the box had its own rear wall of masonry, behind the sherd wall, but independent of the sweatroom wall. This was not really established. While such a design differs from that at Structure N-1, it agrees with that at Structure P-7-1st, and permits the supposition that front and rear walls of the sweatroom were of the same order of thickness.

Summary

The data available on two fireboxes in this series of six sweathouses are sufficient to show very considerable variation from the box selected as the type at Structure N-1. A firebox could be smaller, even though apparently in a sweatroom of comparable size. The on-end construction at the front could probably be absent, and surely could be only partially present. It is quite clear that the firebox floor could be at the level of the sunken passage or sink in front of the box, so that the firebox sill was not a constant element. While it seems probable that there was always an opening covered by a lintel, this might be no narrower than the interior of the firebox itself.

So far as they go, the additional data suggest that sherd walls were universal in the latest phases. Whether our reconstructions are essentially correct or not, these

peculiar walls probably could be renewed without disturbing the rest of the box, if this was ever necessary.

Decoration

Excavations in this group of six buildings were such that surviving evidence of sculptural decoration over the sweatroom doorways should have been found, if it existed. Results were negative except at Structure O-4. Here Cresson found stucco fragments, some containing sherds, in the debris in the doorway, along with 53 sherds in the doorway and just before and behind it. Some of these had stucco still adhering. In merely approaching the doorway in 1932, many large sherds were encountered by the writer. I was puzzled by their number until it was noted that remains of stucco adhered to many of them. There can be practically no doubt that some stucco design appeared above the sweatroom doorway. This is a unique feature in our whole series of sweathouses, and, as suggested elsewhere, it may be correlated with a unique design in which the sweatroom was not set back within a relatively deep enclosing building.

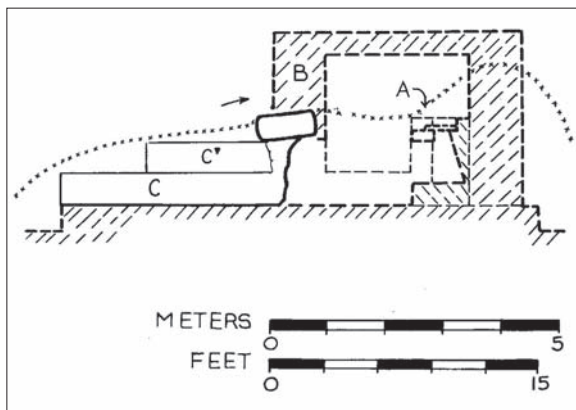


Figure 9.36 Cross section at center with reconstruction, Structure R-13. only).

The association of stucco sculpture with even one sweatroom is important. It suggests that the sort of sweathouses thus far found here were part and parcel of the complex of ceremonial buildings used by the priests. It tends to confirm the evidence of their location, which is more suggestive in this respect at some mounds than at others.

Dating

We have no sure means of dating any of these structures relative to each other or to the other two known sweathouses. We might arrange them in some typological scheme, based on a theoretical evolution of the types. Such a procedure is hazardous at best, and it certainly should not be attempted with such partially known structures.

The indicated high degree of variability in enclosing buildings, and to a lesser extent in fireboxes, at least suggests that the time-range represented by Structure N-1 and these six other examples is considerable. On the other hand the sweatrooms themselves seem all to have been substantial masonry affairs of about the same size as that of Structure N-1, and like that in having heavy stone lintels. At Structure P-7, the sweatroom, corresponding in these respects, is undoubtedly late in a series; it is stratified over remnants of another, apparently of much lighter construction. This latter, however, belongs in the second and not in the earliest of three periods. The indication is that none of the sweatrooms and fireboxes in the group of six here described go back beyond some middle period in the city's history. Behind this suggestion is the unproved assumption that heavy and light sweatroom walls were not built contemporaneously. If, in general, light walls followed, rather than preceded heavy ones, they should have appeared in the latest phases of some of the non-vaulted sweatrooms here examined.

In surmising that none of the sweatrooms thus far examined were very early at the site, we must remember that parts of the buildings may be older than others, though still in use at the time of abandonment. In addition, despite the lowness of the platforms, remnants of largely removed sweatrooms and enclosing buildings may lie completely buried. In none of the six examples considered in this section were such remnants searched for. In the one case where this was done, at Structure P-7, these were found.



Figure 9.37 Interior of sweat room, Structure J-17, showing sunken passage leading to doorway at observer's left, firebox believed to have occupied area at lower right.

It is by no means impossible that the sherd walls undoubtedly present at Structures J-17 and S-2 were later than the fireboxes themselves, and these in turn could have been secondary replacements in their sweatrooms. There is no positive reason for suspecting

either of these situations, but the possibilities make the sherds unsatisfactory for ceramic dating of the buildings. However, they date the sherd walls themselves as no earlier than the first appearance of the ceramic types surely represented in the sherd walls.

The sherds from the J-17 sweatroom excavation were piled at one side in 1932, and were first examined carefully by Cresson in 1935. There is no guarantee that any particular sherd came from the sherd wall, but most of them probably did. The number of fragments which got to this pile was 1,293, about half the number at Structure N-1, but many were probably thrown out by the workmen. Included in this salvaged lot were the fragments of the large-lipped plate with monkey design illustrated in Satterthwaite (1942a). This is undoubtedly a late form and design, the latter corresponding with the designs on the deeper bowl at Structure N-1. The indication is that the sherd wall dates from the latest ceramic period, or at least that the sweatroom was then in use.

Among the few sherds saved from the excavation of Structure S-2, and almost certainly coming from a sherd wall, is a fragment of a large polychrome bowl of the same basic form as the monkey vessels from Structures N-1 and J-13, though the design is a different curvilinear one. Rough bard white mortar or plaster still adheres to much of one surface. The indication is that this sherd wall also was constructed after the appearance of a ceramic form still in use at the time of abandonment. So far as we know, sherd walls may have been an exclusively late feature in the fireboxes; evidence of early ones would not be likely to survive (Tables 9.14 and 9.15).



Figure 9.38 Doorway and sunken passage of sweat room, Structure O-4; note slab floor of passage damaged at front; halves of broken lintel removed from doorway during excavation, believed to have occupied area at lower right.

Masonry Notes

Very little masonry of the structures here considered was exposed, and little attention was paid to it. Wherever seen, platform and sweatroom walls were of tabular stone laid in mortar. At Structure S-4 crushed stone was observed in the mortar, between the stones in the sweatroom wall. The Structure J-17 sweatroom walls seemed to be predominantly of thin small slabs, with selection of large blocks at corners. Here the comparatively shallow sunken passage walls were formed of one course of large blocks (Fig. 9.37). At Structure O-4, the body of the plaster on the passage floor was about 3 cm thick, pink in color, with a white finishing coat. This recalls the similar plaster in the passage of Structure N-1, the pink color being unusual.



Figure 9.39 Lintel and doorway of sweat room, Structure S-4, from front; sunken passage outside sweat room in foreground.

The heavy stone lintels, all plain, seem to have all been well tooled, at least where necessary to obtain smooth exposed faces. However this was not specifically recorded in all cases. It was noted that the lintel of Structure O-4 was well worked everywhere. The ends were gently rounded, when seen from above (apart from a large part of one end, which probably was damaged in the fall). This lintel also showed a slightly convex vertical profile on the well-preserved end, and on one of the long faces, probably the front. The careful work on the ends was useless from our point of view. A similar curving of the front edge can be detected in the photograph of the R-13 lintel (Fig. 9.40), and it was observed at Structure S-19. One is inclined to suspect the use of parts of old plain stela. But one long face of the J-17 lintel was fairly straight in vertical section, the other cut to the curve indicated in Figure 9.32. One end was not tooled at all, the other rough-worked and not at a right angle to the long axis, though fairly straight. We believe the curved edge of this lintel was the inner one, as indicated, but this is not certain. Since this form occurs on some stones believed to have been vertically placed

Table 9.16 Distribution of Pottery and Stucco (Structures S-2, S-19, J-17, and O-4)

		Sherds	Stucco
Str. J-17	In debris in sweatroom	W-42-1	
Str. O-4:1	In debris front of sweatroom	S-9-1*	
Str. O-4:2	In debris in doorway, near floor level		S-9-2*
Str. O-4:3	In debris in, and just front of and just behind doorway	S-9-3*	
Str. S-2	In debris, center trench through sweatroom	SE-9-1	
Str. S-19	In debris in sunken passage, outside sweatroom	SE-12-1	

* Sherds at Str. O-4 probably all from disintegrated stucco.

panels, it should be noted that here it surely occurred on a lintel. This stone does not look like part of a reused stela. It may be noted in the Dimension Table that the depth of a large lintel may be somewhat short of the wall thickness; this non-exact correspondence was observed in position at Structure S-4 (Fig. 9.35). On the other hand, a lintel may be somewhat deeper than the wall at floor level, as at Structure J-17 (Fig. 9.32). In all cases the lintels, whether originally quarried for this purpose or not, were long enough to give substantial bearings on the jambs. They range from 56 to 83 cm longer than the distance they spanned, assuming vertical jambs. At Structure O-4 the jambs were 25 cm further apart at the top than at the bottom, but probably had been forced out of shape by the heavy fragments of the lintel itself, which rested between them like a wedge. Even without allowing for this, the O-4 lintel could have overlapped each jamb by 16 cm. A more probable minimum amount of bearing surface, indicated by this series of sure lintels, is about 25 cm (Table 9.16).



Figure 9.40 Lintel and doorway of sweat room, Structure R-13, seen at an angle from front; rule stands against right side of sunken passage, pick against wall of Unit C' (No excavation behind front face of lintel, which was found exposed as shown).

4. STRUCTURE P-7, *Linton Satterthwaite*

Preliminary Remarks

Published notices of Structure P-7 refer to it in its latest form, and have already been referred to. This structure came to be known to us as the standing building, the only one at the site where more than remnants of a vaulted roof had survived. However, this applied only to the sweatroom, which was found completely vaulted, in contrast to all others thus far discussed at this site. The enclosing building of this final phase was in a ruinous state, but portions of it survived to an extent which makes reliable reconstruction possible (Figs. 9.46, 9.47, 9.57-9.63). In passing to this structure we do not leave semivaulting behind us, but it is here applied to the enclosing building, instead of to the sweatroom.

Maler's entirely different interpretation of the ground-plan stems from the assumption that the whole building was roofed with complete vaults (Maler 1901:53). His assumption could scarcely have survived a half-day of digging and is in itself a fair guarantee that he did not disturb the mound-contours by excavation. Even so, his imaginary walls, had they existed, could not have fallen to produce the observed results (Fig. 9.47, Sections A-B, I-J, G-H).

Surviving masonry was generally in good condition, as was floor plaster, the latter fact being very helpful in establishing a minimum of eleven sequent phases, and in showing a high degree of probability that the structure functioned as a sweathouse from the earliest to the

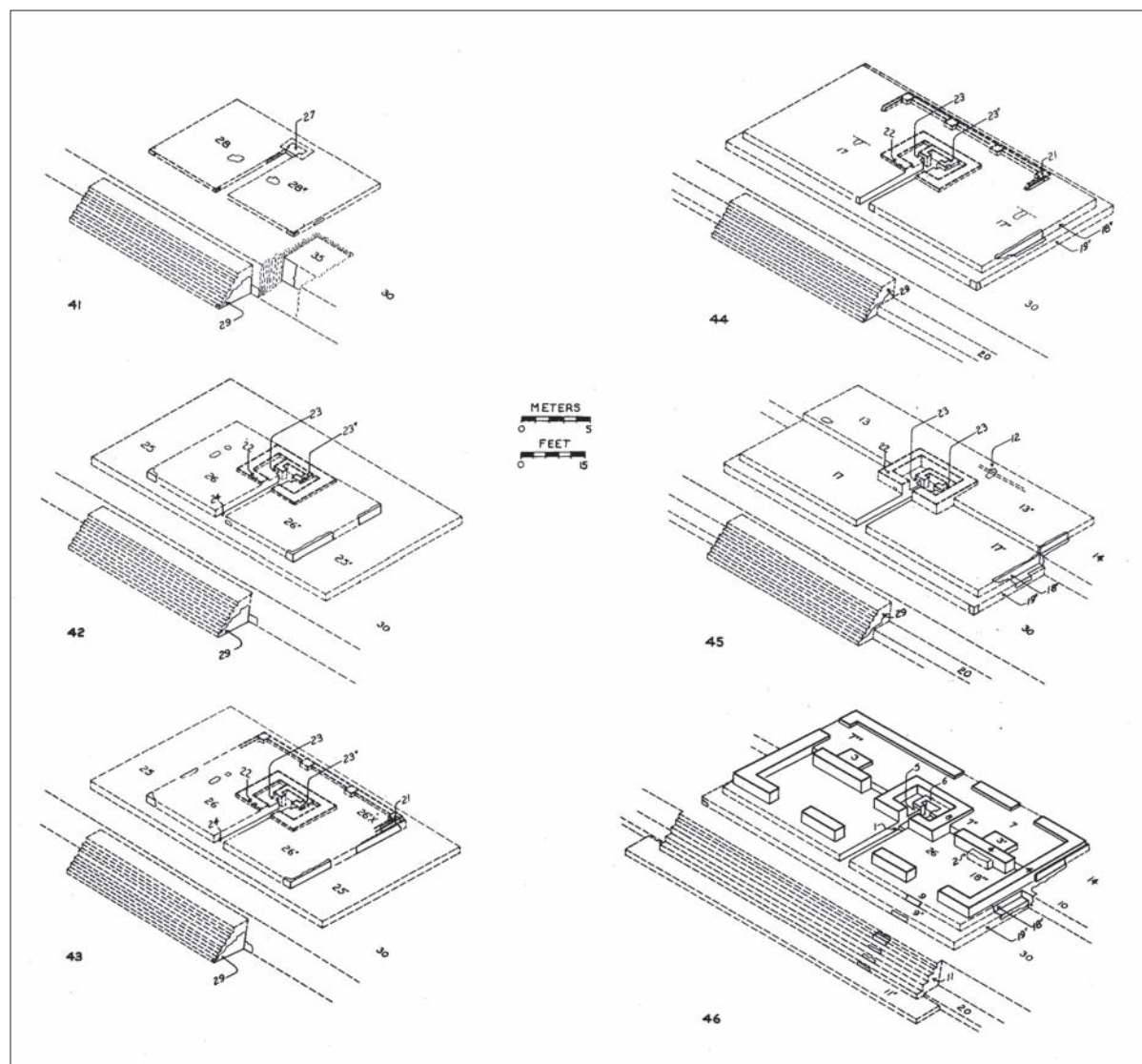


Figure 9.41–46 41—Isometric reconstruction of Structure P-7-3rd (Units 30-27); basal platform (Unit 30) cut out to show relation to basal platform of Strs. P-7-4th-B and -A (Unit 35); plan of firebox suggested without physical evidence. 42—Isometric reconstruction of Structure P-7-2nd-F (Units 26-22). 43—Isometric reconstruction of Structure P-7-2nd-E (Units 26X-21). 44—Isometric reconstruction of Structure P-7-2nd-C (Unit 17, plaster with turn ups to missing masonry); drawing shows survivals from prior phase (Str. P-7-2nd-D) not illustrated elsewhere, as follows: step-terrace (Unit 20); short extension to Unit 25 (Unit 19); probable extent of building platform modified by Unit 18 and hidden below plaster of Unit 17. 45—Isometric reconstruction of Structure P-7-2nd-A (Units 14-12); Units 16 and 15 of prior phase (Str. P-7-2nd-B) illustrated in cross section of Figure 9.53 only. 46—Isometric reconstruction of Structure P-7-1st-A (Unit 1, with Units 11-2 surviving from Structure P-7-1st-B or prior phase).

latest phase. This means that sweathouses may go back to the earliest local period of occupation. As one would expect, the sequence of phases reveals significant changes in design. These were more profound in the enclosing building than in the sweatroom itself, but hints of interesting developments in the latter are not lacking. The extensive semivaulting of the roof of the final enclosing building is a structural feature unique in the Maya area

thus far, and adds to the claim of this mound for special attention.

We have here more convincing evidence of this roof-type than anywhere else. It was first inferred by Mason in 1931, when he did the bulk of the excavation at this mound. The same year Wyer was assigned the task of measuring the main features of the latest phase, which was done without the controls of triangulation

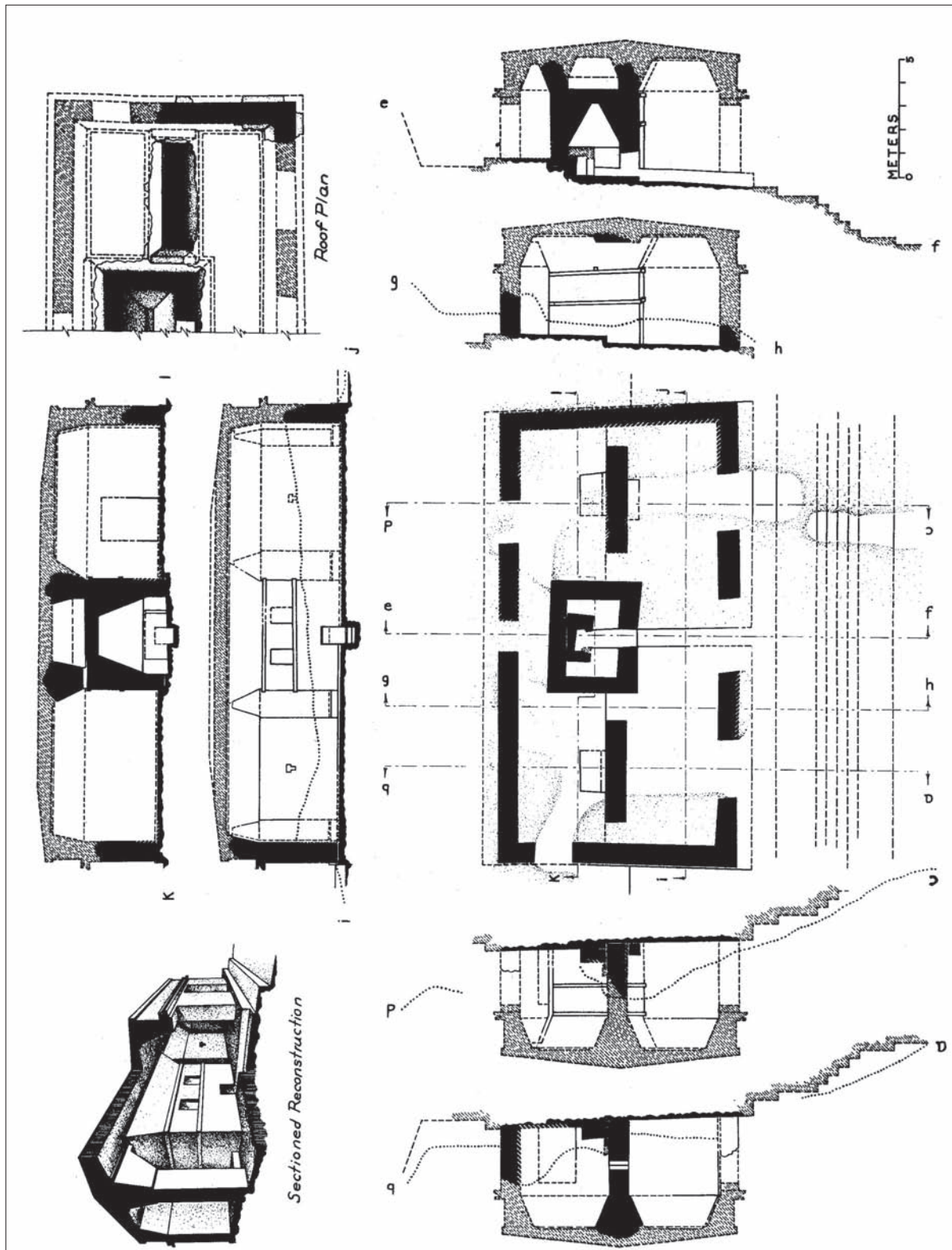


Figure 9.47 Drawings of Structure P-7-1st-A, with reconstruction; plan with unexcavated areas as of 1934 indicated by stippling; at sides and top center, sections combined with elevations; top right, partial roof plan; top left, perspective drawing of sweat room exterior with cut sections through enclosed building.

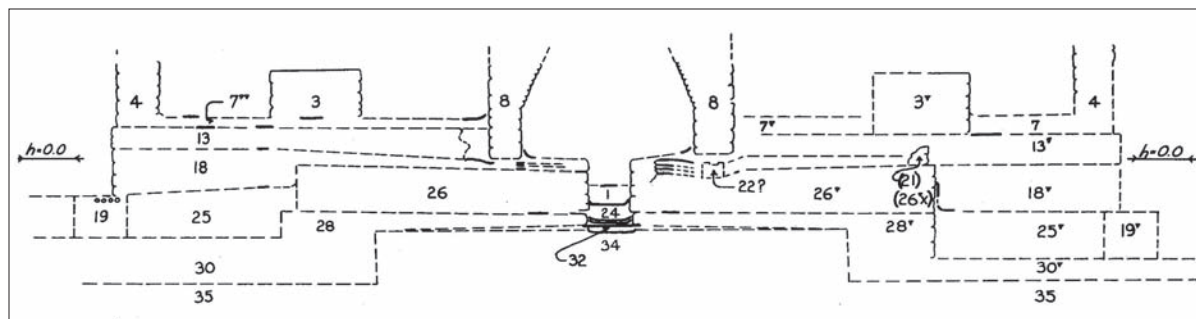


Figure 9.48 Composite longitudinal section of Structure P-7, approximately correct for line passing through center of final sweat room, except that Unit 26X is a rearward extension of Unit 26, beginning behind that line, and Unit 21 survived as a remnant on Unit 26X only; the suggested level of Unit 35 is inferred from an exposure far forward of that line.

and the leveling instrument. I remeasured with these aids in 1934, when excavations were not permitted. The drawings now published are based chiefly on that work, combined with Mason's notes and measurements as of the time of his excavations, where needed.

After this rechecking in 1934, Mason prepared a rough-draft report, chiefly on the final phase, which has been freely used here, without further acknowledgment. Figure 9.47 was drawn in 1935 by Proskouriakoff to accompany that report. In later seasons I became convinced that a very little further excavation might establish the existence of more phases than was then clear, so it happened that I returned here for a day or two at a time, with this limited objective, and as work at other mounds permitted. As of 1935 the original excavations had reached the latest floor in the areas indicated by lack of stippling in Figure 9.47. This had been penetrated only in the sweatroom and sunken passage outside it, and in the left rear room (right of an observer facing the building). My later excavations were confined to additional penetrations at strategic spots within these areas, and to extending the cut at the left so as to give a cross section reaching the plaza at the front.

Any attempt to exhaust the possibilities for learning what had survived from earlier phases would have been very time-consuming and would have vitiated other plans. Nevertheless it has been possible to assemble the many disconnected items of buried construction with reference to a single front-rear axis, which very clearly remained the same from first to last. When available stratifications are brought to bear, many of these items must be put in one phase rather than in any other, and all may be assigned to particular phases where they become parts of reasonable broken-line reconstructions. The reconstructions make sense as sweathouses of the local types known at other mounds. A picture of change within this functional limitation emerged, and the reader can get a quick impression of it by comparing Figures

9.41-9.46. These consist largely of broken lines, but it will be found on close inspection that no important component is thus drawn or partially drawn unless there was some (though perhaps not much) physical evidence for it. Where this is only an isolated bit of wall, usually its position combines with the positions of others to fit the generalized sweathouse pattern, as established at Structure N-1 and in the latest phase here. In all cases, something existed which will not fit the plans of local temples and palaces.

Returning our attention to the final phase, mention should be made here that before Maler's time vandals had gone to great labor to break a large hole through the right side of the sweatroom wall and vaulting. Once inside, they undoubtedly proceeded immediately to probe in the firebox which, in their imaginations, doubtless seemed like a treasure chest. Mason found it partially destroyed, and presumably its already ruinous condition accounted for Maler's description of it as a "large stone bench." As we shall see, there is no reason for doubting that it was a firebox quite similar to that at Structure N-1.

It is probable that the avarice of modern woodcutters prevented us from seeing this firebox of the Initial Series Period exactly as it was left at the time of abandonment. The completely vaulted sweatroom roof protected it from the elements and from falling trees. The semivaulting of the enclosing building must have collapsed a few generations after abandonment, sealing in the low doorway completely.

Unit Designations and Temporal Sequences

Although no deep digging was done at this mound, shallow cuts produced a relatively large number of superpositions. Some of these cuts eventually coalesced to form the front-to-rear trench referred to above, penetrating the debris of the final enclosing building, the floor of the latter, and exposing the left face of an earlier, shorter, platform. This trench was carried forward and down to plaza level,

where bedrock was encountered, with an interruption below the medial wall of the final enclosing building. The findings here are largely covered by the cross section of Figure 9.53. The earliest basal terrace in this cut, Unit 35, may be the earliest construction at this spot, but this was not proved by following bedrock to the rear.

Stratifications were found in a number of scattered lesser cuts, and as many of these as possible are brought together in the longitudinal cross section of Figure 9.48. Various other cuts are shown in Figures 9.49-56, placed on the same page for ready reference and comparison. The datum or zero height is indicated on each, to help in visualizing stratigraphical relationship as between different figures. It will be noted in Figure 9.48 that the floor of the earliest probable building platform encountered, Unit 34, is at a height above Unit 35, which makes it likely that the two were used together. Therefore this earliest building unit may be the earliest built at this part of the East Group. But again, this was not proved by the required amount of deeper excavation. Our sequence may or may not start at the very beginning of occupation of this part of the site, but it surely begins long before the time of abandonment.

As implied in the above, at this mound units of construction have been numbered rather than lettered, because it seemed advisable to distinguish more units than there are letters in the alphabet. In general, primed numbers refer to a part of a unit seen to the left rather than the right of the front-rear axis. In two cases the letter X has been added to a number to distinguish a distinct unit. Unit 34X as a label connotes special doubt whether a supposed wall remnant really was such. In the case of Unit 26X, the special type of designation will serve to remind one that its temporal relationship to Unit 26 is a matter of inference rather than physically dug-out proof. The two together came to form a single platform, but which is an extension of the other is open to some theoretical doubt.

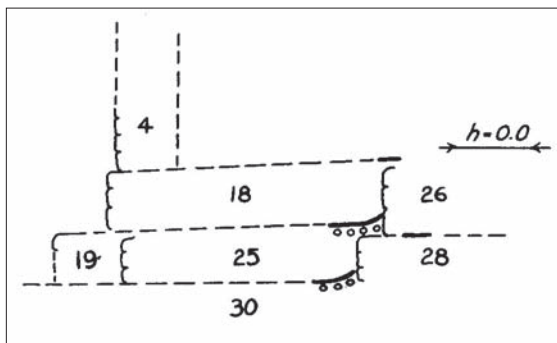


Figure 9.49 Composite longitudinal section of units exposed near right front (W) corners of platform units shown.

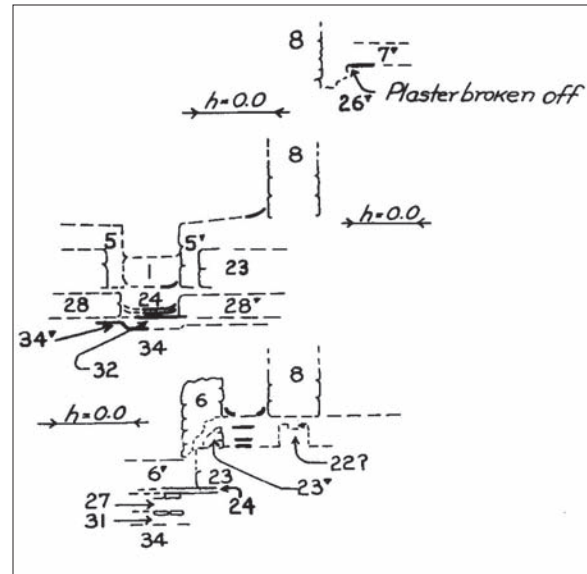


Figure 9.50-52 50—Longitudinal section near left rear (E) corner of final sweat room (Unit 8), showing probable excavation into earlier platform before erecting the new sweat room (see similar evidence in Figs. 9.53 and 9.56). 51—Longitudinal section in final sweat room, slightly to the rear of line of Fig. 9.48, passing through "pit" of Fig. 9.42 (i.e., through Units 23 and 23', forward of firebox).

52—Longitudinal section through left (SE) half of final sweat room, including area of fireboxes of various phases.

As is usual, there is some leeway where judgment has had to be exercised in assigning a given unit to a particular phase. The scheme of sequences adopted is tabulated to make it possible to get a fair notion of the changes which went on without struggling with the tedious text devoted to particular phases. The latter, it is believed, justifies the tabulation as it stands, and it is felt that fuller knowledge would not require drastic rearrangements, though it would certainly fill out many phases considerably.

A tabulation of all stratifications would be large and cumbersome, and of doubtful value. Instead of providing it, with the tabulated descriptions of units in each phase we give figure numbers applicable to the units concerned; if a figure number is underlined it refers to a three-dimensional drawing of one or more of the units in question; if not, to such a unit or units as part of or in relation to a cross section. The latter show stratigraphical relationships so far as they are known and seem significant.

We do give a Table of Selected Stratifications, and use it in demonstrating that eleven phases certainly existed. In assigning particular units to them, the usual principle adopted in such cases has been applied: when we come to a new phase we assign as much to it as the stratigraphies

Table 9.17 Structure P-7 Scheme of Temporal Sequences

Str. P-7		Unit	Figure Nos. (drawings)
4 th -B	*Basal platform (stairway not searched for)	35	9.48,9.53
	*Building platform with apparent plaster passage drain (enclosing building platform? Evidence not searched for).	34,34'	9.48,9.51, 9.57
	*Probable remnant of front wall of sweatroom	34X	9.57
	*Probable remnant of rear wall of firebox or fire pit (Stepped wall in correct relation to Unit 34X)	33	9.57
4 th -A	Thick resurfacing of platform (of Unit 34), with elimination of old plaster drain	32	9.48,9.51, 9.57
	Paving of presumed firebox or fire pit with stone slabs	31	9.52,9.57
-3d	*Basal platform (new)	30	9.41,9.53
	Stairway of same	29	9.41,9.53
	*Building platform, new, with shallow sunken passage; re surfacing of passage (New enclosing building platform? Evidence not searched for)	28,28'	9.41,9.48, 9.51,9.57
	Paving stones, new, forming low sill (for old or a new firebox or fire pit?) New sweatroom presumed, evidence not searched for	27	9.41,9.57
-2 nd -F	*Building platform, new, with new sunken passage over old one (enclosing building platform? Evidence not searched for)	26,26'	9.42,9.48, 9.49,9.55
	*Supplementary platform (first at this mound)	25,25'	9.42,9.48, 9.49,9.53
	Floor of new sunken passage at level of supplementary platform	24	9.42,9.48, 9.51,9.52, 9.57
	Rectangular pit at head of sunken passage (presumed to have partly contained a new firebox but possibly predating this period)	23	9.42,9.51, 9.57
	*Remnants of supposed firebox, new	23'	9.42,9.52
-2 nd -E	*Remnant of supposed front wall of sweatroom (new)	22	9.42,9.55
-2 nd -D	*Rearward extension of low platform, presumably as a deeper building platform (evidence on left side)	26'X	9.43,9.48
	*Remnant, apparently of pier and base-wall (reconstructed partially as enclosing building of type of Str. N-1-1st-A)	21	9.43,9.48
-2 nd -C	Step-terracing at side of basal platform stairway	20	9.44
	Slight lateral extensions of supplementary platform	19	9.44,9.48, 9.49
-2 nd -B	*Major lateral extensions of supposed building platform (for new or extended enclosing building? Evidence not searched for)	18	9.44,9.48, 9.49,9.53
	Two resurfacings of building platform as extended in prior phase; construction of new masonry as evidenced by turn-ups (Plaster of Unit 17 may have turned up to a medial wall of enclosing building; that of Unit 17' may have turned up to bench or wall forming stepped-top platform.	17,17'	9.44,9.53, 9.54
-2 nd -A	Bench (?), apparently facing rear	16	9.53
	Thick resurfacing inferred from height of base of bench; actual new surface not found and presumed destroyed	15	9.53

continued on next page

Str. P-7		Unit	Figure Nos. (drawings)
-2 nd -A	*Raising top of basal platform at rear, forming stepped top	14	9.45
	*Raising top of building platform at rear, marking first appearance of stepped top building platform	13	9.45,9.48, 9.53,9.56
	*Remnant of presumed enclosing building, new	12	9.45,9.56
-1 st -B	*Basal platform stairway, new	11	9.46,9.47, 9.53
	Forward extension of rear of stepped-top basal platform	10	9.46
	Slight forward extension of building platform	9	9.46,9.53
	Corresponding slight forward extension of supplementary platform	9'	9.46,9.53
	*Sweatroom, new	8	9.46,9.47, 9.48,9.51, 9.52,
	Semivaulting of enclosing building, where structurally continuous with sweatroom	8'	9.47,9.57
	Slight raising of rear of stepped top building platform accompanied by tearing out at front of rear portion	7	9.53,9.56
	*Firebox, new, at higher level and with sill, burying rear portion of rectangular pit	6,6',6"	9.46,9.57, 9.52,9.57
	Extension of walls of sunken passage rearward to new firebox, preventing sunken pit effect	5,5'	9.46,9.57, 9.51
	*Enclosing building, new, double range with semivaulting (part of semivaulting over sweat-room separately labeled as Unit 8' because continuous with Unit 8).	4	9.46,9.47, 9.48, 9.49,9.53, 9.54,9.56, 9.57
	Benches with back-screens (all masonry thrones)	3,3'	9.46,9.48, 9.53,9.56
	Bench (part of legged throne??)	2	9.46,9.53
	Raising of sunken passage within sweatroom, sweatroom door sill	1	9.46,9.47, 9.48,9.51, 9.57

Note: Starred units required considerable labor in construction and/or are new basic sweathouse components; unit numbers omitted in Figure 9.47.

permit, unless there seems to be good reason to deviate from this rule in assigning some particular unit. In grouping the phases into periods, as for Structure N-1, the principle adopted is that a new period shall include a new sweatroom, known or reasonably inferred (Table 9.17).

Evidence for Minimum of Eleven Phases

The Table of Selected Stratifications (Table 9.18) lists one or two units pertaining to each of 11 phases, proceeding downward in the table in the order of advancing time. The two left columns of units are locked in place by

Unit 18', which is common to each. The third column is not locked to either of the others in this manner, but nevertheless we cannot place Units 4 and 5' in different phases.

This follows from a series of structural sequences within the phase of Structure P-7-1st-B. In Figure 9.57, Unit 8' is that part of the semivaulting of the enclosing building, Unit 4, which seems to rest on the sweatroom, Unit 8. This part of the enclosing building is given the special label 8' to emphasize that, though we first thought it later than Unit 8, a section cut through both showed them to be a single unit structurally. The

term semivaulting over the sweatroom (Unit 8') applies strictly only to the roof-supporting elements at the front and sides of the sweatroom which supports them. At the rear these merge into half of a complete vault, the other half of which rested on the rear wall of the enclosing building, that is, on Unit 4. The situation here is best seen in Sections E-F and K-L of Figure 9.47. Units 8, 8' and 4 clearly belong together in a single phase. Referring again to Figure 9.57, Unit 5 (corresponding to Unit 5') was built against Unit 6, the firebox, and that was built against the rear wall of the sweatroom, that is, against Unit 8, which we have seen belongs in the same phase as Unit 4. Whatever the structural order, Unit 5' cannot precede Unit 4 in significant phase, and it certainly did precede Unit 1 in a significant sense, since the latter changed the vertical depth of the passage. Thus we must have the eleventh phase, Structure P-7-1st-A, for the raising of the passage,

It might in theory be argued that Unit 1 represents a late change in plan, after lower parts of the structure P-7-1st-B had been started but not completed. There is no stratigraphical proof to the contrary; but since a similar raising of the passage floor has been noted at other mounds, this seems extremely unlikely (Table 9.17).

It may be noted that reversing the orders of Units 26' and 26'X in the column of Figure 9.48 would not affect the necessary number of phases in the table. In the table, and in Figure 9.48, Unit 26'X is in parentheses because it really belongs to the rear of that longitudinal cross section. The observed relationships of Units 26' and of 26'X to Unit 18' were the same, and it seemed simpler to bring the front and rear portions of a composite platform onto the one drawing. We neglected to dig out actual proof that Unit 26'X is a later rearward extension of Unit 26', and not the reverse.

Since we use these two units as phase-indicators, it should be stated that a line in the masonry of the left face of the platform in final form showed clearly that it was a composite one, there had been an extension, either forward from Unit 26'X or, almost certainly the case, backward from Unit 26'. Masonry details here were not recorded, and we failed to expose more than one face at the old corner. However, if in theory we should reverse the sequences of Units 26' and 26'X, the latter would come immediately after Unit 28' (the platform illustrated in Figure 9.41). In such a temporal position it does not make sense; considering it as a rearward extension of Unit 26', as in Figure 9.43 and our table, makes Unit 26'X a logical step in the development of the large enclosing building of the final period.

Discussion by Early Periods and Phases

Structure P-7-4th-B (earliest)

This phase is not illustrated by a special three-dimensional drawing, but a portion of the basal platform (Unit 35) appears in a cut-out in Figure 9.41. To the observer's left of this portion one may imagine a stairway hidden beneath the later one shown, presumably centered before a building platform about 50 cm high. The latter, Unit 34, is also hidden by the later construction shown in Fig. 9.41. Its top only was seen, and only on and near the front-rear axis (as determined by units of later phases). Part of this exposure is shown in plan in Figure 9.57.

In that figure it will be seen that Unit 34X is in just the right position for a remnant of the front wall of a sweatroom, that is, it is below the front wall of that component of the final period. This Unit 34 X consisted of two thin slabs, bedded side by side on a few centimeters of yellow earth, presumed to be remains of mortar, and similar to the bedding of the much later sweatroom wall of the final period. There is not much doubt that we correctly infer a wall-remnant here, and none that it belongs in time within this period, though actual proof that it belongs in this earliest phase, rather than in the next phase, was not recorded.

The plaster floor of the platform, Unit 34, extended by some unknown amount more than 2 m forward of this wall-remnant. In the rearward direction at one point it could be followed to within 30 cm of a stepped remnant of wall, Unit 33, based at its level. At this point extreme heat had modified the plaster to such a soft chalky consistency that its surface could not be followed further. There is no doubt, however, that this surface once reached back to Unit 33, which appears in cross section in Figure 9.57. This unit, as can be seen in that figure, is in just the right position for a remnant of the rear wall of some sort of masonry arrangement for the fire, that is, it is partly below the rear wall of an undoubted firebox of later times (Unit 6) and below another similar remnant of an intermediate phase (Unit 23).

From the foregoing we conclude that our earliest platform, Unit 34, served a sweatroom of normal size, with interior arrangements for the fire centered at the rear of the sweatroom, just as in all known later examples. As in many of the latter, including Structure N-1, the sweatroom was set back on a platform much deeper than was necessary for this component alone, and the platform probably was also much longer than the sweatroom, providing raised areas at the sides as well as to the front. Presumably an enclosing building roofed over the sweatroom and these additional areas, but there is the logical possibility that in the earliest

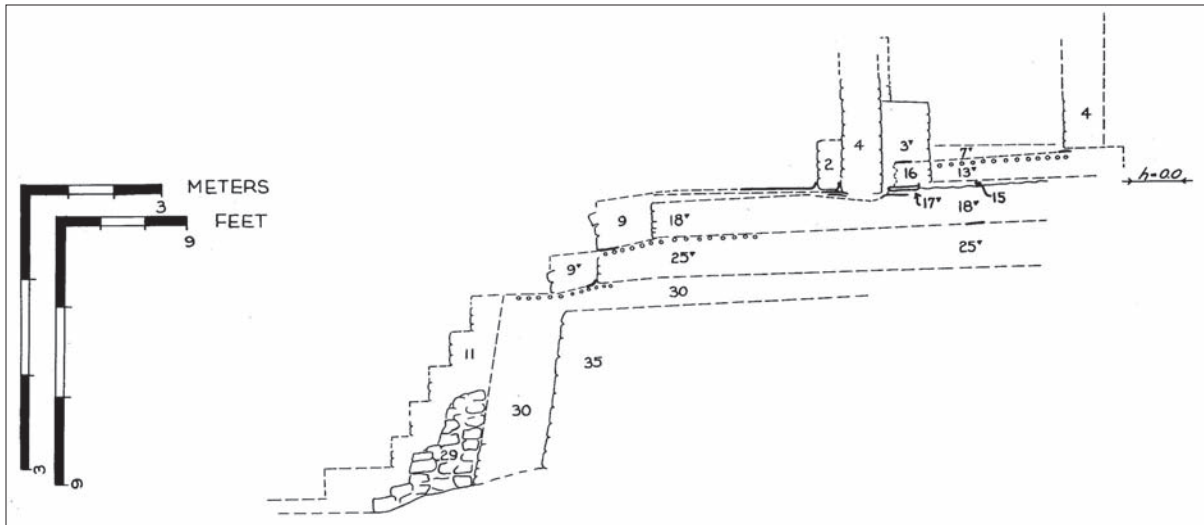


Figure 9.53 Composite front-rear section, approximately correct for line running through center of bench-throne in left (SE) rear room of final period, just outside left walls of platform-units 28', 26', and 26X; masonry of early stair sidewall sketched in elevation.

phases a building platform larger than required for the sweatroom merely provided unroofed raised areas at the front and sides.

The actual size of this earliest building platform is unknown, but its length was less than that of Unit 28, the building platform of the next later period. The length indicated in Figure 9.48, by broken line, is based on no more knowledge than the fact that the left side wall of the earliest platform, Unit 34, must lie somewhere behind the corresponding wall of Unit 28'.

An interesting feature of this phase is the plaster passage drain, sunk into Unit 34. One side of this is indicated in Figure 9.57, largely in broken line, as Unit 34'. This duplicates what was more completely seen on the other side of the axis, hidden below later construction in this drawing. The platform as a whole sloped gently downward toward the front, and on either side of the axis low shoulders in the plaster defined a long narrow area sunk about 5 cm below the level on either side. Cross sections through this appear in Figures 9.48 and 9.51. These shoulders definitely were such, and not turn-ups to since-vanished masonry walls of a sunken passage, though they lay immediately below such walls of the next period.

On the one side where preservation was best, the shoulder of this shallow drain turned to the side and "petered out" as the lowered area bounded by it rose in the lateral direction. This happened about 40 cm forward of Unit 33, the remnant of the firebox or fire-place which clearly belonged with it. As indicated in Figure 9.57, the shoulder marking the left side of the drain passed by the

end of the wall-remnant Unit 34X. The drain was in the correct position, and of the correct width, to confirm our inference that Unit 34X is a remnant of the front wall of a sweatroom, and also that it is at the doorway of such a room, the drain passing from within, through the doorway and out across the deep building platform to the front. This drain differs in no way, except in its shallowness, from the sunken passages of later phases. Hence we can be sure the doorway of the earliest sweatroom known was of the same approximate width as those of later periods.

Actual plaster turn-ups to Unit 34X were not noted for this phase nor for the next; in the latter phase the plaster surface of Unit 32 was seen to be broken off just short of the inner side of the wall-remnant. This probably occurred when the wall was largely removed. It lay below the sunken passage wall of Structure P-7-3rd and must predate it. Lacking the evidence of plaster turn-ups, the slabs themselves are good evidence, though not the best, that the walls of this earliest sweatroom were only about 30 cm thick. This is decidedly thinner than at any other mound thus far known, but similar to the probable thickness of the same element in a later phase here (Structure P-7-2nd-F).

Structure P-7-4th-A

We have here the first appearance of slab-paving for the fire. This is illustrated in cross section as Unit 31 in Figure 9.57. These slabs had been removed some years before the plaster passage drain of the previous phase was discovered, but since their forward ends must have

lain above a portion of the drain, they belong in the next phase, that here under discussion.

Apparently at the same time there was a resurfacing of the building platform, so thick at the center as to obliterate the old plaster passage drain (see Unit 32 in Figures 9.48 and 9.51). This new floor surface was flush with the slabs for the fire, though actual contact of the new surface with them was not recorded. It must be remembered that in the vicinity of the firebox, destruction by heat as well as by early treasure hunters must be reckoned with.

The general slope forward was maintained. Our evidence indicates that provision of a special drain was temporarily given up. If it was not, the sides of either a plaster passage drain or a sunken passage remained hidden from us, because the drain was wider than in earlier and later phases. In that case, the plaster floor of Unit 32 should have covered the end at least of Unit 34X, which almost surely marks the position of the door jamb of the earlier phase. The plaster did not quite reach that remnant of wall, the jamb apparently still functioned, and it is a fair conclusion that in this phase nothing but the slope provided for drainage. Thus the plaster passage drain of the earlier phase appears to have been an unsatisfactory experiment. The presence of the slabs, obviously used in connection with the older Unit 33, shows that fires were still being provided for, and confirms the evidence that the old sweatroom was still in use as such.

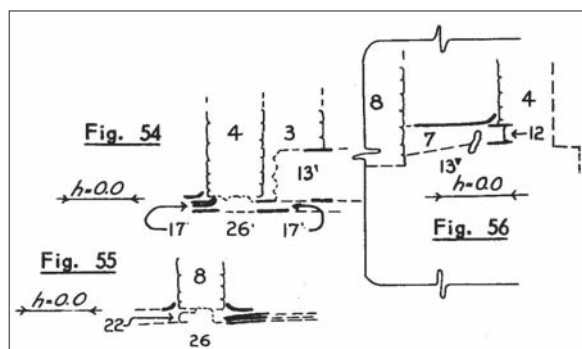


Figure 9.54–56 Composite front-rear section, approximately correct for line passing through bench-throne in right (NW) rear room of final period (54). Front-rear section through front wall of sweat room of final period (Unit 8) showing supposed remnant of earlier sweat room wall (Unit 22) (55). Front-rear section on line through sweat room of final period near its left (E) corner; note plastering of platform before erecting final enclosing building wall (Unit 4), and remnant of earlier enclosing building wall below it (Unit 12); position of slab suggests disturbance of old platform during final operations (56).

Structure P-7-3rd

What is known of this period (consisting of a single phase) is illustrated in Figure 9.41. This and the cross sections show that everything about it is new, it completely obliterated all known earlier units.

We are dealing with a time of important change. The raising and forward extension of the basal platform (Unit 30) was a job of considerable magnitude. The known side of the new stairway for it (Unit 29) lines up with the corresponding side of the new building platform (Unit 28), so the reconstruction of a rather imposing full-width stairway, fully covering the building, is mandatory.

The two front corners of the building platform were exposed, so we know the length, and that the sunken passage is centered. It survived wherever looked for, except close to the firebox or fire-place, where a new set of paving slab (Unit 27) maintained the effect of a low firebox sill. This is all that survived of a presumed new firebox. No remnants of a new sweatroom were encountered, but this must be postulated in view of the overwhelming evidence at other mounds (and in later phases at this one) that the sunken passage is a certain sweathouse indicator.

We still lack physical evidence of an enclosing building, but we did not dig for it.

It is interesting to note that the sunken passage of this phase was comparatively shallow, and tended to be a few centimeters wider than that built above it later on. The surface of Unit 32 of the prior phase could have been used as the floor of the new passage, but a new plaster surface was provided and there was a still later resurfacing. These tended to make the passage, the earliest sunken passage known, even shallower than otherwise, but this effect is somewhat minimized in Figure 9.48.

It was at first supposed that the low walls of this passage were merely the lowest course of a much deeper one. Future excavators are warned against making a similar mistake. That it was a mistake is shown sufficiently by the solid-line portions of Units 28 and 28' in Figure 9.48.

Structure P-7-2nd-F

Figure 9.42 illustrates this earliest phase of a new period. Comparison with Figure 9.41 shows no change in the basal platform, but everything else is entirely new. The building platform (Unit 26) is about the same size as before, but has been built over the prior one. We still lack positive evidence that it served an enclosing building. Unit 25 completes the obliteration of the old building platform, where its sides would otherwise have remained exposed (Figs. 9.48 and 9.49). This Unit 25 marks the first appearance of the supplementary platform in our sequence. During the next phase it corresponds closely to the supplementary platform of the latest phase at Structure N-1.

Assignment of this supplementary platform to this phase, rather than to the next, requires a wider exposure to the rear than to the front of the building platform, a suspicious circumstance. If we shift this component to the next phase it is hard to understand why the new building platform was not properly registered on the old one (in Figure 9.48 Units 26' and 28' are flush, but in Figure 9.49 Units 26 and 28 are not).

The height of the sunken passage walls is also now comparable with that of such walls at Structure N-1, but the passage shows a feature not observed elsewhere, and not fully illustrated. Its parallel walls run back to a point about 5.4 m from the front, that is, to points well within the sweatroom. There they turn away from each other, and then turn rearward again, finally joining at the back to form a rectangular pit, open at the head of the passage. This measured about 1.2 m in width by 1.1 m in depth. We have labeled its walls Unit 23. Though the rear portion survived only at the base, it was fairly clear that walls of pit and passage were continuous.

It is possible that the pit alone served as a fire-place at first. A remnant of wall, Unit 23', was so placed on the floor of the sweatroom, at the side of the pit, as to suggest that a firebox was built in its rear portion (see Units 23 and 23' in Figure 9.52). The net effect was probably as reconstructed in Figure 9.42, the passage is a little wider immediately in front of the firebox. Judging by levels, but not by an actually surviving definite surface, the slab flooring of the prior firebox was buried beneath a new floor of plaster or earth.

A firebox in this phase calls for a sweatroom in which it served, and there is evidence that such a room existed, that it was of approximately the same size as that of the final period, and that it had masonry walls or base-walls. This evidence is Unit 22, explainable as a remnant of the front wall, torn down to its base course to make way for the final (and thicker) front wall of the final period. The final wall (Unit 8) was placed directly above it, while the positions of its front face and of exposures of three plaster floors which must have functioned with it, show that at the observed point it was less than 65 cm in thickness (Fig. 9.55). Unfortunately, in working in under the final wall, from its interior face, we did not proceed far enough to reach the interior face of the earlier unit, and so must suggest it in broken line in the figure. In Figure 9.42 the wall-thickness for this sweatroom is taken as 60 cm. This may be correct, or it may have been still thinner.

We are probably safe in concluding, from this evidence of thin sweatroom walls during this period, that neither complete or semivaulting was used for the roof, hence that it was entirely supported on beams.

Structure P-7-2nd-E

This is an interesting phase because the little which we learned about it indicates the situation summarized

in Figure 9.43. The only elements in this figure which do not survive from the phase of Figure 9.42 are Unit 26'X, and Unit 21, resting on it. The latter is our earliest physical evidence of an enclosing building. Whether this was of pier-and-base-wall construction, as suggested in the figure, is not really certain. The model for this is Structure N-1-1st-A, and what little had survived of Unit 21 best fits that masonry style.

It is quite possible that this phase consisted of a rearward extension of the building platform to accommodate a rearward extension of an already existing enclosing building of this sort. In any case, in this phase we encounter a new feature, maintained throughout the rest of this sequence, but not found as yet at any other sweathouse mound. By extending the old enclosing building, or providing a new one, the sweatroom is no longer all the way back within the building, though it is still to the rear of a central position on the front-rear axis.

Merely theoretical doubts that Unit 26'X (and therefore Unit 21) may have belonged in an earlier phase have been disposed of.

Structure P-7-2nd-D and P-7-2nd-C

These are puzzling phases, the later of the two being summarized in Figure 9.44. The composite building platform of Figure 9.43 (consisting of Units 26 and 26X) was extended laterally so as to submerge the old supplementary platform. This new construction is labeled Unit 18 (Fig. 9.48). Unit 19 represents a slight extension of the supplementary platform, so that this component now seems a mere matter of style, and no longer provides extensive raised areas at the sides of the enclosing building. The levels are such that the old enclosing building probably still survived, as suggested in Figure 9.44, and the problem arises as to whether the building platform itself now provided raised unroofed areas at the sides. We know that these were eventually to disappear altogether.

There followed two apparently general resurfacings of older as well as new parts of the enlarged building platform. We rank these as a separate phase and attach the label Unit 17 because turn-ups show that masonry construction was added at the time of the first of these resurfacings, survived to the time of the second one, but followed the enlargement of the building platform. These turn-ups are located in Figure 9.44. One of them shows that a wall, bench or some masonry feature was placed on the extended portion of the old building platform, left of the enclosing building, unless that was enlarged. This wall, on Unit 17, faced forward, well back of the longitudinal axis. The other also faced forward, close to the median position. In neither case was it determined whether they were free-standing walls or not. The plaster

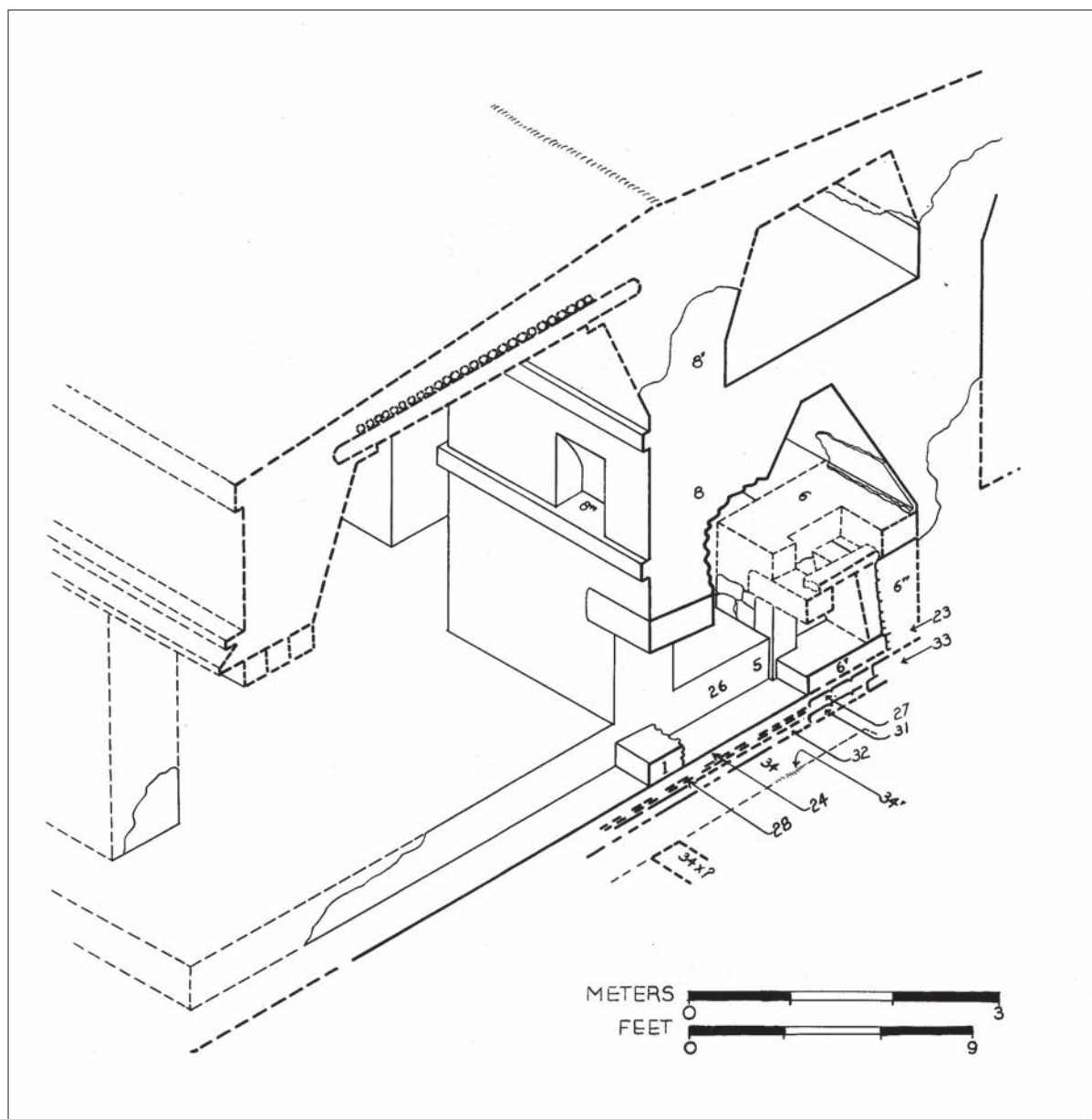


Figure 9.57 Isometric reconstruction of enclosing building, sweat room and firebox of Structure P-7-1st-A, combined with cross section at center, all phases, so far as known on this line; sunken passage modification (Unit 1) shown as cut off to rear of sweat room door sill; all other exposed elements as in Structure P-7-1st-B.

tum-ups are shown in the cross sections of Figures 9.53 and 9.54.

Neither of these phases seems to have been particularly minor in character, though we know little about them. Step-terracing at the base of the basal platform (Unit 20) is assigned to the earlier of these two phases, but it may belong earlier or later than either.

Structure P-7-2nd-B

Not much can be said of this phase, other than what can be read in the cross section of Figure 9.53. The bench (Unit 16) faced rear and overlay the turn-ups to one of the two vanished walls of the prior phase (Unit 17'). This position, and the level of the bench, show that the turn-ups of the earlier Unit 17' could not have been to the

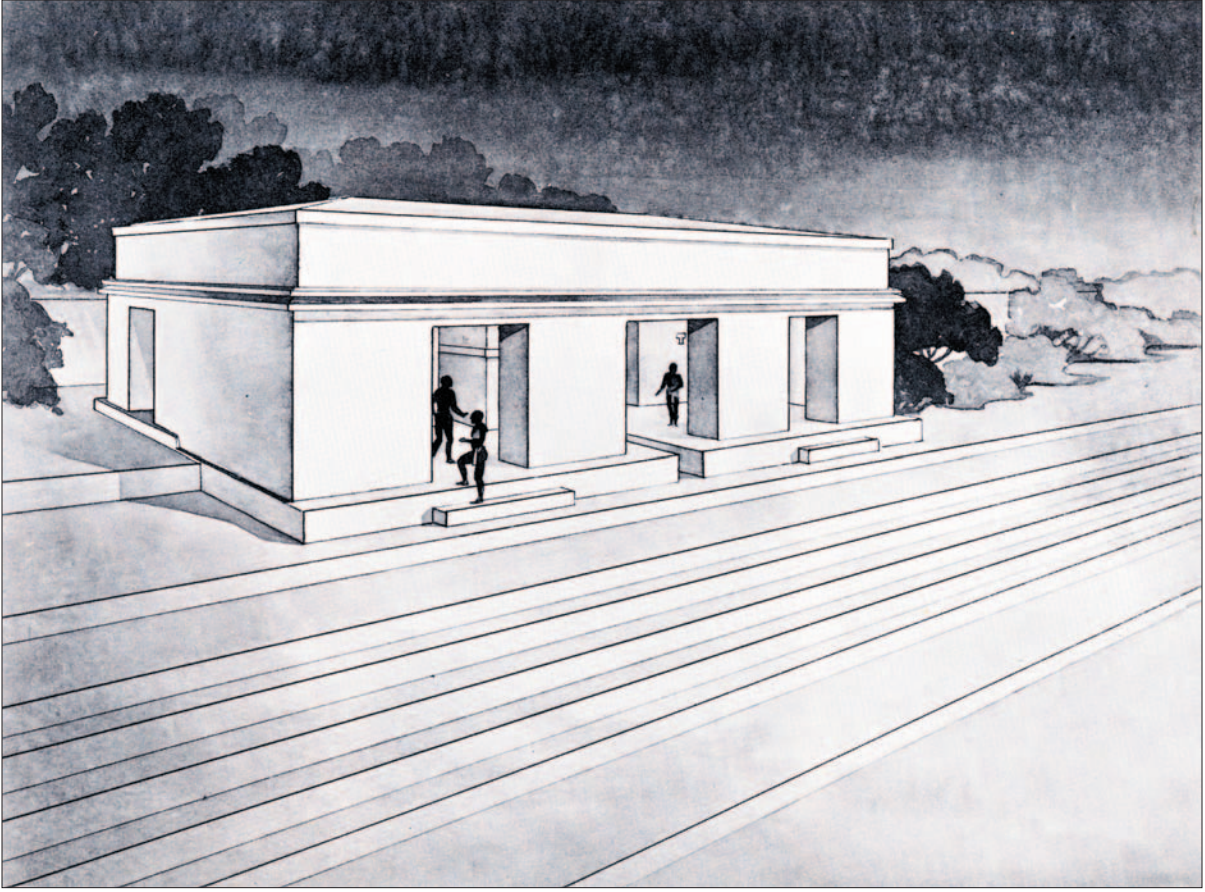


Figure 9.58 Structure P-7-1st- B and -A, restoration drawing by Tatiana Proskouriakoff.

face of the higher rear portion of a stepped-top building platform. That feature (Unit 13) does not appear till the final phase of this period, since its fill rests against Unit 16, our supposed bench. What we have taken to be a surviving bit of the plastered top of the bench may possibly be floor-surface of the next phase. In that case, Unit 16 may be a cut-down section of a free-standing wall, rather than a bench.

This phase involved removing old masonry construction and adding new, but it may have been confined to rearrangements within (or possibly outside) an enclosing building. There is no reason for doubting the continued functioning of the sweatroom of the earliest phase of the period.

Structure P-7-2nd-A

The evidence is good that this phase includes an important change in the design of a new enclosing building, but there is no sign that the sweatroom itself was new or underwent modification. The new feature, Unit 13, marks the introduction of the stepped-top building platform so far as it serves the

enclosing building (Fig. 9.45). A stepping-up of the rear portion of the basal platform by Unit 14 is also assigned to this phase, without physical proof that it belongs here.

So much of Figure 45 is in broken line that the reader is referred to Unit 13' in Figure 9.53, where the plastered top of this elevated rear part of the platform runs under and slightly below Unit 4, the rear wall of the enclosing building of the next phase; and see Figure 9.56. In the latter cross section we may assume that plaster running immediately below the lowest course of a wall merely means the erection of the wall after the platform had had time to harden. Here we have two such floor surfaces surviving, the earlier one, on our Unit 13', running under an obvious remnant of an earlier rear wall belonging with it (Unit 12).

While the plastered surface of Unit 13' could not be followed forward from the rear, the floor material itself was followed forward to the face of the bench, Unit 16, as indicated in Figure 9.53. Evidently the bench (or a cut-down section of old wall) was incorporated in the new raised part of the platform.

Though we have physical evidence of a new enclosing building in this phase, we know very little about it, unless we reason back in time from the final period, during which the stepped-top design for the building platform was retained. For this present phase we lack evidence within the building as to where the step-up occurred, but this is probably because the face of the rear portion was torn out in the next period, when medial walls of the later enclosing building were based on the lower front level. That operation cut through Unit 16 and the two floors of Unit 17' below it. However, on the outside of the enclosing building of the final phase, to the right, a step-up in the building platform was seen and is drawn in Figure 9.46 (as if seen on the building's left side). The latest wall rests on it, but it probably dates from the phase here being discussed. At the left of Figure 9.48 we have a longitudinal cross section through this stepped-up part of the building platform. Its top, on the outside, corresponds in level with the floor attributable to Unit 13, not to Unit 7. Though in plan the step-up occurs precisely in line with the rear of the final medial walls, it is probable that their positions were adjusted to the earlier step-up. The outer faces of the final outer walls, at least in some places, apparently rest directly on the old building platform which, at the rear, means on Unit 13. Within the building there was a further raising (by Unit 7) and the inner faces of the same walls were based on this higher interior level, as in Figure 9.56. It is probable, then, that the step-up of the phase under consideration was along the same line as that of the final period, as indicated in Figure 9.45.

It is quite possible that by the time of this phase the enclosing building had here evolved to about its maximum size, and already showed the main features of the final plan, the passage behind the sweatroom, the stepped-top building platform, and, one may conjecture, two ranges of rooms separated by medial walls.

By the time of this phase, successive resurfacings had added to the height of the front part of the building platform by an appreciable amount. Earlier floors were, however, very hard to distinguish outside the sweatroom, and within it our record of them is somewhat confusing. However, the cross section through four plastered surfaces in Figure 9.48, to observer's right of the sunken passage, was clear. The later ones probably curved down to the top of the sunken passage, being destroyed near the passage in the phase to follow, when an extra course was probably added to the passage walls. However, we were not really able to prove that the passage walls were thus raised.

Discussion of Final Period (Structure P-7-1st-B and -A)

The two phases of this period can be conveniently considered together. Phase A consists only of the raising of the sunken passage within the sweatroom. This blanked out a firebox sill, introducing a sweatroom door-sill instead, but otherwise all units of the earlier phase B continued to function. Figure 9.46 presents a full summary of the plan in three-dimensional form, for comparison with what is known of earlier phases thus illustrated. Solid lines are used here on an assumption of symmetry. What was not actually seen is indicated in the plan and sections of Figure 9.47, and in the partial roof-plan of that figure. In the perspective drawing, at the upper left of that figure, and in Figure 9.58, there is no effort to differentiate what is restored from what was seen in place. It is perhaps likely that the ceiling of the enclosing building was not smooth, as shown in Figure 9.47, but consisted of exposed beams and cross-poles resting on the semivaulting, as suggested in Figure 9.57. These drawings tell the complete story of our reconstruction, and if they are studied in connection with the photographs provided, it will be apparent that very little uncontrolled imagination has been used. However, since the building is unique, a certain amount of textual description and comment seems desirable.

Basal Platform

A new stairway, Unit 11, is assigned to this period, but it may belong earlier. It was wider than the stairway which preceded it, Unit 29, but its side wall was not searched for, so its precise width as reconstructed in Figure 9.46 is conjectural. A cross section through it appears in Figure 9.53. It may have extended on either side indefinitely, as alternatively reconstructed in Figure 9.58, but the subsequent discovery of the end of the earlier stairway, just covering a building platform, argues against this.

The stepped-up rear portion of the basal platform was extended forward about a meter by Unit 10 (compare positions of the faces of Units 14 and 10 respectively in Figures 9.45 and 9.46). This change could be assigned to any phase after P-7-2nd-D, but it probably is connected with the forward extension of the building platform in the latest period.

Building Platform

As stated before, the building platform of the prior period was of the stepped-top variety, and the higher rear portion was now raised somewhat. But this further raising appears to have been confined to the interior of the enclosing building (Unit 7 in Figures 9.48, 9.53 and 9.56). The side faces and presumably the rear face of the old building platform continued to function in this final period. However, there was a slight forward extension of the building platform, and a corresponding extension of the supplementary platform (Units 9 and 9' in Figure 9.53).



Figure 9.59 Ruin of central and right (observer's left) portion of Structure P-7-1st, as seen from front after partial excavation of enclosing building; workman stands in doorway between medial wall and sweat room, behind ruin of pier-like section of front wall; range pole marks end of sunken passage in prior period of Strs. P-7-2nd-F to -A.



Figure 9.60 Structure P-7-1st-B, showing right front corner of enclosing building (left foreground in picture) with sweat room beyond; note remnants of medial molding and upper zone.

Enclosing Building

The enclosing building of this latest period is entirely new. Since it rests in large part on an older building platform which was not lengthened, it probably was no longer than the building which it presumably replaced, and its rear wall occupied the same position as the older rear wall (Unit 4 over Unit 12 in Figure 9.56). Its front walls rested almost entirely on the forward extension of the old building platform, so the new building was surely a little deeper than the old.

One is tempted to liken this building to a double-range palace, with modifications in the plan to allow for insertion of the sweatroom. However, it does not show the Janus façade, and at this site we never find the stepped-top building platform in a palace, nor room-depths approaching those found here. The front-rear dimensions of the building platform in earlier phases suggest that the typically narrow rooms of the palace type were never suitable for enclosing buildings of sweathouses. Figures 9.8, 9.9, and 9.25 through 9.30 seem to tell the same story of deep enclosing building rooms at other sweathouse mounds, whether or not the building platform may have been of the stepped-top variety, and whether or not there may have been two ranges of rooms in the enclosing building.

Roof

At no known sweathouse mound of this site is there any evidence of vaulting or semivaulting for the enclosing building, except in this final period at Structure P-7. Here it is considered to be certain. Evidently this use of semivaulting was, in part at least, dictated by the necessity

for deep rooms, which the builders of the period did not feel competent to roof with the complete vault.

As may be seen in the drawings, the semivaulting rests on outer and medial walls except in the region of the sweatroom. There, instead of merely crossing the roof of the latter, we have a hollow square of masonry, consisting of semivaulting and, at the rear only, a complete half-vault. This enclosed a functionless chamber or air space, similar to such features in roof-combs at Tikal. The roof evidently could not be counted upon to remain absolutely water-tight, for this chamber was provided with a drain, about 12 cm. wide and of an equal height. This appears in longitudinal section in Figure 9.47, Section K-L, and the opening appears in the perspective drawing of that figure, and in the photographs of Figures 9.63 and 9.65. After passing below the semivaulting it continued on into the chamber at least 20 cm, but here it was an open channel about 5 cm deep, the sides formed by edges of slabs in the floor of the chamber, which, in a sense, was also the roof of the sweatroom.

Mason's notes record presence of slabs elsewhere in this floor. They were presumably merely the top of the completely vaulted roof of the sweatroom. If this floor, or roof, was plastered, the surface had disappeared, nor did any trace survive on the inner sides of the semivaulting and vaulting which formed the chamber.

These inner sides were much cruder than the exposed outer sides, as may be seen by comparing Figures 9.63 and 9.65. On the inner sides, facing the chamber, the soffit slope generally began about 50 cm above the base, instead of directly at the base, as on the outer sides. At some points at least the inner slope was about 17 degrees

Table 9.18 Table of Selected Stratifications

Figure	9.48	9.53	9.51
Str. P-7-4th-B	34	35	
Str. P-7-4th-A	32		
Str. P-7-3rd	28'	30	
Str. P-7-2nd-F	26'	25'	
Str. P-7-2nd-E	(26'X)		
Str. P-7-2nd-D	18'	18'	
Str. P-7-2nd-C		17'	
Str. P-7-2nd-B		16	
Str. P-7-2nd-A		13'	
Str. P-7-1st-B		4	5'
Str. P-7-1st-A			1

from vertical, but outside, where measurable, the slope was about 23 degrees. It is hard to imagine any function for these inner soffits unless there was a conscious use of the cantilever principle, but the design and execution failed to provide as much balance as was possible. Nothing was found in the chamber except potsherds in the debris which covered the floor. These undoubtedly originated in the roof material.

The medial and upper moldings of the sweatroom caused us at first to suppose that it had once stood in the open and not within an enclosing building. The fact that these moldings do not run across the rear should have given us pause. Examination of an exposed section later showed that the semivaulting is structurally continuous with the upper zone of the sweatroom, and it is also structurally continuous with the semivaulting on the right medial wall. There is no doubt that the whole enclosing building and the sweatroom were built as one operation, though of course there were structural sequences within the phase. The free-standing walls were allowed to harden before the roofing commenced, since the plaster on the right side wall was seen to curve in and run over its top, below the semivaulting.

Evidence for Semivaulting

Thus far, what has been said about semivaulting might have applied just as well to complete vaulting which had failed to survive to full height. A considerable number of factors make such a hypothesis untenable.

1. Since Maler's extra walls were imaginary, complete vaults here would have covered much wider spans than any known for a Classical Period building. There are three features in the design which indicate that a major advance in this direction was not being planned for. A comparison with the two "most advanced" completely vaulted buildings at this site is instructive here (Table 9.18).

An absolute measurement the front walls here are somewhat thicker than the thinnest ones supporting complete vaults, but this is probably because they are decidedly higher; in addition to the weakening effect of the greater height of these walls their thrust-resisting capacity is further reduced by front doorways much wider than in known completely vaulted buildings at this site; and the amount of this thrust is increased to more than was necessary by the inseting of the upper zone. This zone was structurally continuous with the semivaulting, and had it not been inset its balancing effect would have been greater.



Figure 9.61 Structure P-7-1st looking down into front room or gallery after its partial excavation; sunken passage partially hidden by debris in foreground, which also hides lower portion of sweat room at observer's right.

2. The soffit slope of what survived is about 23 degrees from vertical, except that, after rising for about 1 m, it seemed to curve to a less steep angle. Any believable continuation upward to form complete vaults would make the vault height

Table 9.19 Structures P-7-1st, J-11-1st, and F-4 Vaulted Buildings

	Str. P-7-1st	Str. J-11-1st	Str. F-4
Span	3.7	2.6	2.6
Wall Thickness	0.9	0.8	0.6
Wall Height	3.2	2.2	?
Door Width	3.2	2.2	1.4
Upper Zone	Inset	Inset	?

considerably greater than that of the walls, that is, more than 3.2 m. Such high vaults could not have fallen so as to leave such shallow deposits of debris as are shown in sections A-B and G-H of Figure 9.47. The situation in the chamber over the sweatroom is also instructive. When found, some of the soffit slopes had survived on all sides. This shows that, though this semivaulting was not as well-balanced as it might have been, no large complete masses of it had toppled outward. It had been disintegrating gradually, and all fallen material which had originally sloped out over the chamber must have been found in it. Yet Mason's notes record a minimum debris depth of only 50 cm. With complete vaulting the depth of debris on the chamber floor would have been much more than this, everywhere.

3. Specialized capstones *were* used over the sweatroom and over the vaulted interior doorway which did not fall. Such stones would have been provided for complete vaults over the rear rooms and front gallery of the enclosing building. They were not noted in the debris there.

4. At three places, indicated in the roof-plan of Figure 9.47, firmly embedded slabs projected horizontally about 15 cm beyond the line of the soffit slope. They were all at the same level, 1.3 above the spring, and this was the highest level reached by the soffit slopes anywhere. One of these slabs is at the junction of the slopes of semivaulting on a medial wall and the sweatroom, and was firmly embedded in both elements. The slabs had not been pushed out by roots. To allow for them we have reconstructed a molding at the top of the semivaulting. In order to incorporate them in a reconstructed complete vault the latter would have to be of the stepped variety, for which there is no evidence elsewhere at the site.

5. In Figure 9.59 it may be seen that the maximum surviving height of what survived above the right medial wall is about the same, from end to end. The fact that it is a little lower at the observer's left is due to minor excavation there. On the completely vaulted hypothesis, this element originally rose to at least double the height shown, and it could scarcely have disintegrated everywhere at the same rate, so as to produce so close an approximation to a level top for what remained, when seen from the front, this maximum height being greater than the maximum anywhere else.



Figure 9.62 Structure P-7-1st-B, front façade of sweat room (door sill of Structure P-7-1st-A removed; man stands on excavated portion of floor of enclosing building).

6. There was a plastered concrete roof at about this level, a fact which is proved by the character of material on the surviving surface of this semivaulting above the medial wall, compared with material in the debris on the floors of the enclosing building.

Scattered over the surface of the semivaulting were many water-worn pebbles-gravel from the river together with a few weathered sherds. Gravel was also noted on the highest portions of semivaulting as it survived over the sweatroom, and also near the building's right front corner. Crushed limestone rather than gravel is the normal residuum of concrete at this site, and careful examination of exposed sections in this building showed



Figure 9.63 Structure P-7-1st, seen from right rear (N), showing (from observer's left to right); sweat room with post-Columbian large hole, small drainage hole, and superimposed semivaulting; rear face of right medial wall and semivaulting; outer face of end wall of enclosing building from jamb of side doorway to right front corner.

that gravel was not used in floors, nor in plaster or hearting of walls or surviving semivaulting. The search for gravel was extended to cuts through fallen debris. At various levels, and in all parts of the enclosing building, cuts through the debris revealed lenses and often more or less continuous bands of gravel, sometimes with a few sherds. Thin limestone flakes seemed to be more plentiful in these lenses and bands, but it was the gravel which defined them. The highest one noted was 1.8 m above the floor of the left side of the front gallery, where roof-collapse had been complete. Elsewhere they were never more than 60 cm above the base of the debris, sometimes at the base itself.

7. In the front gallery, besides the deposits of loose gravel, we were able to find several intact fragments of concrete, which consisted of gravel, the pebbles being held together by a very hard dirty white mortar, this color contrasting with the yellowish mortar characteristic of that in walls and semivaulting. This special concrete occurred in thin sheets, the thickness being from 2 to 5 cm, so that frequently the same pebble was visible from both surfaces. In several cases these fragments were

found with a coating of lime plaster, like floor plaster, on one side only. In the debris, this might be found face up or face down. The most satisfactory example was near the center of the front gallery in the cut shown in Figure 9.61. It lay, plastered side up, on a deposit of crushed stone and earth of a minimum thickness of 7 cm, the latter directly on the floor.

On a final check-up, a loose but intact fragment of the gravel concrete (without the final plaster coat) was found within a few centimeters of the surface of the semivaulting on the nearby right medial wall, proving that there, as well as in the fallen debris, the loose gravel was the residuum of an unexpectedly thin sheet of a special sort of concrete. Obviously the gravel originated from a roof consisting of a fairly thick layer of ordinary concrete, probably containing occasional sherds and thin limestone flakes, on which a thin layer of gravel was spread before the final plastering. If this thin sheet of gravel had originally been spread at a level very much higher than the maximum surviving height of the vaulting, it would have been absent or very scarce, instead of plentiful, on the surviving surface above the right medial wall. Various

Table 9.20 Average Dimension Tables: Basal Platform Units

Phase	Unit	Height	Length	Depth	Slope
Str. P-7-4th-B and A	35	1.6	?	?	82
Str. P-7-3rd to 1st-A	30	1.9	?	?	82*

Note: Starred dimension is an approximation usually based on reconstruction.

other lines of evidence requiring a roof not much above this surviving height are thus confirmed. The spaces between elements of the vaulting, thus limited as to height, must have been bridged by wooden beams.

8. When complete vaults fall, experience shows that vault-stones and/or capstones frequently are in actual contact with the floor, or nearly so. Where wooden beams are used in the roof, ordinarily these would rot and let down roofing material before walls (or walls and semivaults) began to disintegrate, so that we should expect most building stone to be elevated somewhat in the debris. This was the characteristic condition in the enclosing building here, though it cannot be said that no building stone whatever reached the floor.

Miscellaneous Dimensions

The right medial wall, which survived completely, and still supported more or less complete semivaulting, was 3.2 m high, though on the rear side the stepping-up of the floor reduced the visible height by about 30 cm. Near the right front corner, on the outside where medial molding and part of the upper zone survived, the end wall was measured as 3.2 m high. Had the medial molding been exactly level, a decided slope of the front gallery floor would have increased this dimension, if anything, so 3.2 m is a minimum, not maximum figure for walls forming that gallery. To the rear, as has been noted previously, the outer sides of the outer walls appear to have been based on the stepped-up rear portion of the old building platform, the inner sides sometimes being founded on a secondary slight raising of that element. Nevertheless, the spring of the vaulting at the rear of the sweatroom was at the same level as elsewhere, so it is safe to conclude that side and rear walls were lower by an amount sufficient to compensate for their more elevated bases. Therefore, presence of the stepped-top building platform probably did not result in stepping up the exterior moldings and roof at the rear.

The semivault height was 1.3 m, as determined by the supposed molding slabs at the ceiling, already mentioned. The slope was about 23 degrees from vertical, disregarding a tendency toward a less steep slope at the top. Disregarding the molding slabs, which might have been placed only between beams, the exposed lengths of

the latter were no more than about 2.7 m, considerably less than the wooden lintels which must have spanned the middle doorway of the front gallery (Table 9.21-9.23). As reconstructed, the roof beams rest above the molding with an exposure of only 2.4 m.

Benches

Excavation was sufficient to make it fairly certain that there were only the three benches shown in Figure 9.47, unless others were placed in the rear corner of the left rear room, or against one or both end walls of the front gallery. The benches in the rear rooms, so far as known, are indistinguishable from some of the all-masonry thrones of the palaces. Their heights were 59 and 63 cm. Each certainly had a masonry back-screen, but only the lower portions survived. Thicknesses of these backs were measured as 15 cm and 20 cm respectively, the exposed top measuring about 0.9 m by 1.8 m in the case of the completely excavated sample. The bench in the front room, also masonry, is puzzling. It is much narrower than expected (48 cm) but there was no sign of a slab top, or of legs to support such a slab top at the front. Thus we have benches, but none of the type found at Structure N-1, unless some of the latter had back-screens which failed to survive.



Figure 9.64 Ruin of firebox, Structure P-7-1st, after removal of floor and sill, exposing complete on-end jamb stone; inner face of left wall at center, masonry rear wall at left of picture; at right, crude masonry extension of left wall of sunken passage, abutting jamb stone.

Table 9.21 Average Dimension Tables: Supplementary Platform Units

Phase	Unit	Height	Length	Depth	Slope
Str. P-7-4th-B and A	None?				
Str. P-7-3rd	None?				
Str. P-7-2nd-E and F	25	0.4	19.0*	11.2*	V
Str. P-7-2nd-D and B	19	0.4	21.2*	11.2*	V
Str. P-7-2nd-A	19	0.4	21.2*	6.0	V
Str. P-7-1st-B and A	9'	0.4	21.2*	6.0	V

Note: Starred dimensions are approximations usually based on reconstructions; the letter V means approximately vertical.

The rear rooms, because of the nature of their benches, seem classifiable as thronerooms. The throne in the right rear room was built after the floor as well as the medial wall had been plastered, but this seemed not to be the case in the other room, and both may date from the earliest of the two phases of this final period, to which we have assigned them. The hypothesis can be entertained that the double-range enclosing building developed in response to a need to provide secluded thronerooms as well as a large open room near the sweatroom.

The narrow bench in the front gallery rests on floor plaster which turns up to the medial wall or (possibly) which once turned up to an earlier medial wall, since torn out. The final floor plaster in front of the bench turns up to it (Unit 2 in Figure 9.53). In this case also it is impossible to say with assurance that we are dealing with a feature belonging in a secondary phase. The original height of this bench could not be ascertained with certainty. The surviving height was 50 cm.

Sweatroom

In plan, this room measures 4.8 m by 3.8 m on the outside, and does not differ notably from what is known of sweatrooms at other mounds. It is the only completely vaulted one and, probably for this reason, the only one surviving to any considerable height.

Façades

The height as seen from the front is the same as the height of the walls of the enclosing building, minor variations aside. Thus the spring of the vaulted doorway to be seen in Figure 9.59 is 14 cm lower on the sweatroom side. The rectangular moldings are 15 cm high, project 2 to 7 cm, and provide the effect of a vertical upper zone 1.1 m high. The medial molding forms the floor of each of the two niches in this upper zone on the front side. The niches are best seen in Figure 9.62 and in the perspective of Figure 9.57. That on the left (observer's right) was found badly damaged, probably by vandals before they shifted their attack to the right side. The well-preserved right niche varies from 65 cm in width at the bottom to 57 cm in width at the top. This tapering is caused by the non-verticality of the outer side only. The lack of symmetry is noticeable. The depth of the niche, measuring from the edge of the molding, is 38 cm. The back, as it rises, curves forward to the edge of a single slab, set flush with the wall like a lintel. The lower edge of this slab, at the top of the niche, is about 20 cm below the upper molding.

One wonders if the moldings and niches are reminiscent of sweatrooms which did not stand within enclosing buildings. The effect of an independent sweatroom building is enhanced by setting the spring of the superimposed semivaulting back from the edge of the

Table 9.22 Average Dimension Tables: Building Platform Units

Phase	Unit	Height	Length	Depth	Slope
Str. P-7-4th-B and A	34	0.5*	?	?	?
Str. P-7-3rd	28	0.4	12.35	7.3*	V
Str. P-7-2nd-F	26	0.4	12.1	7.3	V
Str. P-7-2nd-E	26,26X	0.4	12.1	9.5*	V
Str. P-7-2nd-D to -A	26,26X,18	0.4	19.7	9.5*	V
Str. P-7-1st-B and -A	9,13,18	0.65	19.7	11.2*	V

Note: Starred dimensions are approximations usually based on reconstructions; the letter V means approximately vertical.

Table 9.23 Average Dimension Tables: Building Units of Str. P-7-1st-B and A

Units	Section Table				Façade Table				
	W	R	M	R'	W'	Length	Depth	Width	Height
4 (encl.bldg.)	0.9	3.8	0.9	3.6	0.9	19.5	10.0	2.5	3.2
8 (sweatroom)	0.8	2.2			0.8	4.8	3.8	3.2	3.2
8 (same, int.)						3.3	2.2	0.8	1.1
6 (firebox)						2.0	1.1		
6 (same, int.)						1.0	0.4*		

Addendum: Maximum dimensions, lintel of Unit 8, 1.3 x 0.8 x 0.3.

Note: Starred dimension is an approximation based on reconstruction.

upper molding, instead of offsetting it as on medial and outside walls of the larger building. At the rear there are no moldings, and there the semivaulting springs without either offsetting or inseting, good evidence that offsetting of vaults at the spring-line was a matter of esthetics and not of structural convenience.



Figure 9.65 Structure P-7-1st, seen from right (NW); end of wall of enclosing building in foreground, from jamb of doorway; sweat room and semivaulting in background.

The door is capped by a heavy lintel, 1.1 m above the passage floor, but only 73 cm above the sweatroom floor on either side of the passage. In width it varies from 72 to 83 cm.

At the rear and along most of the sides, the effective height of the new sweatroom is reduced by the stepping up of the building platform. This reduces the actual height of walls of the enclosing building at the rear, but both sides of those of the sweatroom are based structurally at the lower level. This is doubtless connected with the fact that on the inner sides these walls had to reach down to the sweatroom floor at the same level as the floor of the front gallery. We have inferred that this sweatroom

replaces another of similar size in the same position, which, in the phase preceding this one, functioned with a stepped-top building platform. We must further infer that in the neighborhood of the sweatroom there was some excavation into the old higher portion of the platform (Unit 13), in order to remove the old walls, and base the new ones at the lower level. Failure to find the floor of Unit 13 near the right side confirms this inference (Fig. 9.48), and similar conditions were noted at the left rear corner.

Vaulted Roof

The vault slopes in from all sides, covering a room-area measuring 3.3 m by 2.2 m. Much of the plaster on the soffit slopes survived, and no damage had been suffered by the vault except for the large hole broken through wall and vaulting on the right. The appearance was one of very neat and accurate construction, but measurement showed that this appearance of accurate construction was misleading.

There is no offset at the spring. An average wall height, from floor to the spring, can best be taken as about 72 cm, though in one place this was measured as 68 cm and in another as 90 cm. The capstones vary as much as 4 cm in height above a single point in the short distance from center to one end. Assuming a spring everywhere at the same level, the average vault height was 2 m, and, disregarding minor differences in floor level, the caps may be said to be 2.7 m above the floor on either side of the sunken passage.

This seems very high for a sweatroom, but the soffits slope in from all sides so that the room could not have held a steam cloud nearly so large as a semivaulted room of the same maximum height. Apparently all four slopes were intended to be the same, and if we average them they seem significantly different from the slope of the semivaulting on the enclosing building. Careful measurements yielded slopes of 25 and 29 degrees on the

front-rear cross section, and 25.5 and 27 degrees on the longitudinal section. The average slope of 27 degrees is certainly much steeper than it needed to be here. One wonders if the wall heights of the enclosing building were determined upon first, the sweatroom being designed to reach that pre-determined height, with a roof of ordinary thickness. There were no vault-beams.



Figure 9.66 Right front corner of enclosing building, Structure P-7-1st, after clearing to expose remnant of upper zone; jamb of doorway in end wall at observer's left.

Firebox

This important component would have yielded more information than it does, had it not been partially destroyed by human agency. It probably did not differ greatly from the firebox of Structure N-1-1st. As in Figure 9.11 for that mound, in Figure 9.57 for this one we show a cross section combined with one-half of a three-dimensional reconstruction.

In both cases the jambs of the opening were monolithic, but here the on-end construction does not extend to the whole front of the box. Here as there, a firebox sill is present, but the jamb-stones do not rest on it—the sill is fitted between them. It was present from the first, however, since the rear wall (Unit 6") was based at the level of the sill, as was the inner side of the side wall. The photograph of Figure 9.64 shows, from left to right, the rear wall, the inner side of the left side wall, and the left monolithic jamb.

We know that the firebox rose (at the rear at least) to the spring-line of the vault—about 70 cm above the sweatroom floor. This is proved by plaster turning out to its former top at this level. The surviving part of the rear wall (Unit 6") had an approximately level top, a fact which bolsters our reconstruction to a slight degree, but anything above this is conjectural. In Figure 9.57 we have suggested

a sherd wall in front of Unit 6", in order to account for large numbers of sherds found within the box. Unit 6" itself, of masonry, has a slight but definite slope.

This firebox functioned with the sunken passage of the prior period, possibly but not surely after a slight raising of its walls to compensate for rising of the floor level with successive earlier resurfacings. Had there been no change other than this, just in front of the box, the passage would have been a little wider than elsewhere. This was prevented by extending the old walls backward from the corners where they diverged. These new walls (Unit 5) were comparatively crude. In Figure 9.64 one of these walls is seen ending against a jamb-stone of the firebox.

The floor of the box was of earth or plaster, as at Structure N-1, and there was evidence of extreme heat here as there. As has been stated, in the final phase of the period, within the room, the floor of the sunken passage was raised to the level of the box by Unit 1.

Measurement

We do not have many accurately located points except for the final period, and in the plan for that (Fig. 9.47), many points were seen far above floor level. Consequently, this is not a suitable mound at which to draw fine distinctions with respect to accuracy in laying out and executing plans. Nevertheless a few observations seem justified.



Figure 9.67 Broken section through right end of wall of enclosing building, Structure P-7-1st; squared blocks at lower left and in jamb of doorway.

When Unit 26, the building platform of Phase P-7-2nd-F, was constructed, the right side wall formed an obtuse angle of about 92.5 degrees with a line joining the two front corners. The left side wall formed an obtuse angle of about 95 degrees with this line, so the two sides diverged by more than seven degrees. The sunken passage met this corner-to-corner line at a very close approximation to 90 degrees. The platform did not show the parallelogram form so evident at Structure N-1, but it was far from a proper rectangle. It was surely significantly longer along the rear than along the front. The front was bisected by the passage, with an error of only a few centimeters, indicating accurate linear measurement there. But if the inner end of the passage had been located by equally accurate measurements from the sides, it would have bisected the platform as a whole with greater accuracy than was observed, and the passage would have met the line joining the front corners at a less close approximation to a right angle. The latter line does not accurately locate the two sections of the wall. At the passage each of these is 20 cm or so forward of this line.

When this platform was extended to the rear by Unit 26'X (as known on the left side only) the addition to the side wall did not run back on a prolongation of the line defining the left side of the original platform, but on a line orientated differently by about 5 degrees. As a result, in the complete composite platform, the greater length of the rear was doubtless retained, but it was not increased, though a resulting bulge in the composite side wall must have been noticeable. Presumably early carelessness was now noticed.

In the final period, the plan of the sweatroom includes inside corners known at floor level. These form a fairly accurate parallelogram, the divergence from rectangularity being about two degrees. There seems to have been no similar tendency in the plan of the enclosing building, which closely follows its platform, most of the latter dating from the prior period. In contrast to the still earlier platform Unit 26, this one is noticeably longer at the front than at the rear, if we correctly interpret the positions of known parts.

Proportions, Decoration, Function

In all phases there seems to have been a centrally placed sweatroom of about the same small size, but the building platform grew larger as time went on. From first to last it was much deeper than was necessary for the sweatroom only, and it probably was always much longer than necessary. After the two phases of the earliest of the four periods this latter characteristic is certain. Such platforms, deep in relation to length, and too large for a small room centered at the rear, are non-characteristic of local temples and palaces, and are known elsewhere at the site only in association with more definite sweathouse

indicators. Their presence here confirms the sweathouse function in phases where more striking evidence is scarcest. Whether they supported enclosing buildings from the first is uncertain, but there is good evidence that they did so during the later phases.



Figure 9.68 Inner faces of walls and semivaulting above sweat room, Structure P-7-1st, showing junction at left front corner of chamber.

No sculptural or carved stone decoration was encountered, but in the final period two niches in the façade of the sweatroom suggest the presence of clay idols there. There was no evidence that anything had been permanently fixed in these niches. The niches, combined with moldings as if for an independent building, show clearly that the sweatroom was the chief center of interest of the whole structure. The provision of throne rooms in the final phase (and possibly earlier) suggests that the sweathouse ceremonies had more in common with those practiced in palaces than with those for which the temples were designed.

A T-shaped opening penetrates the right medial wall, and presumably was balanced by another in the left medial wall. Such openings have been found nowhere else at this site. The surviving opening is rectilinear with rounded corners. The maximum height and width is 36 cm and 30 cm respectively. This opening surely had a symbolic meaning which is here indirectly associated with sweat-bathing. Seen from the rear, it appeared above the throne (Fig. 9.63).

Dating

Sherds in the firebox of the latest phase presumably came from a sherd wall there. The reader should be reminded that vandals preceded us here. Included among these sherds was the Polychrome C sherd illustrated by Butler (Figure 4.3). The masonry of the final enclosing building seems identical with that of the technically most advanced vaulted palaces of the latest



Figure 9.69 Ruin of semivaulting over sweat room, Structure P-7-1st, seen from front left corner; workman holds rod, marked in centimeters, on floor of chamber (the roof of sweat room); debris in chamber has been cleared.

period of the Acropolis. Similar thrones may be original in this sweathouse, but secondary in the palaces. Though ceramics were very scarce here (apart from the firebox area), and inscriptions nonexistent, it is probable that the final structure, with its semivaulted enclosing building, belongs in a final period of architectural activity for the site as a whole.

We have no reliable yardstick for measuring how far back from this the entire sequence goes. Included among sherds from Position 6 (Table 9.24) was an example of Polychrome E (Butler classification) such as has been found on bedrock at the very beginning of the architectural stratification on the Acropolis; and also a sherd of a lipped bowl of the form expected on the latest Acropolis level, and at the surface everywhere. The sherds of Position 6 result from digging in the left rear room, which penetrated from the surface there down into Unit 18'. The early type sherd may have come to rest during the phase of Unit 18', that is, during the sixth of the phases of the sequence, counting forward in time. However, the hearting of this and other platform units

seemed sterile during later times, and an early sherd may have been redeposited in late times.

The fact that the end of the buried basal platform stairway, Unit 29, lines up with the end of the building platform of P-7-3rd, argues for their contemporaneity. Since this end of the stairway rests on the bedrock, it is clear that during the two earliest periods (comprising the three earliest phases) the East Group plaza had not been raised sufficiently to eliminate all exposures of bedrock. It is unsafe to infer great antiquity for these periods from this circumstance alone, since such exposures were tolerated in late times in the West Group. Nevertheless these phases pre-date the latest plaza floor, and the earliest may represent the first building at this spot.

The fact that a minimum of eleven phases must be distinguished, coupled with good evidence that most of them surely involved significant change, shows that this mound was the site of a sweathouse for a very considerable time, whatever that may have been in terms of years or *katuns* (Tables 9.20 to 9.24).

Table 9.24 Operation E-2 Object Table

Position	Sherds	Remarks and Miscellaneous Objects
1. Base of building	-3	-2 (human bones)
2. Soil of trench in sweatroom	-5	
3. Under lintel of sweatroom		-6 (fragment of bright red plaster)
4. Interior of sweatroom	-8	
5. In firebox	-1	
6. Northeast (left) rear room	-10	-10 (flint blade)
7. Same, near bench (Unit 3')	-7	-7 (pumice stone)
8. Northwest (right) rear room	-9	
9. Particular locations not noted	-4	

Masonry Notes

Fills

Pure broken rock, small size, in building platform Units 26 and 18; solid earth and stone in raised rear portions of building platform where seen (Units 13 and 7); not penetrated or recorded elsewhere.

Outer Building Wall

In final phase, tabular stone, blocks frequent, much chinking with thin flakes, bonding at corners (see Figures 9.60, 9.63, 9.65, 9.66); tops plastered.

Interior Walls

Well-preserved in places in final period, but masked by surviving plaster; upper portion of sweatroom shows many thin slabs, little chinking, but this is far above the vault-spring inside (see Figures 9.59, 9.62).

Semivaulting

In final period, blocks as well as slabs, considerable chinking as in outer walls (see Figures 9.59, 9.61, 9.63, 9.65, 9.68).

Vaults

In final period, sweatroom only: cross section available where hole was broken through. Built mainly of long to medium-long slabs tailing deeply into the hearting, separated by thick beds of thin small slabs, spalls and mortar; vault is structural unit from sloping inner to vertical outer face; lines of slabs leveled up at outer face only to form moldings; cross section in niche shows structural continuity with semivaulting above; specialized capstones with edges chipped to provide good fit. Semivaulting of enclosing building resulted in complete vaults over interior doorways, specialized capstones observed over the surviving one.

Concrete

Crushed limestone and lime mortar for floors in all phases; roof of final period provided with thin cap of gravel concrete.

Plaster

White lime for floor of all periods, and for final layer of roof in final period. Turn-ups indicate walls were plastered as early as Structure P-7-2nd-C and presumably they were plastered in all phases (Table 9.24).