INTRODUCTION

As Structure P-7 is the best preserved building at Piedras Negras its examination was one of the first projects begun. The greater part of the excavation was done during the first season in 1931 ~~under the direction of~~ by Dr. Mason. These excavations went but little beyond the stage of revealing the details of the building at its last occupation period and discovering some of the buried features. No further investigations were done upon it in 1932 or 1933. In 1934 Mr. Satterthwaite, estopped from making excavations by the terms of our agreement with the Guatemalan Government for that year, spent many days in making very careful measurements, notes and many photographs of the structure. In 1935 he and his assistant that year, Mr. Francis M. Cresson Jr,, continued these, and in addition made exdavations at important points which revealed the nature of the buried features found in 1931, discovered others, and afforded the greater part of the data upon these, and on the occupation and building periods. Therefore, while the present text has been prepared by Dr. Mason with the advice and approval of Mr. Satterthwaite, the excavations upon which it is based were directed by both authors, independently and in different years.

A little further excavation was done and a few observations made by Dr, Mason during a short visit in 1936.

The plans and sections have been admirably prepared by Miss Tatiana Proskauriakoff to whom the authors wish to express their sincere obligations and appreciation.

The expedition of 1931 was known as the First Eldridge R. Johnson Middle American Expedition, the necessary funds having been given by Mf.Johnson of Moorestown, New Jersey. To him the authors, the University Museum, and students of Maya archeology should be and are most grateful for the inception of this important work.

Structure P-7

Of all the many structures at Piedras Negras, P-7 alone retains ~~high standing walls and~~ a completely roofed chamber, it being the sole ~~one~~ structure which, before excavation, gave much of the appearance of a building. It was termed by Maler[1] the "Temple of the Eight Chambers"

[1] Teobert Maler; Researches in the Central Portion of the Usumatcintla Valley; Peabody Museum Memoirs, Vol. 2, No. 1; pp. 52, 53; Cambridge, 1901.

(Edificio de Ocho Aposentos), a term which, as will be shown, is a misnomer. Nevertheless, it could hardly have been one of the most important structures, since it does not occupy a very prominent position, was not placed on a pyramid, and has no associated stelae or other carved and dated monuments and few decorative features. ~~Probably, however,~~ Like all the buildings, ~~it~~ was originally covered with ~~ornamental~~ masonry, the stonework smooth plaster, but there is no evidence that stucco ornament was employed. ~~stucco~~. However, as we shall see, it is one of the most important structures in the city from an architectural standpoint.

In type P-7 falls with the class of buildings generally termed "palaces" rather than with the "temples", though it contains some features more characteristic of the latter and is in some respects hybrid. These two terms are applied to the two main classes of Maya edifices without sufficient evidence as to their former use.

Under the older classification by which all early Maya buildings were considered either as "palaces" or as "temples", P-7 would have been placed in the former category. However our researches at Piedras Negras, as well as similar studies elsewhere, indicate that there are several other types of buildings with definite functional purposes. We may anticipate our conclusions as given in some detail at the close of this paper, and state that P-7 is the best preserved and most typical example of a class of structures of which seven others have already been found at Piedras Negras, structures with a definite and uniform complex of features and evidently intended for a specific purpose. We shall later give our reasons for belief that this purpose was for sweat-baths.

In addition to these features common to this type of structure, of which many are new to Maya architectural studies, P-7 is unique and of great interest because of the probable character of the roof, which we believe to have been of the usual nearly flat type but supported on long timber beams resting on vaulting instead of possessing the short capstones which usually join the two halves of a Maya vault. The appearance of the interior was therefore that of a much widened vault, the ceiling broad and flat instead of with the usual narrow flat capstones. On the whole P-7 is one of the most interesting buildings so far reported in the southern Maya area, because of its structure, its complex design and its probable function.

The structure faces southwest upon a narrow arm of the East Court Plaza towards the right side of Pyramid O-12 on the other side of the Plaza arm. To the left or southeast of P-7, at the end of this arm of the Plaza, is Structure P-6, a long mound. To the northwest is the large Pyramid Temple O-13, the most impressive structure in this general region. The distance from P-7 to the latter is about 50 m, to P-6 about 12 m, and to O-12 about 35 m, this being the width of the level arm at this point. P-7, P-6 and O-13 are at the foot of a long hill. All four structures were obviously planned with relation to each-other, though probably erected at different times. P-7 and O-13 face southwest, the line of the front wall of the former being practically on a continuation of the line of the lower step of the stairway of O-13. P-6 and O-12 face northwest at practically a right angle to the others.

Left and right refer, as usual in this series, to the structure, not to the observer.

The structure faces south~~west~~ upon a narrow arm of the East Court Plaza, towards the right side of Pyramid 0-12 on the other ~~side~~.

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~~side of the Plaza arm. To the left or southwest of P-7, at the end of the arm of the Plaza, is Structure P-6, a long mound.~~

P-7 is not, like most of the structures, especially those classed as "temples", on a high pyramid, but on a relatively low terrace against the side of a hill. This terrace extends for a considerable distance to the right, towards Structure 0-13, and to the left it merges with the substructure of P-6 which therefore had easy access to P-7. To the rear, the slope of the apparently natural hill behind begins close to the rear wall; ~~the hill is, however, terraced at its base.~~ At the front is a slope to the floor of the arm of the East Court Plaza which is about 3 m below the base of the structure walls at the front. ~~Trenching revealed the expected stairway below the debris on this front slope;~~ A wide stairway ascended the front slope; this apparently extended the entire length of the building and the entire length of the slope to either side. ~~and eliminated terraces on the front.~~ Surface contours show that there are no terraced descents to the sides of the building, but lateral benches or terraces run out from the right side and probably also from the left. ~~Debris contours rise towards the rear of the main terrace on either side of P-7, and excavations would probably reveal evidences of other constructions of a minor nature at the sides.~~

it is doubtful if any exist, references to the structure and its details refer to P-7 in its latest and final form, except where specifically noted.

In its final form P-7 consisted of a relatively central, relatively square chamber which still contains a completely roofed vaulted room, the only one at present in this condition at the city. This central chamber was surrounded and enclosed by a much larger rectangular oblong building with the longer sides to front and rear. At the front were three large entrances separated by sections of wall, but the side and rear walls were nearly continuous, the right side wall being pierced by one small doorway, the rear wall by two, the other side wall lacking any doorway. Along the longer axis, and approximately in the center of the building, a medial wall in either wing divided the enclosed space into front and rear rooms. As the central chamber sits back of the longitudinal axis, leaving a narrow passageway between it and the rear wall, two rear rooms are produced, but at the front the front of the central chamber projects but little beyond the medial walls so that the front room is but little lessened in width at this point and is essentially continuous, though divided into two halves by a sunken passage or trench leading out of the central chamber from the doorway.

These medial walls do not abut upon the side walls nor upon the chamber walls, doorways between the front and rear rooms of the central chamber. being left along the side walls and the walls of the Sanctuary.

In spite of the unusually great width of the front and rear rooms, the longitudinal division walls, parallel with and between the medial walls and the front and rear walls, which additional walls were presumed to exist by Maler and were shown on his plan, are ~~non-existent. Maler, op. cit., p. 53~~ non-existent. The structure consists of one front and two rear rooms in addition to the ~~Sanctuary~~ central chamber, not of eight rooms. Maler could never have had any real evidence indicating the existence of these walls, and his assumption of their existence must have been merely because the width of the rooms ~~was~~ is so great that he could not conceive of their having been undivided. Unfortunately his description of the building and his plan based on this are given unequivocally

Maler, op.cit., fig. 21, p. 53.

and without any implication of uncertainty, and his plan has been extensively copied as an example of a very complex type of Maya

As, for instance, in Thomas A. Joyce; Mexican Archaeology; New York and London, 1914; fig. 75, 8, p. 327.

structure. A comparison of Maler's plan with that shown herein in Plate I will show many other errors in major and minor details,

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and we have found Maler to be in error in other unequivocal statements of fact in other parts of the city. These dogmatic but incorrect statements naturally lead us to doubt the accuracy of Maler's observations at other sites. However, for the major part, especially as regards measurements and dimensions, we have found his statements reliable.

See J. Alden Mason, Linton Satterthwaite, Jr., and Mary Butler: The Work of the Eldridge R. Johnson Middle American Expeditions of the University Museum, Philadelphia, at Piedras Negras, Peten, Guatemala; Maya Research, I, 1, pp. 30-36; New York, July, 1934; p.32.

The structure was by no means entirely excavated, and in every room unexcavated portions were left as controls and are indicated by stippling in the plans. The left wing of the front room was excavated only along the medial wall except for a trench cut to floor level from the front entrance to the medial wall. Most of the right half of the front room was cleared to floor level, but against the right side wall about a quarter was left untouched. The rear rooms were little more than half cleared, the excavations in the right room being a little more extensive than those in the left.

deeply and

Excavations ~~revealed that although~~ there are no completely buried structures beneath the upper and latest one, such as those on Pyramid K-5 by which the height was greatly increased, and the low foundation level of P-7 precluded the existence of such. Nevertheless alterations to the building ~~had been very~~ extensive; and apparently there were at least nine building ~~periods~~ in each of which the structure had been somewhat altered.

In the ensuing text the structure as it existed at the last period is first described, and plans and sections of this latest structure are shown in Plate 1. Later in the text the evidences for and data upon the earlier buried features are explained, and these earlier periods are shown in the sections in Plates 2 and 3.

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2/14-21 general; 21, excavation in front; 23-33, trench, sanctuary interior, shrine (plans, 30, 32); 33-38, walls, etc; 38-40, upper chamber; 40-42, sanc. room and shrine; 42-45, debris, etc; 45-46, right rear room and altar; 46, Sanct. doorway; 46-47, front wall; 47-48, outer trench; 48-51, front wall, terrace, etc; 51-55, sanct. y shrine; ~~55-57~~ 55-57, trench; 57-58, front y terraces; 58-61, sanct. trench, shrine, chamber. 64-65, Sanct. chamber.

3/1-2, Sanct. 67b-72, rear rooms; 72-73, Sanct.; 73-rear rooms 74.

4/1-4 Front y terraces; 4-5, left rear rm; 5, front rm y sanct. wall; 6-20, rear rooms.

The central chamber.

~~THE SANCTUARY~~

The ~~CENTRAL building, termed by us "The Sanctuary",~~ central chamber has the only ~~remaining~~ perfectly preserved vault remaining at Piedras Negras. The four walls, the roof over the vault and the interior of the vault are still intact; the uppermost parts of the walls and of the roof, as will be described later, alone are partly destroyed. The one small low entrance doorway was ~~blocked~~ hidden by debris so that the first modern visitors to the city, even before Maler's day,* found, apparently, a completely closed structure. Always seeking for hidden treasure in ruins, ~~they~~ with the expenditure of much labor they broke through the northwest wall, throwing masonry debris into the chamber, and it was probably they who partially destroyed the altar within.

~~statuary~~ * Maler, op. cit., p. 53.

As may be seen ~~by referring to Plate 1, and~~ in the photographs in ~~the~~ plates, the central chamber ~~Sanctuary~~ gives the impression of being relatively square, ~~and~~ rectangular and rectilinear. Reference to the plan in Plate 1, however, will show that the builders, doubtless owing to inefficient technique, failed in their obvious intent to produce a rectangular ~~and~~ structure. Continuous walls

are apparently straight, but the angles at which they meet deviate slightly from right-angles, so that the walls are not exactly parallel. The right (northwest) side wall is apparently parallel to the axis of the enclosing larger structure, and the right half of the front wall at a right angle to this and practically parallel to the longer axis of the larger structure. The rear wall, however, meets the right side wall at a little less than a right angle so that it is not exactly parallel to the rear wall of the enclosing structure. The left side wall, however, is practically parallel to the right side wall and of about the same length, so that the left front corner is about 20 cm forward of the line of the right part of the front wall. As this wall was continuous above the doorway, therefore, the left part of the front wall could not be made straight with the right portion, and a slightly concave wall was thus produced.

The dimensions of the front and rear, and of the side walls, however, are practically the same, producing a building about 3.80 by 4.70 m in exterior dimensions.

This lack of symmetry is indicated by exact observations and measurements. Most of these obeservations, however, were not made at floor level since excavations reached this point at only the right side and the right half of the front. Interior observations to floor level corroborated external ones, but the slight convexity of the front wall was not obvious to the eye.

The walls, ~~at floor level, were of varied~~ are of slightly different thickness, but each wall is of practically uniform thickness. The ~~left~~ right side wall ~~was~~ is the thinnest, about 65 cm, the front wall the thickest, about 85 cm near the right corner. The walls ~~of the sanctuary, at least that on the right side,~~ rest on the level of the floor of the front room.

The front wall is broken by a central low doorway which was, ~~when~~ before excavation, completely covered and hidden by fallen debris. This ~~was~~ is not only low and narrow, but sunken below the level of the floor at the base of the walls to a depth of 46 cm. The height of this entrance ~~was~~ is only 1.20 ~~m~~ to 1.25 m (four feet), so that it ~~was~~ is necessary for any adult person to stoop in order to enter. The base of the lintel spanning it ~~was~~ is therefore only ~~73~~ 75 cm above the floor at the base of the walls. A sill in the doorway reduced the effective height of the doorway entrance to practically 1 m.

In all vertical measurements on this structure, the base zero level was the floor of the large front room near the medial wall on the right side. The floors were not perfectly level, probably intentionally so for purposes of drainage, and at the door of the ~~Sanctuary~~ central chamber it had ~~it was at~~ an elevation of -5 cm.

The doorway is 70 cm wide and exactly in the center of the front wall, there being 2 m of wall from the jambs of the doorway to the corners of the wall on either side.

The walls of the ~~Sanctuary~~ central chamber are vertical for a height of about 3 m and ~~where protected by the remaining half-vaults above~~ on the exterior and retain their surface coating of plaster almost completely. The vertical surfaces are broken, however, by a decorative protruding ~~ledge~~ narrow rectangular molding on front and sides but not on the rear. The base of this ~~ledge~~ molding is at a height of 1.77 m above the base of the walls. (It must be realized that these elements are not perfectly horizontal, nor is the floor, so that all vertical measurememts differ by several centimeters when taken in different places.) This height applies to the front and to the ~~poor~~ anterior part of the side walls; the floors of the rear rooms are at a higher level so that the ~~ledge~~ molding is at an effectively less height on the posterior portion of the side walls. The vertical thickness of this ~~ledge~~ molding is 14 to 15 cm, and it extends out for a distance of from 4 to 7 cm. The upper horizontal surface ~~is~~ is slightly beveled by the use of plaster. The stones composing it are selected naturally rectangular slabs thinner than those used elsewhere in the wall and projecting further out.

At a height of 1.08 m above this, or 2.97 above the floor, the verticality of the walls ends with another similar ~~ledge~~ molding, immediately above which begins the spring of the vault. At the rear, this ~~ledge~~ molding, like the

one below, is missing, the wall being perfectly unbroken to the spring of the vault. At the sides the wall is plain except for these two molding; the great hole made by the treasure-hunters removed a part of the lower one molding. At the front the expanse of wall between the two molding is broken by ornamental features. The upper molding is practically similar to the lower one, about 14 cm in vertical thickness and projecting about 4 cm from the face of the wall.

At the front of the building the space between the two molding is occupied by two ornamental vertical quadrilateral rectangular niches. That to the left is much destroyed, but that to the right is well preserved and the two were obviously symmetrical. They are relatively evenly spaced as regards the wall, the distance between them, and between the left one and the corner of the wall being 1.10 m, at the other side 1.20 m; the niches are 65 cm wide. The low doorway is, of course, below the space between them. The beveled top of the lower molding forms the base of the niches and their tops are formed by a lintel 15 cm vertical in thickness placed just below the upper ledge; it is therefore 90 cm in height. The rear interior surfaces of the niches are slanting, recessed for 38 cm

at the base, ~~(probably~~ including the 4 cm projection of the ~~ledge),~~ molding, while at the top it ~~curves~~ slopes out practically to the lower front edge of the lintel. The structural necessity of such a lintel seems slight or non-existent here; in fact the left niche seems to have had no lintel above it, as its right jamb continues up straight above the point occupied by the lintel in the ~~left~~ right niche. Possibly this lack of a lintel contributed to its partial destruction, but it is more likely that this destruction was done by the same treasure-hunters who made the hole in the right wall. It is possible that the right niche was supplied with a lintel in order to make it appear as a miniature representation of a doorway; the niches are but little smaller than the low actual doorway below. The plastered surface of the interior of the right niche is unusually well preserved

at the base (probably including the 4 cm projection of the ledge), while at the top it curves out practically to the face of the lintel. The structural necessity of such lintels seems slight or non-existent here, and it is possible that the niches were miniature representations of doorways; they are but little smaller than the actual doorway below. The plastered surface of the interior is unusually well preserved.

Immediately above the upper ~~ledge~~ molding the spring of the corbelled vault begins. This is set in 10 cm from the edge of the ~~ledge~~ molding and therefore about 5 cm from the line of the wall. The sharp angle was rounded off by plaster. Naturally this is not the case at the rear where there is no ~~ledge~~ molding; here the spring of the vault begins flush with the wall.

On the right side, just above the ~~ledge~~ molding and at the base of the vault-spring, is the drain orifice that will be mentioned in more detail later; this is about 15 cm square. It is approximately in the center of the right or northwest side wall.

The roofing and ceiling that connected the ~~Sanctuary~~ central chamber with the larger surrounding structure is fallen with the sole exception of the arch that connects it with the medial wall that separates the right rear room and the right part of the front room; the under side of this arch is still intact. On the four sides of the ~~Sanctuary~~ central chamber are remains of the half-vaults. Those at the front and the left side are so destroyed that they afford no information; ~~but of those~~ they are fallen away to a point practically vertical with the walls below, but with just enough projecting stones in some places to indicate the former existence of half-vaults. On the rear and the right side the half-vaults are perfectly preserved to a considerable height and the right rear or north corner is in practically perfect condition.

At the rear the half-vault sets at an angle of 22 degrees from vertical to a vertical height of ~~about~~ almost 1 m. The angle of the half-vault on the right side is ~~about the same, degrees~~ a little less steep, about 28 degrees from vertical, and the present maximum vertical height about 1.20 m. The details of the intact arch that connects this half-vault with the right medial wall will be given later. On the left side a section of the vault is intact in only one place, but this suggests a slope of 34 degrees from vertical.

The present maximum height of the ~~Sanctuary~~ of the central chamber walls is about 4.50 m, except above the before-mentioned intact arch, where it rises to 5 m. This is ~~not~~ only about ~~more than~~ 50 cm above the present maximum height of the half-vault.

As will be later described in more detail, the interior height of the vault of the ~~Sanctuary~~ central chamber was only 2.70 m, some 2[illegible] m below the present maximum height of the walls. The roof is by no means of this thickness, however, for the ceiling and roof above the vault is only 50 cm thick. Above this is a chamber of some sort with walls on each of the four sides, which slope inwards to balance, after a fashion, the slope of the half-vaults on the exterior. The floor of this chamber is at a level only a couple of centimeters above the upper surface of the upper decorative ~~ledge~~ molding on the exterior and at about the level of the spring of the outer half-vaults. At the base these walls are from 70 to 90 cm in thickness. Their vertical height below the spring of the vault is very slight and varying; at one point the spring begins practically at floor level, and the maximum height is not over 50 cm. The angle of slope is 16 degrees from vertical on the sides and ~~72~~ 23 degrees at front and rear. ~~much~~ steeper than that of the exterior half-vault, ~~about~~ ~~degrees~~, and the maximum present height of the walls is about 1.~~30~~ 40 above the floor of the chamber.

The masonry of these walls on the interior is rather rude, in contrast to the rather good and even masonry on their outer sides, the slope of the exterior half-vaults. They show no trace of stucco facing. Also the masonry of the four walls differs somewhat. That to the rear is too fallen to afford any information. The front, right, and probably the rear walls were built of large rude blocks, chinked with smaller stones -- even above the vault-spring more like ordinary wall masonry. The left wall is better made, with thinner and more rectangular blocks and slabs, more like the usual vault masonry, except near the top where some large blocks are seen.

34-131-133.

The size of the chamber at the base is 2.95 by 2.20 m. The floor was hard but without any evidence of plaster finish. Large flat stone slabs formed a part of the floor; these were presumed to be the upper side of the vault caps, slabs immediately above them, and they were not lifted in order not to destroy the roof of the vault. The depth of debris on the floor was not great, varying from 50 to 120 cm, and suggesting that there was no complete vault above and no roof-comb.

34-131 In the middle of the right or northwestern wall at its base is the entrance to a drain, the end of which has been mentioned as piercing the wall just above the upper ornamental ~~ledge~~ molding. Its details left no doubt that it was built to drain water, presumably rain-water, from this upper chamber into the right rear room below. The floor of the chamber and the wall ~~was~~ were so made that the entrance orifice set a few centimeters below floor-level, and there was a slight catch-basin surrounding it. This is in the form of a sloping shallow trench, 16 cm wide and 6 cm deep at the wall, extending into the room for a distance of 30 cm. The drain, and the orifices at either end, are rpughly square, and of about the same diameter, about 12 cm, throughout. The slope is slight and the length therefore but little more than the thickness of the wall, about 95 cm. The surfaces had been much destroyed by tree-roots and are now rather rough, but apparently originally were plastered and smooth.

The small size of this upper chamber, the absence of any mode of entrance, the poor quality of the masonry, the absence of plaster finish or stucco facing and the variation in, and slight height of, the walls below the vault-spring all suggest that the chamber was not intended for use or occupation but was probably merely a technically utilitarian feature, an air-space made or left to reduce the weight of the roof, the inner overhang serving as a cantilever to balance the weight of the exterior vaulting.

The interior of the ~~Sanctuary~~ central chamber is a vaulted ~~chamber~~ room of oblong roughly rectangular shape. All four walls are vertical for a short height above which they converge to a narrow ridge covered by capstones. Except for the hole in the right wall made by treasure-hunters the only entrance is the small low doorway in the middle of the front wall. From this a ~~depressed~~ sunken passageway runs to the entrance ~~of~~ a small rectangular masonry feature which, for reasons to be explained later, we term the fire-chamber. ~~shrine which~~ This fills the central part of the rear half of the chamber. To either side of this narrow ~~depressed~~ sunken passageway, and to either side of the ~~shrine~~ fire-chamber, the floor of the chamber is at a higher level.

The walls of the ~~Sanctuary~~ central chamber being from 65 to 85 cm thick, the floor dimensions of the chamber are ~~at~~ 3.40 m from ~~northeast~~ northwest to ~~southwest~~ southeast and 2.30 m from northeast to southwest. ~~The entrance is about 75 cm wide.~~ Since, as has been noted above, the exterior of the ~~Sanctuary~~ central chamber is not an exact rectangle, and since ~~the wa~~ each wall is of practically uniform thickness, it follows that the chamber is slightly asymmetrical also. ~~Rear and~~ The side walls are practically parallel and the rear wall almost at right angles to them, but the front wall is slanting slightly, making the left inner wall a little longer than the right.

The level of the floor surrounding the ~~shrine~~ fire-chamber and to either side of the ~~depressed~~ sunken passage or trench is of approximately the same level as that of the front room outside the ~~Sanctuary~~ central chamber. which is the zero level from which measurements were taken. The floor is slightly sloping and varies a few centimeters from this level. There is a marked slope from rear to front and a less noticeable one from the sides to the ~~the~~ sunken passage. The presumption that this was for purposes of drainage is reduced by the discovery that the slope of some of the buried lower floors is in an opposite direction, from the sunken passage to the sides.

Sollberg die zweite Periode?

The entrance is about 75 cm wide. At the latest period a sill of 20 cm height had been placed in the doorway at the edge of the outer wall; this made the level of the floor of the trench 20 cm higher within the ~~Sanctuary~~ chamber than outside in the front room.

This sill was composed of two large roughly rectangular blocks with very flat tops. When these were taken up they were found to rest on the outer trench floor which continued into the ~~sanctuary~~ chamber below the later higher floor. It lay on the plaster floor of the trench, ~~which continued into the sanctuary,~~ indicating unequivocally that the ~~latter~~ upper trench floor, at 20 cm greater height, was a later phase.

This sill lessened the effective height of the doorway to 1.65 m. As the floor of the ~~sanctuary~~ chamber was at a height of 30 cm above the upper trench floor, the top of the doorway was only 75 cm above this floor.

68

The doorway is spanned by a plain stone lintel 142 cm in length, 22 to 26 cm in vertical thickness, the under side sloping downwards towards the rear and the front edge rounded, and 82 cm in width, this being the thickness of the wall at this point. The spring of the vault begins immediately above it at the front; on the other three sides it begins at approximately the same level, but as there is no offset and the low angle of junction is rounded with plaster, the exact point of the spring is difficult to fix. This, coupled with the slope of the floor, gave various measurements above the floor of the chamber; from 70 to 97 cm; the norm is probably about 90 cm.

From the spring, all four vault slopes converge until, at a height of about 2.70 above the floor, they almost meet. The angle of slope of the front and rear vaults is about 29 degrees from vertical, that of the side vaults about 25 degrees. The gap of about 170 by 25 to 30 cm is covered by four large regular capstones. The surfaces, both of the lower walls and of the upper vault slopes, are composed mainly of small horizontal slabs covered with hard plaster. The ceiling and roof is about 50 cm in thickness.

The floor of the chamber was well preserved, the finishing plaster remaining hard and unbroken in several places; it was most disintegrated close to the sunken passageway.

The base of the side walls was found at about the level of the floor, but it was actually built on the finishing plaster of a floor about 2 cm lower, the masonry resting on about this thickness of a yellowish gravelly mixture.

L.16
removed

Sanct #17

The sunken passageway or trench runs across the ~~sanctuary~~ from chamber ~~to~~ the ~~entrance~~ doorway to the entrance to the ~~shrine~~ fire-chamber, a distance of about 1.15 m. It is of approximately the same width as the doorway and the trench outside the ~~sanctuary~~ chamber in the front room, ~~about~~ 75 to 80 cm. On account of the sill of 20 cm height in the doorway, its latest floor was ~~that~~ much higher than outside of the ~~sanctuary~~ chamber, and 30 cm below the floor of the ~~chamber~~ latter.

The upper floor was hard in places and evidently originally had a plastered surface; in other places it was missing and the ~~was not very definite~~. upper few centimeters apparently eroded. Some potsherds were found in this upper flooring material But the walls of the trench are hard and the plaster surface well preserved. At the entrance to the ~~shrine~~ fire-chamber the upper floor is at the top of a sill, just the same as in the doorway, indicating that the raising of this trench floor was a very late feature.

(pss. pp. 18, 19, 19a removed)
Sanct. 20/

Owing to the breach that had been made in the right wall of the central chamber, the room had often been entered and the fire-chamber at the rear partially destroyed. This is most lamentable, for it was probably perfectly preserved until relatively recent years and would have afforded exact data as to its nature. As it is, it was more dismantled than at least one other example of its type at Piedras Negras (N-1), which was partly destroyed and partly covered by the fall of the covering vault. When it was first entered by us .....

the floor was a mass of stones, some probably forced in when the hole was made in the wall, some thrown in through this hole, ~~and~~ but the majority ~~others~~ probably resulting from the demolition ~~or collapse~~ of the fire-chamber ~~shrine~~ at the rear. Since this debris contained such miscellaneous material which was at first supposed to be exclusively foreign to the chamber, it was thrown out without careful examination, and parts of the fire-chamber ~~shrine~~ may have been included. Since the ceiling was intact, together with most of the surface plaster, there was no debris that had fallen naturally. After the surface stones had been cleared out, the fire-chamber ~~burial~~ at the rear was discovered.

In floor plan the fire-chamber ~~shrine~~ was obviously intended to be rectangular, occupying the central 2.05 ~~2~~ m of the rear wall and extending out into the chamber for 1 m. The interior was open and not much ~~a little~~ wider than the width of the trench that entered it at the front ~~so that the shape was actually that of a broad horseshoe, with the open ends slightly inbowed~~ entrance. Careful measurements indicate that actually it departs somewhat from this plan. It follows in the main the asymmetrical form of the chamber but carries the same eccentricities even

2.05
1.10

further, the external dimensions of the four sides being 2.10 m (rear), 2 m (front), 1 m (right side) and 1.15 m (left side). The fire-chamber thus occupies about the central third of the chamber.

The fire-chamber consists of a rectilinear open space surrounded on three sides by thick walls. There is ~~apparently~~ no front wall, though the interior width (or length) is here lessened at the entrance by the two stone jambs which project about 10 cm from the inner line of the side walls and make the entrance, which is 75 cm wide, 5 cm less than the ~~of approximately the same width~~ of the depressed passageway, about 15 cm narrower than the fire-chamber.

The three walls are thick, considering the small size of the central chamber and the fact that they bore very little weight. The side walls are 50 and 65 cm thick; the rear wall, laid against the rear wall of the central chamber, varies from 30 cm at one side to 45 at the other. They do not extend below the level of the chamber floor on their external faces, but to a greater depth on the inner sides of the fire-chamber.

At present these walls extend only slightly above the level of the floor of the chamber at the front, but rise somewhat towards the rear, and the rear wall stands to a present maximum height of 48 cm. It is probable that the rear wall was originally a little higher and that the side walls were of equal height.

The six ends and corners of these walls ~~are~~ were apparently each marked by a large quasi-rectangular stone, one on either side of the entrance, at the end of the depressed passage, one at each of the corners, and one where each side wall meets the rear wall against the rear wall of the larger chamber. ~~One~~ The left one of the latter was not in position, but a loose stone of this type was found among the debris. In size they range from 17 x 28 to 22 x 25 cm in thickness. ~~They project 20-25 cm above the floor of the chamber.~~ However, those flanking the entrance are 68 and 70 cm long or high, tall jambs, extending much below the chamber floor and 30 cm above it, while the others do not extend below the chamber floor and project 20 to 25 cm above it. ~~If this height is correct for the stone at the left rear, it is covered by the masonry of the higher wall at this point.~~

was not in position, but a loose stone of this type was found among the debris. They range from 17 by 28 to 22 by 25 cm in thickness. The two at the entrance are 68 and 70 cm long or high, the others probably of about the same height. They project about 20 cm above the floor of the chamber and are practically on the level of the top of the walls of the shrine, indicating that these walls were originally little if any higher than at present.

The two stones flanking the entrance to the shrine are 75 cm apart, the width of the trench, and are practically in the exact center of the sanctuary chamber. Their inner sides set from 8 to 15 cm further into the shrine niche than the short sections of the front wall flanking them. They extended below the upper floor of the trench and rested on the paved floor 20 cm below that. Between them at their base and also resting on the paved floor was a sill 20 cm in height, equal to the sill in the sanctuary entrance. Obviously these two sills and the raised floor at their tops were made later than the shrine. This inner sill consisted of one large stone with relatively straight flat front and upper faces and an irregular rear face against the right upright jamb, and a few small stones against the left jamb. These sill stones were much fractured,

probably by heat, and the dirt around, between and beneath them was very light, white, powdery and ashy. Three fine painted polychrome potsherds were found here.

? The interior of the ~~shrine~~ fire-chamber measures approximately ~~35~~ 40 by 90 cm. After the large fallen stones had been cleared ~~from the surface~~ out, the ~~surface of the ground~~ level inside ~~the shrine~~ was found to be relatively ~~level~~ even and high. This consisted of light material thickly crowded with sherds of large pottery vessels, often nested together. ~~and probably from several or many large broken vessels.~~ All were of thick coarse red unslipped ware, the exteriors generally showing shallow striations. Most of them were of the type found most frequently in superficial excavations and in upper layers throughout much of the city, with rims much thicker than the bodies, the lips flat; in others the rims were not thickened and the lips were round. ~~This ware is termed by Miss Butler~~

They were much mixed with dirt and ~~even~~ some small stones, spalls, probably cracked off of the masonry In both of the rear corners of the ~~shrine~~ fire-chamber there were deep recesses in the rear and side walls which were full of burnt clay and charcoal. In the lower levels ~~of the cist~~, the dirt was replaced by compact white ash

or lime dust mixed with small stones and charcoal. In this lower part, but at two different levels, were found two sherds of the same fine polychrome vessel with a dainty geometric decoration.

After this mass of ash and potsherds had been cleaned out, the base of the cist, or the hearth — for it was indubitably used for fires —, was found at the depth of a few centimeters below the base of the stone jambs at the entrance, the base of the sill between them, and the lower paved ~~trench~~ floor of the sunken passageway. The floor or hearth of the cist was paved with stone slabs of irregular size and height. They extend under the ~~shrine~~ walls which were apparently built upon them. These paving slabs were much calcined and broken.

The hearth slabs were partly removed, and under them was found another hearth or layer of stones with another very well made sill of two stones at the entrance. This is at a level of 56 cm below the chamber floor and about on the level of the third floor in the ~~trench~~ sunken passageway, 12 cm below the base of the stone jambs. Below this lower hearth were found white powdery ash and small stones lying on hard red earth, probably baked by fires. Excavation here was not carried below a depth of 1.08 m, 15 cm below the best floor.

While, therefore, the side walls of the fire-chamber extended little if any below the floor of the chamber on their external faces, they extended down 47 cm below the floor on their internal faces. The nature of this change will be explained later; it was due to different periods of construction.

Both side and rear walls were probably originally considerably higher. The rear wall at present has a maximum height of 94 cm above the hearth of the fire-chamber, extending about equally far above and below the chamber floor.

Probable Original Form of the Fire-Chamber.

The fire-chamber was probably intact until relatively recent years when it was probably demolished by the treasure-hunters who made the breach in the side wall. The data supplied by the excavation give a picture of its present condition. Fortunately its former nature and appearance need not be deduced entirely from this but may be restored in accord with the data secured from the excavation of a similar structure, N-1, of very similar type. This structure contained the same complex of elements as P-7: central chamber surrounded by an enclosing structure, single low door with stone lintel in the central chamber, depressed passageway, and fire-chamber. The roof of the central chamber had fallen, demolishing the fire-chamber, but excavations revealed certain details of the latter better than in the case of P-7.

The fire-chamber was roofed, probably by a flat roof. A stone lintel spanned the stone jambs at either side of the depressed passage. In the case of N-1 this lintel measured 90 cm in length, 34 to 40 in width and 24 in thickness or height; in the case of P-7 the lintel probably measured over 1 m in length, width and thickness being about the same as that of N-1. It was probably broken by the vandals and thrown out with the rest of the masonry

debris from the perforated wall when the central chamber was first cleared. Probably stone slabs spanned the rest of the fire-chamber from wall to wall with a plaster coating above them. At a height of 80 to 85 cm above the chamber floor and only a few centimeters below the vault-spring the well-preserved plaster coating of the vault ended in a rather straight line, indicating that the top of the roof of the fire-chamber met the rear wall at this height. Since the rear wall seemed to be at its original height at the maximum point, this would indicate a roof of over 30 cm. thickness, but this may have been reduced, at least in large part, by placing the roofing slabs in a corbelled position. The difference between the height of the anterior jambs and the rear wall indicates that the lintel at the front had a thickness or height of 22 cm, approximately equal to that of N-1.

Excavations in N-1 also indicated the purpose of the many potsherds found within the fire-chamber, which were at first supppsed to have come from large vessels used and broken there. They obviously had been used in building a fire-wall at the back of the fire-chamber, such as was found partly intact in N-1. Here the sherds were laid horizontal, one above another, with a thin binder of cement holding them together. This wall sloped outward towards the top and apparently ran from the hearth to the ceiling. It was about 27 cm thick at the hearth much thicker at the ceiling, the upper part having fallen. Doubtless it withstood heat better than the masonry wall which, being of limestone, would pulverize, crack and chip, and the slope reflected the heat downwards. Judging by the quantity of potsherds, P-7 must have had a similar fire-wall, though probably of lesser thickness on account of the rear wall which was absent in N-1; also the quantity of potsherds was considerably less in P-7.

Purpose of the Fire-Chamber and Central Chamber

The whole appearance of the fire-chamber indicates beyond doubt that it was used for fires. The shape, the calcination and pulverizing of the masonry, and the baking of the earth, The fires produced considerable heat, more that would have resulted from the burning of incense. The structure seems to have been a stove or furnace, and we would have regularly referred to it as such did we not prefer a less definite term which will not have to be replaced in view of later researches. All the evidences indicate such a use, except the absence of any chimney, or any other draft or ventilation, either in the fire-chamber or in the surrounding central chamber. The only ventilation shaft that could have existed would have been through the side wall and enlarged by the vandals to afford themselves entrance. It is difficult to imagine how wood could have been burnt in the fire-chamber without rendering the central chamber uninhabitable by reason of smoke. Charcoal might have been employed but even this would have released some gas. Nevertheless we believe that the fire-chamber was used to produce heat. The entire central chamber might have been made so hot by reason of the

We have considered and rejected the hypothesis that the entire central chamber could have served as a furnace to heat the outer rooms; the walls are so thick and the outer rooms so large that a very hot fire would have been needed for a long time to heat the central chamber walls sufficiently to radiate heat into the outer rooms. The rear rooms are not so open, but investigation of the other similar structures in the city indicate that it would have been impossible to heat the outer rooms in these.

Despite the lack of ventilation, the explabation that best suits the evidence is that the central chamber was used as a sweat-bath. The form, with small area, low ceiling or high floor and small low doorway with stone lintel and depressed padsage, is very well suited to the production and retention of heat. The depressed passageway could have served several useful purposes: a draft of cold air to fan the flames would have entered directly to the base of the hearth, possibly heavy noxious gases would have been carried off, water used in the production of steam would have flowed out, the ashes would have been easily swept out, and bathers could more easily enter without crawling through the door which had to be ~~kept~~ made low. They

could sit ~~with their feet~~ on the chamber floor with their feet in the passageway, or lie or stand on the chamber floor. As is usual in America it is not likely that the bathers occupied the chamber while the fire was burning; the walls of the fire-chamber and of the central chamber, and especially the thick roof of the fire-chamber were probably allowed to become very hot, the ashes and embers were ~~probably~~ raked out through the depressed passage, possibly with a long hoelike implement without entering the central chamber, and after the noxious gases were partly dissipated and the air had cooled to bearable temperature while the stones of the fire-chamber still retained much heat, water may have been dashed upon them to produce ~~the~~ steam. Or containers of water may have been placed on the roof of the fire-chamber. The exact details of the use cannot be decided at present, but further excavation of the other structures of the same type in this and other cities will doubtless eventually make this clear.

The practise of sweat-bathing is universal in America. Most primitive people have no house especially for this purpose but

Continue after getting quotation from Sahagun

The Outer Rooms

Of the larger structure enclosing the sanctuary only the walls in certain places; the true roof is everywhere missing. and ~~the lower courses of~~ the vaults remain. These vary considerably in degree of preservation, but compared with most walls at Péadras Negras they are for the most part high and well preserved.

The structure is large and relatively oblong and rectangular. Accurate measurements, however, revealed that actual construction departed from this ideal plan, the opposite parallel walls differing somewhat in length. The front and rear walls are approximately parallel and at right angles to the right side wall, but front and rear walls differ somewhat in length and the left side wall is not even approximately parallel to the right wall. Carelessness on the part of the builders is probably responsible for this, but it has been suggested that possibly the Maya produced asymmetry intentionally in order not to assume the godlike prerogatives of perfection. While a perfect right-angle may have taxed their engineering abilities, they must have been able to duplicate linear measurements with approximate accuracy.

The larger structure measures, in external dimensions, 19.90 m on the front, 19.30 on the rear and 9.90 on both sides.

Walls, Piers and Entrances

All the walls are of practically uniform thickness, not varying more than 5 cm to either side of the norm of 85 cm. The masonry is not of unusual quality. The blocks and stones are on the whole small, though varying greatly in size, often roughly rectangular in form but not in any case shaped, and carefully tooled, and chinked with small stones and slabs. At the ends of walls and in door ways especially large, heavy, regular rectangular blocks were selected. The blocks and slabs often extend beyond the central interior of the wall and there is no appearance of a central core with veneering. The right medial wall is unusually well preserved and high, with fossilly all of the half-vaults at its top still in place, and the arch connecting it with the central chamber is still intact, though a large tree growing above it will probably eventually destroy it. The plaster surface is hard and well preserved. The western corner with the adjacent sections of the front and the right side wall is also well preserved with high walls, parts of the half-vault, and traces of plaster, but is cracking, slanting, and, if not repaired, will fall before many years. The rest of the walls, including the rear, left side, left medial, left front section, and the

two front piers are lower, and some of them were not visible above the debris before excavation. Few of these walls, especially those on the left side, were cleared to floor level, but the plan is so symmetrical and simple, and the walls generally visible in some places, that it is reasonably certain that a complete excavation would reveal everything intact at floor level. Therefore on the ground plan in Plate I the walls are all given in solid black, but the parts that were not ~~cleared to their bases~~ visible above the debris are shown with white hatching on their sides. It may be taken for granted that the fallen left interior medial wall duplicated the right ~~interior~~ medial wall, and that the surrounding exterior walls duplicated those in the right front or western corner. Stippling on the ground level or floor in the Plan indicates portions not excavated, and where this abuts upon the walls this naturally indicates that these walls were not cleared to floor or ground level but were visible on the surface.

There were six entrances in the surrounding walls; three wide entrances at the front, two doorways in the rear wall, and one in the right side wall. The three in the front are symmetrical and one in the rear is in the central axis of the structure, in the center of the narrow ~~passage~~ aisle separating the rear of the central chamber ~~sanctuary~~ from the rear ~~wall~~ encompassing wall. Each of the rear rooms has another entrance; that of the right room in the side wall, that of the left room in the rear wall, and it is certain that no other symmetrical entrances existed. The entrances are of slightly variant ~~widths~~ widths, that in the center of the rear wall ~~1.35~~ 1.35 m, that to the left in the rear wall 1.80, and that in the right side wall 1.50 m. Only around the latter were excavations relatively thorough, but in no case was any trace of a stone lintel seen.

The right front entrance, between the the right pier and the right section of the front wall, is 2.45 m in width. This is ~~presumably~~ also the width of the left front entrance ~~which was not excavated~~. As the left pier was so much destroyed that its right end could not be ascertained with certainty, the width of the central entrance is uncertain, but is calculated at about 3.15 m. This is the widest entrance to a vaulted structure so far known at Piedras Negras though it is exceeded by two entrances to non-vaulted structures: K-5-3d (3.60) and O-18 (3.71).

The two piers separating the three front entrances are fallen to nearly floor level. The right pier was cleared except at the front where it leaned forward so that excavation here would have felled it entirely. That to the left was left entirely covered with debris except at the left edge; it was so much destroyed that its right edge could not be ascertained with certainty. It is taken for granted that it was of the same size as the right pier. They seem to have been of the same thickness as the front wall, about 80 cm, and the right one is 2.90 m wide. This is unusually wide for a feature of this kind, and they might better be considered as sections of walls than as piers. The true walls at the right and left ends of the front wall are of about the same external dimensions, 3.00 and 3.05 wide, so that the front portico of the building consisted, in effect, of four wall sections of approximately equal width and three entrances, the central one of the latter a little wider, the others a little narrower, than the walls. The maximum present height of the masonry, which was at the debris level before excavation, is about 80 cm. The masonry was in the main of relatively large blocks chinked with small slabs and chips. Accurate measurements indicated that all six ends of piers and walls are parallel with the slanting left wall rather than with the right wall, and not at right angles to the front wall; they are therefore parallelograms rather than rectangles.

see reconstruction

The western corner is the best preserved part of the exterior walls and may be taken as typical of the exterior walls in general. The irregular blocks and smaller stones are not laid in courses and there is no intentional breaking of joints which has led to lines of weakness and present cracks. But at the junction of the two walls, on the outer corner, some attempt at bonding seems to have been made, the large selected rectangular blocks generally alternating long and short.

The present maximum height of the right side wall near the front corner is about 4.62 m above the outer plinth ledge, and the details of the outer face are intact at one place to a height of 4.20 m. The wall is vertical and plain for a height of about 3.20 m. (All measurements hereabouts vary since the plinth has apparently settled, is sloping, and the side wall is cracked and the front wall sloping; the latter measurements varied from 3.17 to 3.29 in various places.) At this height is a two-member apron cornice 37 cm in vertical width and projecting out for 30 cm. The principal elements are two lines of projecting slabs about 8 cm thick and 20 cm apart. The lower one projects out about 30 cm, the upper one about 25 cm. These two ledges are composed of

each of a single horizontal line of thin stone slabs of relatively equal thickness set deep into the core of the wall. The details of the band between are now gone, but the stones remaining in place warrant a reconstruction of a sloping apron as shown in the Sections in Plate 1 and as existent in other Maya cities and indicated on other temples at Piedras Negras. The width of the upper ledge, however, is 36 cm, since the wall above it sets back some 12 cm behind the line of the wall below. The face of this wall is well preserved to a height of 70 cm, and the interior core to a height of ~~1.15 m~~ about 35 cm more. The present height of the wall lessens towards the rear and falls rapidly as the entrance to the rear room is neared. The jamb of the latter is well preserved to a height of ~~only~~ about ~~1.50~~ 2 m.

The short right section of the front wall is also high and well preserved at the corner and shows the same two-member cornice. Near the jamb of the front entrance the present height diminishes but the jamb is perfectly preserved to a height of nearly 2½ m. The masonry here is unusually good with large and regular blocks chinked with smaller stones.

At the inner side of this western corner, at the right front corner of the front room, the walls preserve the lower part of the vault slope. This begins at a height of about 3.36 m above the room floor, about the height of the lower edge of the upper member of the external cornice. The angle of slope is 23 degrees from vertical on the front wall, 13 degrees on the side wall, and is preserved for a maximum distance of about 1 m, or a correspondingly less vertical height. The masonry of the vaulting is made of thinner slabs than the irregularly sized blocks employed in the lower vertical wall. The plaster surface is well preserved.

Little can be said about the section of the right side wall to the rear of the entrance, the rear wall, the left side wall, or the left section of the front wall since they are all fallen to slight height below the level of the cornice and the spring of the vault. Presumably they were, throughout, like the walls at the right front corner. The rear wall may, however, have lacked the cornice. The left medial wall, also fallen to low height, presumably duplicated the right medial wall next to be described. The masonry of the rear wall appeared to be of a poorer quality than that of the side walls. The rear wall, and the rear halves of the side walls, were built upon the raised floor levels of the rear rooms, their bases at a higher level than those of the front walls and the anterior halves of the side walls. The detailed features where the side walls rise to a higher level at their bases have not yet been examined.

wall next to be described. The masonry of the rear wall appeared to be of a poorer quality than that of the side walls.

The rear wall, and the posterior halves of the side walls, were built upon the raised floor level of the rear rooms, their bases thus being about 25 cm higher than those of the front wall and the anterior halves of the side walls. This difference in level is taken care of by steps both inside and outside the structure; these steps, however, are not on the same line, the exterior step being about 1 m in front of the line of the interior step. The exterior plinth, however, rises to the greater posterior height on the line of the interior step where there is an external buried step. These peculiarities can best be seen on the restoration in Plate ..... and will be explained in more detail later when the plinth and the external features are described.

The right medial longitudinal wall separating the front from the rear room is probably the best preserved wall at Piedras Negras. It stands straight and firm without cracks, and the hard plastered surface is preserved in most places. On both sides and both ends the half vaults at its top are well preserved, probably to practically, if not absolutely, original full height, and the arch connecting it with the ~~sanctuary~~ central chamber is still intact with the capstones. A tree growing upon it, however, ~~cannot but~~ may destroy it before many decades. The arch on the other end, connecting it with the right side wall, is partly fallen, but replaced by the roots of a tree bridging the gap. The maximum present height is ~~The wall is~~ 5.10 m.

The wall is 4.40 m long, ~~the~~ separated from the ~~sanctuary~~ central chamber by an ~~entrance~~ doorway 1.15 m wide, and from the right wall by an ~~entrance~~ doorway 87 cm wide. ~~The~~ Its thickness at one point is ~~89 cm~~ 89 cm at the base and 81 cm just below the spring of the vault. Measurements of height are given from the floor of the front room, the zero level, the rear rooms being at a higher level. In the exact center of the wall a T-shaped orifice pierces it. This is 36 cm in height, the upper horizontal portion 18 cm high and 30 cm wide, the lower

vertical section 18 cm high and 15 cm wide. The bottom is 1.72 m above the floor, the top 1.12 below the spring of the vault.

The spring of the vault is at an average height of 3.20 m and is well marked by a very slight offset on all sides. This difference in height from the 3.36 m. at the entrance end of the left side wall is accounted for by the slope of the floor. The angle of slope on the sides to front and rear is 23 degrees from vertical, equalling that of the front wall, and presumably of the rear wall. At the left end the angle is 19 degrees from vertical; this is ~~mean between the 13 degree slope of the side wall and the 28 degree slope of the half vault of the sanctuary~~, the intact arch and is an exact measurement. But the slope of the other soffit of this arch, the half vault of the central chamber, ~~sanctuary~~, is 28 degrees, making the arch asymmetrical. Moreover the spring of the vault on the right side of this arch, the medial wall side, is 8 cm higher than the top of the upper ledge of the central chamber ~~sanctuary~~ below the vault spring on the left side. The central chamber ~~sanctuary~~ half-vault, however, seems to be relatively vertical for about this height. These asymmetries may have some bearing on the question of the relative age of these elements of the structure.

The angle of the slope on the right end of the wall is less certain, as it is more destroyed, but seems to be 13 degrees from vertical. ~~horizontal, the same as the slope of the vault of the right side wall, making this arch symmetrical.~~

The other half of this arch, on the wall side, is destroyed, but nearer to the front corner the vault slope seems to be the same 13 degrees, so that this right arch was presumably symmetrical as regards soffit slopes and heights of vault springs.

The lower surface of the capstones of the arch connecting the medial wall with the central chamber is at a height of 4.30 m above the floor on the side, and 4.33 on the wall side, the capstones being this amount off horizontal. They are 1.18 m above the spring of the vault on the wall.. The visible width is 25 cm, the length (the sum of all the capstones) 1.80 m. The lower side of the arch is composed of three flat but apparently thick slabs, and one that apparently is set on edge.

The vault slopes on the long sides of the medial wall, however, continue up to a height above the capstones of the archway, indicating that the ceiling over the rooms was at a greater height than that in the archway. On the front side the vaulting is intact to a height of 4.47 m; on the rear side the highest stones still in original position are several well-shaped slabs about 7 cm in thickness, on the same level, which project 15 cm beyond the edge of the vault slope below them. Their lower surfaces are at a height of 4.55 m. Their front edges are 1.30 m above the vault spring, and 55 cm beyond the line of the straight lower portion of the wall.

These slabs set deeply into the hearting and are apparently in original position. They are covered, at the edge, by a layer of gravel, small pieces of slabs and slab spalls, more or less loose. Further in, towards the center of the wall, the remains of the wall are a little higher, to a maximum of 5.10 m, 48 cm above the top of the slabs at the top of the vault. At a height of 5 m is a hearting slab in solid position, above this is loose gravel concrete, and at the highest point some loose small slabs. The top of this wall and its half vaults are naturally at present convex, sloping down on both sides from the top in the middle to the tops of the half vaults at the sides. The significance of these features will be noted in the discussion regarding the nature of the roof.

The medial wall, like the front wall and the anterior halves of the side walls, rested upon the level of the front room.

Rooms and Floors

The large long front room was narrowed slightly in its center by the projecting ~~sanctuary~~ central chamber but not enough so to reduce its width materially, since the front wall of the ~~sanctuary~~ chamber is only 45 cm forward of the front of the medial wall. At this point the width of the room is 3.30 m; its maximum width is 3.80. The floor of the room is, however, divided into two equal parts by the depressed passage or trench which runs from the ~~sanctuary~~ central chamber door to the central entrance to the room. The ~~length~~ length of the room ~~is~~ varies a few centimeters to either side of 18 m; the length of ~~each side~~ the two halves from 8.40 to 8.80 m, the left portion being a little longer. The length from the side to the side of the ~~sanctuary~~ chamber is about 6.45 m.

~~There are four doorways to the rear room and three entrances at the front.~~

The left portion of the front room was left ~~entirely~~ unexcavated except for a trench run through the left entrance to the medial wall; the walls were fallen to the height of the top of the deep debris. The right portion was cleared with the exception of the right third which included the inner sides of the front and side walls, the right end of the medial wall and the right doorway to the rear room, as indicated by the stippling in the Plan in Plate I.

The floor, wherever ~~[illegible]~~ cleared, was found to be coated with hard plaster still in good condition. This floor at the medial wall was taken as zero level in vertical measurements. It was found to slope considerably towards the front. Probably most of this slope was original and intentional for drainage purposes, but possibly the front wall and piers ~~had~~ have sunk somewhat. The floor at the inner side of the front wall is 17 cm below that at the medial wall, at the outer side 22 cm below it.

The floor of the room, in accordance with customary Maya architecture, extended through the front entrances to the edge of the narrow plinth and thus surrounded the front piers at approximately the same level.

At the rear of the left half of the front room, against the medial wall and in its approximate center, was found the remains of a masonry bench. The height and width were 48 cm. As only one end was uncovered, the length was not measured, but if it was symmetrically placed in the center of the wall it was 1.70 m. The plaster surface was well preserved on the sides and the plastered face of the medial wall ran down behind it, indicating that it was a later addition. No symmetrical bench was noted in the right half of the front room, and debris contours indicated that one was not inadvertantly torn out during excavations.

The same depressed passage or trench that runs from the entrance to the ~~shrine across~~ fore-chamber through central ~~sanctuary~~ chamber to the doorway continues across the front room. Presumably it extended to the edge of the plinth outside the central entrance which there probably formed the uppermost step of the presumptive central stairway. Presumably also the base of the trench was at the level of the next lower step or terrace. The anterior end of the trench was much destroyed and the details uncertain, ~~could not be found~~, but these features have been restored on the plans in Plate 1, and may be visualized to best advantage in the restoration in Plate ___. in accord with this hypothesis, This would give the trench a length of ~~4.75~~ 4.80 m from the central chamber ~~sanctuary~~ doorway; it was traced to exactly this distance.

The ~~trench~~ depressed passage is of the same width as the ~~sanctuary~~ chamber doorway, 70 cm, and practically, though not exactly, at right angles to the front walls. The depth is an average of 50 cm, 20 cm greater than the depth ~~of the trench~~ inside the ~~sanctuary~~ chamber., since the sill in the ~~sanctuary~~ doorway raised the trench floor inside to this much greater height. As has been already noted, the floor of the outer trench continued in the ~~sanctuary~~ chamber as a lower floor. The walls and floor of the ~~trench~~ passage were covered with hard plaster.

Since the ~~sanctuary~~ central chamber sets far to the rear, leaving only a narrow aisle between its rear wall and that of the larger ensemble, the rear portion ~~of~~ of the larger structure may be considered as divided into two rear rooms, right or northwest, and left or southeast, and a rear passageway or aisle connecting them. The latter measures about 4.80 by 1.20 to 1.35 m. ~~4.80 m.~~ As the walls are not exactly parallel, no two dimensions are the same, but the two rear rooms are approximately equal in size and average 3.60 by 6.45 m, a little narrower than the front room.

The floor of the rear rooms is at a higher level than that of the front room, and they have a considerable slope towards the front, obviously for drainage purposes. The difference in level is about 13 cm from rear to medial wall. Even at the front, however, the floor level is 25 cm higher than in the front room. This rise is achieved by one step in the entrances. Only the step in the right entrance beside the ~~sanctuary~~ central chamber and beneath the intact arch was cleared and examined, but the presumption is that the other three doorways contained steps of the same nature. This step is on the line ~~with~~ of the rear edge of the medial wall, the space under the archways being parts of the front room. The step examined is not monolithic but composed of large and small stones cemented together and covered with plaster.

The greater part of this room was excavated, as indicated on the Plan in Plate I. The sole feature of interest found in the course of these excavations was a rectangular mass of solid masonry built against the medial wall. After much consideration we have decided to refer to this by the equivocal term "bench". However, because of its general form and nature, and the raised back, we believe that it belongs in the class of thrones, of which Throne 1 is the best-known example. In opposition to this implied ceremonial use it may be objected that it was secluded in a dark rear room, while Throne 1 occupied a commanding position at the top of a staircase. However, similar objects, more closely resembling Throne 1 than this bench, were also placed in dim interior rooms at Palenque. We have abandoned the name "altar" formerly applied to these benches.

This bench consists of a solid rectangular block of stone masonry with a higher and thinner masonry back at its rear against the medial wall. . . . . .

If it ever bore any decoration or inscription, this was presumably in modelled stucco rather than in carved stone as in the case of Throne 1. However, no fragments of decorated stucco were found on or around it.

The ~~alter~~ bench is approximately in the center of the medial wall and under the T-shaped orifice in the latter, but since the doorways at either end of this wall are not of equal widths, the ~~alter~~ bench is not in the central ~~line~~ axis of the room. It was built on the plastered floor of the room and against the plastered ~~wall~~ face of the medial wall. This indicates that it was one of the last features built, made after the room as a whole had been finished. The presumption is that it is of considerably later date, though a temporal difference of only a few days is not precluded.

At its base, the ~~Altar~~ bench measures 1.80 (?) by 1.05 m and the wider part is 63 cm above the floor; traces of plaster were evident on the top, indicating that it was probably never any higher. The front face and corners were built of more or less uniformly sized and shaped rectangular stone blocks in four tiers, forming masonry of unusually good quality. The rear and higher part, ~~which my equivocal notes seem to indicate continued to floor level~~, is 15 cm thick and,

40(W)

when first seen, extended to 50 cm above the broad flat seat top. This was practically at the surface of the debris and the masonry back may originally have risen higher. The back of the corresponding bench in the left rear room was destroyed to an even less height and afforded no data for comparative purposes.

An excavation in the interior of the bench showed that it was built, except for the masonry facing, of piled rubble, very loose and filled with much dirt.

With the exception of the external doorway, the left rear room is practically symmetrical with the right rear room. The proportion of it left unexcavated was greater than in the latter, but ~~on the other hand~~ excavations ~~beneath the floor were more extensive and revealed some peculiar features, some or all of which might also have been found in the right room had they been looked for in the corresponding places.~~ on the whole the excavations tended to supplement those in the right rear room. The dimensions ~~were~~ are about the same, and the floor at practically the same height, sloping ~~slightly~~ 13 cm from the rear wall forward, probably for drainage purposes, ~~but~~ At the medial wall the floor level is about 25 cm above the zero level of the floor of the front room, ~~and~~ suggesting the existence of steps of this height in the doorways at either end of the medial wall.

Against the medial wall is a bench ~~altar~~ corresponding to that in the right rear room. This is somewhat more destroyed by falling walls and trees than the latter, and a large standing tree ~~prevented thorough excavation. It is about in the center of this wall, and 2.25 m long.~~ The distances from its sides to the sanctuary wall and to the external side wall are each within a few centimeters of this distance, so that it occupies about the central third of the room. ~~(Sat's plan makes it 1.85 long, 2.80 to sanct., 1.95 to side wall; which is correct?)~~

prevented thorough excavation. Such points as could be ascertained indicated that it was of practically the same shape, size and position as the bench in the right rear room. It is placed closer to the left end of the medial wall which, together with the narrower doorway at the left of the medial wall, makes it even further off the axis of the room than in the case of the bench in the right rear room. The left edge of the bench also seems to be not at right angles to its front, but more or less parallel to the slanting left side wall of the room, making the bench asymmetrical.

It is of about the same dimensions as the other bench, 1.85 m long and 1.20 m wide. The well-plastered flat seat top is at a height of 59 cm above the floor and the width of this top about 1 m. The rear 20 cm is occupied by a high masonry back as in the case of the right bench. It was almost completely destroyed so that its original height could not be ascertained, but it was probably at least of the same minimum height as the back of the right bench or 50 cm above the seat top. Like the other bench, it was built upon the upper floor. A flint knife was found on or near the floor in front of the bench.

PLINTH, TERRACES AND STAIRCASE

The complex of P-7 was encircled by a plinth, or rather was built upon one, the edges of which extended a little beyond the outer walls at the levels of the ~~other~~ front and rear floors; traces of this plinth were uncovered ~~at the front and~~ on all four sides, whether it continued also along the rear wall was not ascertained, but as this is the usual custom of Maya architects it has been so reconstructed on the Plan.

The upper surface of the plinth is of course continuous with the floors of the rooms. These, as we have noted, slopped considerably towards the front, that of the front room being at the front wall 17 cm below its level at the medial wall, and the edge of the plinth 22 cm below it. They also slope from the center of the room towards the side walls, apparently by about an equal amount. The exterior wall heights already given are measured from the plinth level.

The width of the plinth at the front is 60 cm while at the sides it is only 6 cm. The height ~~is about 70 cm~~ varies from ~~60~~ to 60 or more at the front ~~70 cm~~. The height of the depressed passage at its anterior end is therefore of ~~the same~~ this height instead of the 50 cm measured nearer to the central chamber, indicating a greater slope in the floor of the passage than on the floor of the room.

The upper courses of the plinth at the front were everywhere destroyed and no data could be taken upon the edge, this being reconstructed from the face of the plinth wall near the base and the floor of the room. The masonry is of stone blocks larger than those composing the masonry of the wall above. These large stones project under the wall masonry, proving that the walls were built upon the plinth, and behind these, in the plinth interior, was seen typical rock-fill of loose uncemented rubble.

The narrow upper plinth surface continues back on the sides of the building, or at any rate where observed on the right side, slowly rising for a distance of 6.10 m to a point on a line with the step inside the building at the rear edge of the medial wall. Here it rises ~~25 cm, the same height as the step inside the building, thus~~ is stepped up 19 cm, gaining the level of the rear room and being continuous with the latter at the side doorway to the rear ? ~~room. This can best be visualized in the restoration in Plate~~ .....

~~This side would be expected to be the same as that of the step under the wall at the left end of the medial wall, but the step at the right end of this wall, which was not uncovered, may be approximately the lesser height of 19 cm.~~

~~Here~~ The plinth is restored along the rear wall also, a feature that was not ascertained in the excavations.

At the base of the plinth a well-plastered flat floor was found at the front; this is considered to be the surface of the upper ~~most~~ front terrace. How far this extended to either side of the structure

room. This can best be visualized in the restoration in Plate .....

This rise would be expected to be the same as that of the step under the arch at the left end of the medial wall, 25 cm, but the step at the right end of this wall, which was not uncovered, may be approximately this lesser height of 19 cm. Investigations in the left doorway in the rear wall indicated that the plinth extended along this wall also and is of a width greater than that at the sides. It has therefore been restored as equal to that at the front, about 65 cm. The plinth was restored along the rear wall also, a feature that was not ascertained in the excavations.

At the rear of the building the soil level at present is comparatively level for a space of some 6 m, where a steep and relatively even slope begins, at the top of which is the more gentle slope of the natural hill. While no excavation was done here, and no masonry seen, the deduction from these data is that the uppermost terrace floor continued back to 6 m or more behind the rear wall at which point the natural hillside was retained by a relatively high battered wall.

At the base of the plinth a well-plastered flat floor was found at the front; this is considered to be the surface of the upper front terrace. How far this extended to either side of the structure

is uncertain. But as the present soil surface is practically level for a long distance to either side of the building, it is certain that there were no terraces to the sides and therefore on the restoration this ~~upper~~ terrace has been continued indefinitely to either side.

~~5166.~~ This ~~upper~~ terrace level was 1 m wide beyond the edge of the plinth in front of the building; to the sides it extended towards the back for a much greater width, for 5 m, where a long step or edge of a higher terrace carried it up to a higher level. This step is not on a line with anything else and is ~~1.10~~ m in front of the point where the plinth rises. This step or terrace face is 30 cm high, only a few cm less than the plinth height, so that for this distance of 1.10 m there is only a very ~~this~~ slight difference between the top of the uppermost rear terrace and the anterior portion of the plinth top. The rise in the height of the plinth at the back results in a step of 22 cm height from the uppermost terrace to the level of the rear room at the doorway.

It will be noted in the above that measurements of heights sometimes differ considerably. Floors and levels generally slope considerably and often not equally, and irregular sinking may account for other variations.

The height of the plinth at the front, ~~about 50~~ 40 to 60 cm, is too great to have served as a step at the front entrances where must have been the principal access to the building. There must have been a step, or steps, at the front, dividing this height. Such a step could not have continued across the full front as it would have obstructed the depressed passage in the medial axis. Two short steps have therefore been placed in the restoration, ~~as short steps~~ one in front of each of the right and left front entrances. The sole corroboratory evidence for this is that at one point near the left entrance, a floor was found at a depth of 25 to 30 cm beneath the plinth top, with the vertical face of the plinth running down behind it.

The floor of the plaza is about 3 m below the level of the front rooms of the structure. The slope is rather steep and it is obvious that a staircase of some nature ascended this slope. This was investigated in different years by both of the authors, both of whom found very much destroyed traces of steps but were unable to trace these for any distance or to place them with any certainty of accuracy. As given on the plans, sections and restorations, they are calculated from a few definite points.

The terrace of 1 m width at the foot of the plinth at the front and of wider extent at the sides has already been mentioned. This had a height of about 38 cm. Below this was apparently a wider terrace of 1.70 m width and 37 cm height, followed at its base by four steps of an average width of 40 cm and a height of from 31 to 36 cm. At the base was another broader low terrace of 1.45 m width at a height of 30 cm above the plaza floor. No terminations of this staircase to either side were found and so they have been shown in the reconstruction as extending indefinitely to either side. At present the soil level indicates the same slope for a long distance in either direction, extending towards the northwest practically to the edge of Structure 0-13.

In 1932 some excavations and investigations were followed to the southeast of 0-13. They indicated that a low wall ran from near the foot of the staircase of 0-13 for 21 m from the edge (of the latter) in the direction of P-7. Here it merged into a long low staircase of several steps at a distance of about 49 m from the right wall of P-7. It is likely that these steps are a continuation of the staircase of P-7. They were much disrupted and difficult to follow, but were traced for a distance of 12 m further towards P-7. No search was made for them in the intervening 37 m.

#60-62 withdrawn

Two test excavations were made at the edge of the plaza near the foot of the terrace slope from P-7. As these were the first excavations made in this vicinity their exact relations to the structure and its terraces and staircase were not noted. These revealed slight depth of soil, from 40 to 70 cm, with irregular surface of bedrock below. The soil was in the main dark humus mixed with stones and potsherds. The plaza floor was not noted. A fragment of a human cranium, probably that of a child, was found in one excavation. This recalls the discovery of a mandible at the base of pyramid K-5, and the human bones buried at the base of R-3. The potsherds found were mainly of large, coarse red vessels, but not of the thickest ware. Some were dark and poorly baked, and some buff, but none was thin or polychrome, and few had any traces of painting. The hollow conical leg of a tripod vessel and the arm of a pottery figurine were also found.

(To follow: factual data on debris; summary of data regarding building periods; disquisition on nature of roof; reconstruction of history of structure; temporal relations, etc.

Revise these sections; eliminate repetitions & make more cogent. Rearrange material to make presentation more logical. Transfer some debris data in second part (nature of roof) to first part (nature of debris)

Lut: Please read & criticize on yellow paper copy.

Depths, Contours and Characteristics of Debris.

As the various depths and the nature of the debris found on the floors has a vital bearing upon the nature of the roofing, together with parts of walls, the fall of which obviously produced this great part of the debris, the data upon this subject are of considerable importance.

The depth of debris differed considerably from place to place, indicating different amounts of fallen material. Since the roof had fallen in every room, the variability is presumably due to the proportion of fallen wall, and this presumption is verified by investigation: the higher the standing walls the less the amount of debris. In the left rooms the walls are relatively low and the debris practically in most places reached their tops, while in the right rooms most of the walls stand high, and the debris is of relatively slight depth. This is especially true of the right half of the front room where the front, medial and side walls still retain much of the vault slopes. In the center of this room the debris was only about 60 cm deep; even less, 40 to 60 cm, against the high medial wall; and about 70 cm against the front pier. At the right side the level sloped up to about 1.40 m against the more fallen right side wall, and increased

again in thickness or depth as the ~~depressed~~ sunken passage to the left was neared, ~~and~~ being especially ~~against~~ deep against the front of the ~~sanctuary~~ central chamber where it completely obscured the low doorway and ~~reached~~ covered ~~nearly to~~ the lower ornamental corbice in places, attaining a depth of 1.90 m below the right niche and over 2 m at the left niche. This greater depth was doubtless due to the falling of the ~~walls~~ vaulting above the central chamber. This great depth decreases rapidly towards the ~~sanctuary.~~ front.

In the left half of the front room the debris was deep, due to the more complete destruction of the medial walls, ~~and relatively uneven,~~ ~~probably approximating 2 m throughout.~~ The walls here at least, All walls, apparently fell forward, the anterior piers falling down the terrace slope and leaving a slight depth of debris, only about 45 cm at the inner side of the pier, while the medial wall fell into the front room where, close against the wall, it produced a maximum debris depth of 2.48 m. Here also it decreases rapidly as may be seen in the section in Plate, the depth in the center of the room being 1.60 m.

The debris in the left rear room was somewhat similar to that in the right half of the front room, with a marked depression of slight depth in the center that gave the probably false impression of excavation having been made there at one time. This depth was only about 75 cm. It rose rapidly towards the medial

debris depth of 2.48 m. Here also it decreases rapidly towards the front, the depth in the center of the room being 1.60 m, that against the front pier 50 cm. These relationships may be seen in the section in Plate .

The debris in the left rear room was somewhat similar in distribution to that in the right half of the front room, with a marked depression of slight depth of debris in the center which depression gave the probably false impression that an excavation had been made there at one time. The depth here was only about 75 cm. The debris line rose rapidly towards the medial wall against which the debris reached a height of about 1.50 m above floor level. Here, however, it covered the altar, so that the depth of debris above the altar was about the same as in the center of the room, about 85 cm against the wall, though only 18 cm above the outer edge of the altar. From the center of the room the debris level rose more gradually .....

to the rear wall where the maximum depth was probably about 1.50 m.

The low original level behind the rear wall had been completely filled up, probably by wash from the hill behind, so that it rose gradually from the top of the rear wall, the height of the soil level being 1.94 m above the upper floor of the rear room at a point 1.50 m behind the rear wall.

In the right rear room the debris contour was somewhat different from that in the left rear room and on the whole slightly lower, as the walls remained standing to greater height. It was lowest near the high medial wall, notwithstanding the fact that it covered the altar here, the maximum height being about 1.15 m above floor level and 55 cm above the altar bench. No note was made of any depres-

sion in the center of the room. The debris level seems to have risen gradually to the top of the partially fallen rear wall at a height of about 2.30 m in one place, 1.70 m in another. As the depth of debris was very shallow on the outer side of the rear wall and great on the inner side, it is probable that the vaulting and upper part of this wall all fell inwards. Under the archway at the southern corner of the room the depth of debris was only about 60 cm.

Neither of the rear rooms was completely excavated, but the excavations were more or less complementary, the portions left unexcavated in one room being for the greater part those excavated in the other.

Nature of Debris:

P Very few large vaulting slabs were found in the course of the excavations and almost none in the centers of the rooms where the debris was of least depth, or in the right front room where some of the vaulting still remains on the walls. In the right rear room up to 30 centimeters of fine deposit were found on the floor and beneath the debris of fine stone masonry, this apparently the result of fallen and disintegrated plaster, stucco or concrete. Against

the central chamber much black ash was found on the floor.

With a view to ascertaining the nature of the roof and vaulting, as shown by the debris on the floor, Mr. Satterthwaite made a very careful examination of the latter in several places in both rear rooms and both sides of the front room, on the face of excavation cuts. In every case, except in some places close to the walls, which had evidently thrown the debris further out into the room, the base of the debris ~~from the roof~~ was of the same unusual characteristics seen nowhere else at Piedras Negras. Had a complete section of the roof fallen to the floor to lie undisturbed with its parts in relative original position ~~on the floor~~, the nature and thickness of the roof would have been shown, but doubtless in no case did this occur; the roof probably broke by degrees, allowing material to slide down and to become mixed and often inwerted.

In no case were large heavy slabs such as are common ~~used~~ in vault masonry found directly on the floor. Instead, there was a varying thickness, up to about 50 cm., which contained, mixed under different conditions of superposition, fine lime dust, small limestone slabs, crushed limestone, limestone spalls and potsherds with plaster adhering to them, river pebbles, and ~~lumps~~ thin slabs of concrete made of river pebbles and ~~lime~~ mortar.

The river-pebble or gravel concrete is a feature that has not been found elsewhere at Piedras Negras and that does not occur in standing portions of walls and vaulting of this building. It implies a roof of rather unusual construction and character. The pebbles are from 1 to 4.5 cm in diameter and were evidently ordinary pebbles from the river. This pebble concrete is rather thin and seems nowhere to exceed the maximum thickness of the pebbles contained in it, from 2 to 5 cm. The mortar in which the pebbles are imbedded seems to be whiter than the slightly yellowish mortar ordinarily employed in masonry.

Slab-like pieces of this gravel concrete, always quite hard, were found in several places surfaced with yellow-white lime finishing plaster, perfectly smooth on the upper surface, which was from 1.5 to 3 cm in thickness. In some of these cases there was a third layer which seemed to be integrated with the gravel-concrete on the lower side of the latter. This layer was always soft concrete of the ordinary type of crushed limestone and lime mortar. Because of the softness of this foundation layer it never presented a well-defined under-side, as did the hard gravel-concrete above it, and it was impossible to determine its thickness with precision. However, at one place

a fairly large piece of this supposed roofing surface was found which showed all three layers: finished lime surface on gravel-concrete on crushed stone concrete, the latter lying directly on the well-preserved floor. A stray river-pebble in the lowest layer, otherwise made up entirely of crushed limestone and mortar, confirmed its association with the gravel layer. The total thickness of all three layers taken together was here 15 cm.

This concrete combination was found in some places lying directly on the floor; in other places lime dust and small limestone slabs and blocks lay on the floor, and all these were evidently intimately associated. Larger ordinary vault slabs were rarely found, and only above the level of this mixed layer.

Probable Nature of the Roof

The unusual width of the outer rooms of P-7, over 3.50 m, combined with the evidences of vaulting on the remaining walls and the relatively slight depth of the debris, only 50 cm in places, seem to be mutually ~~irreconcilable~~ incompatible and to challenge interpretation. Maler solved the dilemma by postulating intermediate walls which would lower the vault height, ~~[illegible]~~ lessen the thickness of the roof in places and ~~[illegible]~~ diminish the volume of masonry; this as we have seen is not the case. We re the vaults carried up to an approximate apex at their present slope near the vault-spring, the maximum height of the rooms would have been over 7 m, and the amount of masonry enormous, even granted a mansard outer face as in many of the structures at Palenque. The height of such a vault might have been reduced by the device of stepping out the vault slope in one or two places as was done at Yaxchilan, and the several projecting slabs in a line at ~~about~~ the present highest point of the vault masonry in the medial wall might be taken as ~~[illegible]~~ such a vault offset. But even granted two of these offsets, the vault height would still be over 6 m and the amount of debris on the floor far out of proportion to the amount of masonry required.

The span is greater by 75 cm than the widest vault-span at Palenque (Temple of the Cross), yet the walls are thinner though of equal height, except for the medial wall which is of equal thickness. The span is also greater by 1 m than in any building at Yaxchilan except Structures 10 and 13, and is 25 and 60 cm wider, respectively, than these, yet the walls are of equal or slightly lesser thickness and a meter or more higher. Furthermore, both of these Yaxchilan vaults span short rooms and the wider of these, at least, gains stability from end vaulting. The span is the widest that has come to our knowledge in the early Maya region with the exception of K-5-3d at Piedras Negras which almost certainly was hot covered by a vault. As regards the height of the vault from floor to cap-stones, the maximum known to us is Structure 33 at Yaxchilan, with a height of 5.74 m. Here, however, the span is less, 2.55 m, and the walls much thicker.

Observations and measurements at Yaxchilan and Palenque are from the unpublished notes of Mr. Satterthwaite.

In P-7 we find a unique combination, unparalleled elsewhere or at least in the Usumacinta region, where in the early Maya region, to our knowledge, of wide span, and high and relatively thin walls. This implies either a roof of unusual construction, or very advanced and developed architectural technique, and almost certainly both. All of these features are desiderata as procuring maximum light, air, and roominess. But for the architect they presented a problem of roof stability. In order to span a wider space with a masonry vault he had either to thicken or lower the walls, decrease the margin of safety, or overcome some of the vault thrust by various modificatory devices.

But the walls are, as we have seen, unusually high and ~~relatively~~ ~~thick~~ of average thickness, thicker than some, thinner than others at Piedras Negras. In proportion to their height, however, they are unusually thin, the thickness being 25 percent of the height below the vault-spring; the thickness of the thinnest vault-supporting wall at Piedras Negras is 22 percent of its height, but the span is only 1.65 m.

Calculations of the mass of the hypothetical complete vault, reconstructed from the remaining evidences, indicate that such a vault would have approached perilously close to the point of instability. ~~would have been unstable. Actually it is.~~ The center of gravity would have been beyond the inner side of the walls, and each half-vault would have, ~~tended~~ with but little additional weight on the center of the roof, tended to fall inwards. To correct and overcome this thrust the architect would have sought to lessen the load on the inner side and increase that on the outer side. On the contrary, he lessened the latter by setting the upper facade back for 15 cm. The relatively steep soffit slope employed reduced the thrust force, but this ~~was~~ advantage was eliminated by employing stepped (if any) vaulting.

There are no interior partitions or pilasters to strengthen the hypothetical vault, as the front wall runs for 18 m without any extraneous help, and is ~~also~~ further weakened by three doorways, the central one of which is wider than in any vaulted building in this city.

In summary, P-7 contains unusually high walls which are unusually thin in proportion to height, unusually wide doorways, ~~and~~ an inset upper zone and stepped vaults, if they were complete vaults. All of these are factors reducing the margin of safety

from a point of view of stability, although a completely vaulted building would call for unusual efforts to produce stability. The high walls and inset upper zone are unknown elsewhere at Piedras Negras.

The obvious deduction from these architectural and engineering features is that P-7 could not have had a completely vaulted roof.

As has already been mentioned, the depth of debris in the rooms is very slight, especially in the right wing where the medial wall still stands to considerable height. The greater depth of the debris in the left wing of the front room, and the slight depth in the left rear room indicates that the entire double vaulting of the fallen medial wall fell into the front room. A completely vaulted structure would call for an enormous quantity of debris while the quantity present is actually less than that found in known vaulted buildings of lesser span and height.

The projecting slabs, still in firm position at the top of the existing vaulting, which were found in three places on the right medial and the central chamber walls at a height of 4.60 m might be construed as either a supporting ledge for ceiling beams, or as the lowest course of stepped vaulting. If the latter, it represents the only instance found at either Piedras Negras or at Palenque. It is known at Yaxchilan. On the latter supposition, thick slabs would seem to be required, and those at Yaxchilan are thick, but these are only 5 cm in thickness.

On the high right medial wall the vaulting is preserved to a height at practically uniform level throughout. If the vaulting had continued above this homogeneously it is most unlikely that in falling it would have broken off so evenly,

while the condition is easily comprehensible on the theory that the vaulting never extended any higher than the line now represented by the few projecting slabs. Also the present surface over the center of this vaulting is approximately evenly convex and relatively level lengthwise except at one point where a little was excavated in 1931. This condition would also seem to be unexpected on the theory of the fall of a large body of material, but consistent with that of gradual disintegration of a small amount of material specially constructed to resist deterioration.

Adding these arguments to these based on architectural and engineering features, we feel safe in asserting that P-7 was not roofed with a complete vault. It now remains to discuss the character of the roofing that presumably was employed.

Especially long stone slabs suitable for use as capstones in complete vaulting were nowhere found in the fallen debris though these have been identified in all other vaulted buildings wherever looked for. Large stone slabs such as were employed in vault facing were never found in debris in contact with the floor though in all known cases of fallen complete vaulting they have been found in this position.

The nature of the actual roofing materials is of course best ascertained by a study of the materials lying on the floors of the rooms where the roof obviously fell, though never in perfect original condition. The character of the materials found on the highest points of the remaining vaulting is also of important significance.

The unique feature of the debris is the gravel or pebble concrete which has already been described. This was never found elsewhere in Piedras Negras and is unknown to us from other parts of the Early Maya region. We may recapitulate in stating that it is a concrete of pebbles and mortar, the latter being little more

than a binder and whiter than the usual yellowish mortar used elsewhere in walls and vaults. It is also harder, contains occasional brick-red potsherds and is practically no thicker than the diameter of the largest pebble, ~~about~~ less than 5 cm. A number of these pieces of gravel concrete had on one side a surface of smooth lime finishing plaster from 1.5 to 3 cm in thickness. Other pieces showed the gravel concrete associated with a layer of ordinary crushed limestone concrete which was of softer texture, and in several instances fragments showed all three layers: finishing plaster, gravel concrete -- limestone concrete, with a total thickness of 15 cm.

In our opinion this represents the roofing material, or the upper part of it. The finishing plaster is the same as that universally used for all outer surfaces, walls, vaults, floors, and presumably roofs; some of the roofs at Palenque still retain traces of it. However it is ordinarily laid directly on crushed stone concrete. The gravel concrete that intervenes in this case is excellent roofing material, much harder than the ordinary concrete. The pebbles are naturally much harder than the limestone, the mortar seems to be unusually good, and ~~the~~ a roof built of this concrete would be more impervious to rain and more resistant to disintegration than the ordinary one. The 15 cm maximum thickness noted has been taken as the minimum thickness of the solid roofing material in our reconstruction.

Small limestone slabs or flakes were frequently found in association with the concrete but ~~its~~ their exact relationship is uncertain. The lowest layer of ordinary concrete was never proved to be laid on slabs or flakes and in one case such a flake was found cemented to gravel concrete. In several cases limestone slabs

lay directly under the three layers. The ordinary concrete layer was apparently too soft to retain its grip on larger pieces of stone. Search was made on the highest point of the vaulting for data on this point, but deterioration had been too great for any definite conclusions to be reached. Limestone slabs and flakes certainly entered into the construction below the gravel concrete layer, but whether as a definite layer beneath the ordinary concrete could not be ascertained.

This gravel concrete is, so far as our experience and knowledge go, quite unique; it has not been found in the walls, vaults, roofing material or debris in any other building of the many examined at Piedras Negras, nor on roofs of observed sections of walls or vaults at Palenque or Yaxchilan. Nor does it occur in standing sections of walls and vaulting of the central chamber or the outer walls or vaulting of P-7. It was found, however, relatively in situ, in hard lumps or disintegrated, over much of the surface of the vaulting of the right medial wall, down to the edges, and also on the highest point over the vaulting at the right front corner and at several points, including the highest, on the vaulting above the central chamber. In certain of these places, above the large solid slabs of the hearting, were found not only this gravel concrete but limestone spalls, small slabs with adhering mortar, and some brick-red potsherds with mortar adhering to them, the same elements ~~are~~ were found in the floor debris.

If this gravel concrete layer had formed part of the roofing above complete vaults and consequently at a level far above the present top of walls and preserved vaulting, it is unlikely almost to the point of impossibility that in the fall of the upper vaulting so much of it should have lodged in several places on the preserved vaulting where actually found. ~~It is however~~ Its occurrence here can be explained only on the grounds that it is practically in original position and that a layer of this concrete originally was placed, above the present vaulting at any rate, extending not far above the point where now found.

One possible hypothesis to conform with these facts is that the gravel concrete formed a layer or course running through the interior of complete vaulting. If this were the case, however, we should find in the floor debris of the right, as well as in the left rooms where the vaulting is entirely fallen, deposits of gravel concrete between vaulting slabs, an association that was not found, and also the concrete should show no surface of finishing plaster as it frequently does. ~~We may therefore consider this hypothesis as eliminated from consideration.~~

In the floor debris the gravel concrete is found only under vault slabs wherever these occur and, more important, is often found without any slabs above it. We may therefore consider this hypothesis as eliminated from consideration.

Under any hypothesis, the restoration of the roof must conform to the observed position of the gravel concrete in the floor debris, since all of the roof and most of the vaulting has fallen and lies on the floor at present, or did before excavation.

If this gravel concrete had formed the roof of a completely vaulted unit it should appear mainly near the present surface of the floor debris, underlaid by wall-stones, vault-slabs and cap-stones, though naturally in the collapse of the roof much mingling of material would have occurred. On the contrary the bulk of the gravel was found very close to the floor, within 20 or 30 cm, and if we consider the layer as a whole, together with the crushed limestone concrete, the bulk of it lay directly on the floor. This was the case in all debris, from the shallowest to the deepest. Rarely was the gravel concrete seen above the lower half of a debris deposit, and never on the surface.

In the right half of the front room no large slabs such as were employed in vault facing were found in the debris, suggesting that the vaulting of the medial wall still stands to practically full original height, for what is missing of the vaulting of the front wall fell forward outside of the building. The relatively slight depth of debris in the right rear room also indicates that the entire hypothetical vaulting of the medial wall did not fall into the rear room. Here accurate notes were not taken on the nature of the debris before most of it was removed from the center of the room, but vault slabs were certainly few and probably missing, and, as in the front room, the gravel concrete lay on the floor.

Near the sunken passage the gravel concrete does underlie vault slabs in the floor debris. The quantity of these slabs is insufficient to indicate complete vaulting, and they evidently came from the semi-vaulting above the central chamber.

In the left half of the front room the entire vaulting of the medial wall evidently fell forward, accounting for the comparatively great depth of debris. Therefore vault slabs are naturally found here, but always overlying the gravel concrete. Included among

the vault slabs was a section of intact vaulting with finishing plaster. In the left rear room no note was made of any vault slabs near the medial wall, and here the gravel concrete lay immediately above the bench altar and just above the floor around it. Here were found two pieces of this concrete, one inverted and with its finished surface in contact with that of the other.

We consider that the data and details as outlined above are entirely incompatible with a hypothesis of a complete vault which we therefore consider disproved and non-existent.

Apparently the only solution that is compatible with the observed facts is that of a relatively flat roof and probably a perfectly flat ceiling, relatively broad, borne on the half vaults of the walls at a height but slightly above the present maximum height of the vaults, this maximum being on the right medial wall. We believe that this was the case and have made the restorations of the building as shown in the plates on this hypothesis. The upper part of this roof obviously consisted of gravel concrete with a smooth surface of finishing plaster. The unusual character of this roof required a unique material

of exceptionally durable ~~character~~ nature, which requirement the gravel concrete met, since, as we have seen in the debris, it is always harder than the limestone concrete or the finishing plaster. It doubtless resisted both strains and the deteriorating effects of weather and of plant life better. Probably the mortar binding the pebbles together was made with special care. This layer of gravel concrete was thin, not over 5 cm, and scarcely exceeding the diameter of the largest pebble in it.

Below this gravel concrete and integrated with it was a layer of softer ordinary crushed limestone concrete. Below this was probably a ~~thin~~ thin layer of small limestone slabs, though these may have been incorporated in the limestone concrete. As the maximum observed thickness of this complex was 15 cm, this has been taken in the restoration as the ~~maximum~~ minimum thickness at the edges of the roof. In order to obtain a rain-shedding slope without disregarding known levels of surviving masonry, we have assumed that the concrete cap increased in thickness towards the center. The amount of this slope as shown in our reconstructions is purely arbitrary. It is made less than those observed on a number of

buildings at Yaxchilan and at Palenque for two reasons. Those buildings are much narrower and could support a greater thickness of roof; if the slope here had been equal to these it seems probable that the masonry over the center of the medial wall would have been carried to a greater height than that found.

One of the weak places in our argument is that the debris gave no indication of the nature of the material that supported this broad, thin flat roof of solid impervious material. Obviously it could not support its own weight without strengthening beams, even if it could have been constructed without foundation which is, of course impossible. Even though no charcoal or other traces of wood or straw were found, and no concrete with impressions of these, we believe that the roof was supported as were and are houses with flat ceilings in the highlands of Mexico. That is to say, a ceiling of timber beams which we estimate at 15 cm average diameter was first laid. At right angles to this and above it was a layer of smaller beams of not over 10 cm diameter, and above this, parallel to the main beams, a layer of twigs, matting or straw on which the concrete was laid, possibly with a thin layer of limestone slabs intervening. The total thickness of this roof as restored varies from 35 cm at the sides to 70 cm at the ridge.

We presume these lowest timber beams to have rested on the course of projecting slabs, a few of which were found at three points, still firmly imbedded, at the top of the masonry of the medial wall and at the corner between this and the central chamber. The possibility that this projecting course represented an offset in the vaulting has already been considered and rejected. The height of the bottom of the ceiling beams was 4.55 m above the floor near the medial wall in the right front room. Due to the slope of the floor it was probably somewhat greater at the front, and of course about 85 cm less in the rear room where the floor was at a higher level.

The supporting beams presumably lay across the narrower dimensions of the room, from medial to exterior walls. According to our reconstruction they would have had to be about 2.50 m long, the width of the flat ceiling about 30 cm less.

A roof of this nature will satisfactorily account for the characteristics of the debris: slight depth where walls are still high, gravel concrete on or near the floor, and relative absence of vault slabs, and also for the gravel concrete on the top of the medial wall, and for the great height of the latter. It is probable that the collapse was more gradual than in the case of a completely vaulted building. Probably the roof held relatively tight and free of large vegetation until the beams rotted or fell prey to termites and broke. The beams would break at intervals, allowing cracks and holes to form in the solid cap; often the broken end would fall and slope while the other end remained imbedded in the wall, thus causing the broken roofing material to slide into a heap and become mixed. The concrete with the now entirely decayed vegetable material would lie directly on the floor to a relatively slight depth. The slight stress produced on the walls and vaulting by the more or less gradual fall of the relatively thin roof layer would have less tendency to topple them than in the case of completely vaulted buildings, and so the medial wall remained almost intact. Possibly the other walls did not fall till after the roof had entirely gone, so that the stones from the upper vaulting would always overlie the

gravel concrete. Where the semi-vaulting did not fall, or fell outside of the building, the debris depth would remain slight, as it does in the right half of the front room.

Oviously after the roof fell, some gravel concrete was still left above the vaulting, as it is at present on the ~~left~~ right medial wall, and when this fell a little of this would be precipitated at a higher point than the gravel concrete from the roof proper. This will actually occur when and if the right medial wall falls. It did happen in the left half of the front room where only is gravel found more than 60 cm above the floor; here it is found at a height of 1.80 m.