

4-1-1985

# Settlement and Community Patterns at Sayil, Yucatan, Mexico: The 1984 Season

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## Recommended Citation

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# LATIN AMERICAN INSTITUTE

Research Paper Series No. 17 April 1985

Settlement and Community Patterns at Sayil,  
Yucatan, Mexico: The 1984 Season

by

Jeremy A. Sabloff, et al.



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## Settlement and Community Patterns at Sayil,

### Yucatan, Mexico: The 1984 Season

#### I. INTRODUCTION

A tourist goes to the famous site of Teotihuacan, just to the northeast of modern Mexico city, with a very well informed guide. At the site, he asks the guide: "How many people used to live here?" The guide responds: "On the basis of the work by Rene Millon, William Sanders, and archaeologists from the Instituto Nacional de Antropología e Historia, among others, it is probable that by A.D. 500, there were at least 120,000 people living at Teotihuacan." "Did they have any industries?" the tourist asks. "Among other pursuits," the guide answers, "they mined obsidian nearby and had obsidian workshops where they manufactured a variety of tools." "And their agricultural system?" the tourist continues. "The Teotihuacanos had an intensive system of agriculture based on canal irrigation," says the guide.

Some days later, the same tourist and his guide arrive at the ancient Maya site of Uxmal in the Puuc hills region of the Northern Maya Lowlands. "How many people used to live here?" the tourist asks. "We don't know," replies the guide, "but they built alot, didn't they?" "What did they manufacture here?" the tourist questions. "Uh, no one is sure," says the guide. "Well, what about their agriculture?" queries the tourist. "Oh, probably a combination of techniques, but the nature of ancient agriculture here is rather unclear," answers the guide. "Is more known about other Puuc sites such as Sayil, Kabah, and Labna?" "Well, no, even less, I'm afraid."

The lowlands of the vast Yucatan Peninsula, where ancient Maya civilizations flourished for 2000 years until the Spanish Conquest in the 16th century, are conventionally divided into the wet tropical Southern Lowlands of Guatemala and Belize and the dry tropical Northern Lowlands in Mexico. The apparent peak of Maya civilization, or at least of archaeologists' attention to it, is in

the Southern Lowlands in the centuries before its collapse around A.D. 900 (the Classic Period), with thereafter the finest remains occurring in the Northern Lowlands, especially in the Puuc (i.e. hilly) region in the northwest corner of the peninsula. Our attention has been brought to this Puuc region in part because its florescence spans the critical A.D. 800-1000 period during which great, if not cataclysmic, changes occurred in the course and locales of Maya civilization and its people. This region should, therefore, offer a most constructive contrast to the chaos of other contemporaneous and, so far, better studied regions. Furthermore, study of the dwelling places of the people should provide evidence not only for just how many they were and how they lived through those tumultuous times, but also for their trade with and possible origins from other regions, and even, perhaps, evidence that they had a significant role in the changes occurring there.

Although thousands upon thousands of tourists each year visit the Puuc region and admire such architectural triumphs as the Palace of the Governors, the Nunnery, and the Temple of the Magicians at Uxmal, the Codz Poop at Kabah, the Great Palace at Sayil, or the Mirador at Labna, the size, population, and make-up of these and other Puuc region sites (see Figure 1) remain uncertain. As soon as one moves away from the great buildings in the centers of the sites, archaeological understanding of these sites drops precipitously.

Unlike the situation at other Maya sites like Tikal or Seibal in the Southern Maya Lowlands, or Dzibilchaltun or Cobá in the north, there never has been an intensive settlement pattern study at any of the Puuc region sites. The recent settlement survey of a part of Uxmal by Alfredo Barrera Rubio, the salvage studies at



various Puuc region sites by the Centro Regional del Sureste of the Instituto Nacional de Antropología e Historia (I.N.A.H.), and the publication of the Atlas Arqueológico del Estado de Yucatan (Garza T. and Kurjack B. 1980) have all provided important new information about aspects of settlement in the region, but without large scale and systematic settlement pattern studies at and between Puuc region sites, knowledge of these sites and the region as a whole will remain surprisingly limited. Yet there are compelling reasons why such studies could potentially provide much data relevant to a number of pressing questions in Maya archaeology. It is generally recognized that the famous sites of the Puuc region played a crucial role in the development of ancient Maya civilization. But without new research which looks beyond the well-known elite architecture of the Puuc sites, the nature of this role will remain shadowy.

As a first step towards rectifying the long-standing neglect of settlement pattern research in the Puuc hills, a study of ancient Maya settlement and community patterns at the site of Sayil was initiated by the University of New Mexico in 1983. To date, two field seasons, an initial reconnaissance in May-June, 1983 (directed by Sabloff) followed by an intensive survey in February-May, 1984 (directed by Sabloff and Tourtellot), have been spent at the site. Further fieldwork is anticipated.

Sayil was chosen for study for a number of reasons. Among these are, first, its location in the core of the eastern Puuc region, halfway between Kabah and Labna. Second, it is one of only two rank 2 size sites in the eastern Puuc region (Garza T. and Kurjack B. 1980; see Figure 2 here) and hence promised to be "impor-

tant" without being of unmanageable size. Third, it has not had either the tourist development of Uxmal or the modern disturbance of Oxkintok, for example. Fourth, all previous studies point to the probability that the bulk of the occupation and visible architecture at Sayil dates to the relatively short time span of the Terminal Classic, or Florescent, period (customarily dated A.D. 800-1000). Fifth, the site was recommended for research by the Centro Regional del Sureste and is located near the existing I.N.A.H. field camp at Uxmal. Sixth, there is a very good but partial map of central Sayil made by Edwin Shook in 1934 under the direction of the late Harry Pollock during the latter's major survey of Puuc architecture for the Carnegie Institution of Washington (Pollock 1980).

While the 1934 map was the best coverage available for any Puuc region site, it concentrates on the site center and does not offer much information on non-elite settlement. As Pollock (1980: 85) forthrightly states: "Many small structures that presumably were dwellings are not shown on the map." Given this background, it was decided that one of the principal goals of the Sayil research would be the preparation of a large-scale map showing all the identifiable cultural features visible on the surface.

The Sayil project also has a series of long-term goals. These goals are (1) to determine the nature of the adaptation of Sayil's former inhabitants to the little known Puuc hills environment, focusing on their patterns of land and water use, (2) for the first time to classify and assign functions to the full range of features and structures of an ancient Puuc community, concentrating on the long neglected small feature clusters or households, (3) to reveal, analyze, and codify the population and internal organization of a

Puuc community and model its sociopolitical organization, and (4) to delimit the organization of Sayil and its relation to neighboring sites.

To realize these goals in our overall study, the Sayil project has four subdivisions or programs of investigation: survey and mapping, excavation, historical research, and environmental research. The **survey and mapping** program has as its objectives (A) total survey and mapping of the built-up area of Sayil, an area now estimated as measuring 1.5 by 2km (Figure 3; this is project phase I on which we are now engaged); (B) reconnaissance or narrow transect surveys out to all known nearest neighbors, including the major site of Kabah 8km distant, Xlapak, and five previously noted but virtually unexplored minor (?) centers at distances of 3 to 6km, begun this past year; and (C) site periphery survey in the area surrounding Sayil (if needed as a supplement to the intersite transects).

This report presents mostly the results of our ongoing phase I operations. It reveals the extraordinary richness of data that can be obtained just from surface indications, with hardly a spade entering the ground, although excavation in depth and breadth really will be needed to help answer the broader questions concerning the place of Sayil in time, in its region, and in its influence within the Puuc region.

The second major program of investigation at Sayil is settlement **excavation**, Phase II of the project. Our long-term excavation objectives include (A) a major effort at total excavation of selected feature clusters, validating their surface signatures and testing whether most of them constituted the primary domiciles for

the vast bulk of the population. We intend to focus a large part of this effort on innovative horizontal exposure in and across broad "open" areas or house lots beyond the hitherto seductively visible features of architecture. We hope to add to the short list of presently documented ancillary (non-dwelling) structures and activity areas as well as possible hidden chultuns (water cisterns) and burial chambers, while supplying the items and contexts for ceramic and artifact analysis in support of chronological and functional differentiation. Selection of feature clusters for broad excavation will be based on a stratification of feature clusters by topographic location and architectural composition in order simultaneously while contributing to our understanding of socioeconomic variation among basic social segments (families or perhaps minimal lineages).

(B) Excavation of several examples of each structure type defined from mapping, preliminary description, and the feature cluster exposures, primarily for the purposes of validation and identification of former use. This strategy may not be required if sufficient returns are forthcoming from the feature cluster exposures.

(C) Chultun, aguada (reservoir), and ring (circular stone) structure measurement and test excavations promise an exciting approach to the study of ancient water supply technology: its incorporation into feature clusters and perhaps into political economy, its volumetric analysis for the purpose of population estimations, and the light that chultun excavation may shed on why such an ingenious system was apparently abandoned after only a few centuries. Study of these water works and perhaps especially their failure (?) may contribute knowledge useful to modern regional development plan-

ners as well as to the understanding of the process of Yucatecan cultural development.

The **historical and ethnographic literature search** program, in progress, is serving (A) to investigate post-Conquest statements concerning agricultural and water technologies, organization, and patterns of use, focused on the Puuc region which was once known as the "granary of Yucatan" (Matheny 1978; Patch 1979; Barrera Rubio 1982); (B) to compile and analyze statements relating to Maya domestic life, the construction and maintenance of buildings, and the tools employed in each task, with the aim of constructing activity sets with material consequences to be tested against the archaeological finds; and (C) to acquire historical data on types of social, political, and economic organizations in Yucatan in order to isolate the range of responses and to serve as stimulating analogs, transforms, or contrasts to the ancient Maya of the Puuc region.

In the **environmental research** program, our objective is to record and learn more of the culturally relevant aspects of the little known Puuc hills natural region and the setting of Sayil by (A) our own topographic mapping in conjunction with the site survey, as no base map is available; (B) collection of new data through observation of the countryside, old aerial photographs and maps, reconnaissance, and questioning of local people; (C) assessment of environmental features and potentials along the 8km Sayil to Kabah transect started this year (i.e., on an axis perpendicular to the grain of the landscape) and along other intrasite and intersite transects; and (D) engaging the interest and services of specialists in soils, agriculture, and karst terrain for specific studies

working from our base map. These studies are helping us to better define and explain the locational choices of the ancient Maya, the local settlement features, and the skewed distribution of sites in the eastern Puuc region (larger sites north of Sayil and apparently only smaller ones southwards).

## II. OVERVIEW

Survey and mapping at Sayil are no easy matters. Heavy secondary forest growth in parts of the site limits visibility, while the large number of vines and spiked plants makes passage quite difficult. In addition, the thick cover of dead leaves on the ground, in the latter part of the dry season in particular, slows down surface examination, while the thinness of soils in certain zones and the widespread presence of natural limestone outcrops often make the discrimination of natural from cultural features an exacting chore. On the other hand, the general lack of deep deposits does help considerably in making cultural features observable in surface surveys. These caveats aside, research at Sayil has progressed very well.

As mentioned above, it is now estimated that the urban zone of Sayil covers slightly more than 3,000,000 sq m (or 3 sq km). To date, the Sayil project has intensively surveyed, mapped and recorded 1,041,000 sq m. (Figure 3). When added to the 360,000 sq m of well-surveyed zones on the 1934 map prepared by Edwin Shook, a total of 1,401,000 sq m has now been intensively mapped. In addition, the project has reconnoitered another 217,000 sq m and has examined selected areas up to several kilometers removed from the center of the site. The mapping procedure consists of a four-phase operation

discussed below. The use of two EDM theodolites during the 1984 field season considerably speeded up the survey. Because of a determined effort to survey radial strips from the "central" causeway (or sacbe in Maya), we now have information on settlement in all four cardinal directions.

The 3+ sq km zone of intensive occupation lies for the most part in a large valley bordered by a series of steep conical hills (uitz) 20-50m in height. Settlement also is found on the slopes and tops of this ring of hills. A number of the slope and hilltop platforms are of large size and sometimes support vaulted buildings. Some terracing also is found on the hills. Generally speaking, vaulted structures are not found in the areas beyond the first ring of hills, and platforms on the tops of the hills of the second ring support simpler structures than those on top of the first ring. It also should be noted that all multi-storied vaulted structures are near the central sacbe. It must be stressed that occupation does not definitely cease beyond the first or second rings of hills. Rather, it appears to become less dense, and the character of the settlement appears to change almost exclusively to chich (cobble) mounds alone (particularly in the north). The possibility that such scattered occupation continues all the way east to Xlapak and Labna and north to Kabah will receive future attention.

In addition, several large, substantial groups of buildings are found well away from the central zone of settlement. The role of these outlying groups is unclear at the present, because they have not yet been linked to Sayil by continuous transects, but they may be dependent parts of Sayil's settlement. The largest of these groups (Figure 3) is located 1.7km to the northwest of the Great

Palace. It is likely that it is the lost site which Stephens (1963) visited near Chack (Chac) in 1843. To anticipate, it includes a three-story building with a view of Sayil's Great Palace, several other vaulted structures, and the only sizable pyramid known in the vicinity of Sayil, all ranged around a huge elevated plaza.

Within the central zone of the site, the settlement pattern appears, at first glance, to be haphazard with the locations of settlement scattered like paint drops flicked from a brush. Further examination, however, reveals the presence of substantial patterning. The newly observed changes in settlement between the first and second ring of hills, and then beyond, have just been mentioned. There also seems to be a large grouping of "elite" standing architecture in the southwest zone of the site and hints from Shook's map of a similar zone in the northeast. Three of the four multi-story buildings cluster at the north end of the causeway. Another apparent zone of vaulted architecture off by itself was reconnoitered in the southeast at the end of the 1984 season. Densely occupied zones with few stone buildings also occur.

Preliminary correlations between settlement and geographic-topographic features can be seen, too. For instance, there may be a relationship between soil types and settlement that needs further study. The location of natural depressions which could be enlarged into rainy season reservoirs or aguadas additionally influenced settlement. But the single most significant aspect of the topography for settlement location appears to be the outcrops of limestone which protrude above the surface in many parts of the site. Their particular significance rests in their use for underground



water cisterns (known in the Maya area as chultuns), because local inhabitants were almost entirely dependent on stored rainfall to supply their needs during the long drought season every year.

Excavations were undertaken in six "feature clusters" (our principal map reference unit) primarily to explore some of the enigmatic yet common chich (cobble) features and to provide data preparatory to full scale excavation in later seasons. A complete type:variety ceramic analysis indicates a 1500 year long sequence, but nearly 98% of the sherds are Terminal Classic (Cehpech Horizon). The 6000 sherds are 99.98% domestic.

### III. MAPPING

#### Mapping Conventions

Sayil is being surveyed in 100m squares under control of a magnetically oriented north-south baseline and grid system. After scanning the valley in which Sayil lies, we designated the baseline as East 5000 meters (E5000 for short). The point at which the baseline intersects the origin of the 1983 West Transect (originally labelled North 0 West 0) has been designated North 8000 meters (N8000), for the valley seemed to extend much farther south than north of the center of Sayil. The resulting imaginary origin point 8km south and 5km west of this intersection was chosen as the 0 point so that all points on our main map of Sayil could be designated with positive numbers within a grid coordinate system that was chosen as the means for designating archaeological feature clusters (the basic reference unit for locating features). This system has allowed us to readily locate or list features and calculate distance functions from specific points or lines for various categories of

architecture. Contour intervals are given on the map in meters above sea level. Edward Kurjack and Tomás Gallareta N. of the Centro Regional del Sureste (I.N.A.H.) courteously obtained the location and approximate altitude (70m) of our N8000 E5000 point on the flat valley floor through the use of the Centro's Magnavox Geociever.

#### Field Survey Procedures

Most of the surface of Sayil has been under milpa (swidden field) at sometime in the recent past (areas that were in milpa from one to twenty years ago have been pointed out to us, while aerial photographs from the 1940s also show numerous milpas in and around the archaeological zone). The far from virgin Yucatecan dry forest here usually consists of a dense thicket of small trees (under 10cm in diameter and 10m in height), bushes, vines, and a diabolical variety of spines. The ground surface consists of either a very flat red soil in the center of the site and between major rock outcrops, or a broken landscape of perilous limestone boulders, outcrops, and abrupt hills (uitz) with pockets of thin brown soil. Early in the field season of February through April, the foliage is dense but the ground is relatively clear; however, as the season advances many leaves drop, improving lateral vision but increasingly obscuring ground details.

In order to deal with this environmental situation, we have refined and implemented a four step survey procedure to find and map archaeological remains:

1. Setting stakes. Traverse lines, consisting of stakes at exactly 50m intervals, are placed along straight trails (brechas)

cut through the forest by two workers apiece under the direction of archaeologists employing an EDM theodolite. The main traverse lines are set off from the main north-south site baseline on 200m intervals. Cross-brechas are cut every 100m to form a grid pattern of 100m square survey blocks or quads. The grid has the purposes of giving us access to the pathless forest, exposing ruins to view, and serving as a control on survey locations.

2. "Cruising" quads. The staked grid yields quadrangles 100m on a side (one hectare in area) that are each examined by a team consisting of two archaeologists and two workers to cut subsidiary trails. The team walks back and forth across the quad from the stake lines outlining the quad, making a sketch map of the contours, outcrops, rubble, ruins, and modern features encountered. A linear series of these quads, usually five or ten in number, form a transect.

3. Mapping mounds. After examining the sketch maps to estimate the quickest way to map the squares in a given transect, a team of two archaeologists (surveyor and recorder) go forth with two or three workers to hack out sight lines from stake positions to stations and features and to map them in detail with an EDM theodolite and portable drafting board.

4. Recording features. When each cluster of ancient features has been mapped, its site coordinate is determined, the features within the cluster are internally numbered, and their architectural and artifactual attributes are recorded on Fortran forms by the mappers. The data are later entered in a microcomputer database for reference and into a mainframe for processing.

### Evaluation of EDM Theodolites

The project used two theodolites having electronic distance measuring (EDM) capability, a Leitz (Sokkisha) SDM 3E with manual entry keyboard and a Zeiss RSM 3 with automatic slope reduction and change of elevation readout. The across the board advantage of theodolites over any transit is the fact that they have direct reading angular scales rather than verniers, and self-indexing vertical rings. Speed and accuracy are thereby increased along with less fatigue in use and the likelihood of fewer errors. These advantages are nice, but the really impressive advantages lie in the awesome EDM technology. Both machines read great distances (e.g., 1.7km to Chac), but in the closed forest cover that is not their most valuable asset. Rather, it is the complete avoidance of the optical and manual problems of stadia work by the use of reflecting prisms instead. There are none of the visual problems of reading and counting stadia marks, or dealing with bubble levels, parallax, haze, shimmer, and gross loss of accuracy on long shots. The harmless laser beams, especially on the Leitz, also have the vital ability to get distance readings through minute gaps in foliage with a minimum of bush clearing, otherwise the slowest operation while mapping in the Maya Lowlands. Furthermore, with either the Leitz keyboard or the Zeiss automatic entry, one gets immediate readouts of corrected horizontal distance and change of elevation. These readouts then allow rapid setting of predetermined stakes on rough terrain or simultaneous lap table mapping, with no laborious or postponed calculation. Thus, surveyers maximize the use of their daily time in the field and the need for resurveys is reduced.

One disadvantage is that theodolites lack magnetic compasses, so the setting of the azimuth ring had to be accomplished either by backsighting when working on stake traverses or through use of a hand compass when free field mapping. The Leitz has an accessory trough compass that was useful after it was calibrated to our baseline, so that machine tended to be used for ruin mapping while the Zeiss was used to set stake lines. The Zeiss is apparently very sensitive to the state of its battery charge and/or to high temperatures, as its output slowed considerably as the day wore on (from about 3 to 10-15 seconds per distance reading). Its battery power was hard to conserve compared to the Leitz because shutting the Zeiss off cancelled out its vertical angle indexing. We always dismounted the instruments from their tripods when changing stations because the tribrach spigot locks look weak and the rocky ground surface is treacherously slippery. It also can be noted that the Zeiss case is not only big, but has aggressively protruding ribs.

For instruments of such high precision, it is amazing how imprecise are the adjustments of the prism rods: there are no scales on the rods to measure extension, no marks for calibration against the height of the instrument telescope, and a minimum length of 139cm that was higher than some instrument setups on slopes or rocks and too tall for shorter people. We further noted that the pointed tips of the rods, fine on rocks, sink easily into soft ground (altering change of elevation readings on turning points).

In sum, the two machines really worked nearly flawlessly, only occasionally making spurious readings, and were of great benefit to the project. They contributed substantially to more than doubling our survey productivity.

#### IV. PHYSICAL ENVIRONMENT AND SETTING OF SAYIL

##### Situation

As a result of the past season's survey we are in a better position to describe the Sayil environment. Sayil is situated in a strongly karstified landscape with no surface water at all. The core of the site lies at the north end of a large north-south trending valley. The center of the valley is very flat with strongly reddish, clayey soil (kancab in Maya) about one meter deep overlying bedrock. The soil is of lesser value for agriculture than other nearby soils. As one moves away from the valley floor, the ground gradually rises on all sides with numerous rock outcrops. The margins of the valley are defined by rings of rounded cone karsts (haystack hills, or uitz). These hills grow progressively higher as one moves away from the center of the valley, with intervening small valleys or glades of sinuous shape whose soils appear to be of better quality than those of the main valley floor. No tower karst (turnkarst) or pinnacle karst features have been seen.

Of the six types of hillslopes on tropical "cockpit" cone karst recognized by Aub in Jamaica (cited in Sweeting 1973:276), three are frequently encountered on the Sayil uitz mapped to date:

(a) "Staircase slopes made up of ledges and vertical steps. The steps are up to 2-3m high and bedding planes are conspicuous." These stepped outcrops could be readily quarried.

(b) "Steep even slopes [on which] the honeycombed limestone is covered with loose limestone fragments and large blocks." This type is far more common at Sayil than (a) and is usually found on upper slopes.

(c) "Scree slopes, covered by small broken material." This type aptly describes the slopes of which cobbles commonly found near the bottom of uitz hillsides.

It also should be noted that the uitz at Sayil often have a heavier soil mantle than suggested by Aub's terms.

Small-scale karstic solutional and weathering features are ubiquitous at Sayil. Such features are collectively known as karren or lapies. A common form of karren on some rock outcrops at Sayil is rillenkarrren (small rounded troughs separated by fine sharp ridges), most noticeably taking the form of "crinkling" or myriads of "vesicules" 1-2cm in diameter. These rocks consequently have an extremely hostile surface. Their formation may be due specifically to intensive rain-beat, and elsewhere rillenkarrren have been observed to form very rapidly "in the space of a few months or years" (Sweeting 1973:81).

Two consequences of these crinkled rillenkarrren are that such erosion is likely to be found on ancient archaeological items (wall stones, carvings, artifacts), and that crinkled finishes on these items may not be original. Many of the pilas (artificial stone basins) at Sayil have this crinkled finish both inside and out, whether upright or inverted, making it difficult to be sure of their former appearance and hence type of use. Since both these pilas and some wall stones have crinkling all over them, the action of more than just rain-beat on one exposed side also would seem to be involved. Because the original forms, but not surfaces, are obviously preserved on these items, their corrosion cannot have proceeded very deep into the stone, however rapid the initiation of rillenkarrren.

Most rocks and outcrops at Sayil do not have a crinkled appearance, probably because solution more usually causes outright slow disintegration.

Observations on other forms of karren, especially the smoother forms shaped beneath a former soil cover (rund-, hohl-, and deckenkarren) may allow us to detect areas of recent soil denudation.

Solution basins (kamenice, potholes, sartenejas, or haltun in Maya) are an important karren type because larger and deeper versions, on exposed rock, can each hold several gallons of rainwater sufficient for human needs (Stephens 1963,II:3). The bowl-shaped or tubular sartenejas are produced by solution in stagnant pools of acidic water. Since they can grow at rates of 3-5cm per decade (Sweeting 1973:85), ones visible today need not be ancient (although others were presumably present long ago, too). Because they often occur in groups on only some fine-grained outcrops, these karren must be largely dependent on the occurrence of certain restricted lithological characteristics of porosity and texture.

Kluftkarren (or cutters) are deep clefts or fissures in exposed bedrock that have been widened by solution (and perhaps root action). Their importance here is that large boulder-size blocks of stone are thereby produced which ought to have been easily quarryable for use in construction. Also, these boulders can be seen apparently broken down into stone blocks, smaller stones, and eventually chich through processes of natural (rain, sun, root action) and anthropogenic (swidden fire) weathering. These products of entirely natural or accidental processes can be mistaken for ancient human terrace construction or quarrying activities.



Another point about karstification and the geomorphology of Yucatan is vital. The soft sascab often found beneath the exposed rock surface is the weatherization front of water percolation and chemical solution moving downward through the limestone rock. The hard caprock overlying it at the surface is actually a secondary redeposit of calcium carbonate case hardened by excessive evaporation (calcrete or caliche) (Sweeting 1973:279-280, 293-296; Wilson 1980:11). That is, the presence of sascab has little to do with the original stratification of limestone. Yet the presence of sascab was apparently essential if the digging of chultuns (cisterns) was to be feasible.

How did the ancient Maya identify places with sub-surface sascab suitable for excavating chultuns? Did they build their houses only after probing had found sascab? (Can we identify unsuccessful probes? Is there something characteristic about unoccupied outcrops that differentiates them from those with structures on them?) It is fairly clear from the genesis of the caprock and from our pit exposures that sascab is unlikely to occur beneath the thick kancab or terra rossa that covers the broken surface of the underlying bedrock in the floor of the valley. Indeed, we have no examples of chultuns penetrating the valley soil. (However, the deep well, now dry, at historic Rancho Chac is located in a valley, but was apparently cut under different technological conditions, namely with gunpowder and iron tools.) More research on these important questions obviously is needed.

Larger in size than karren are the two areas we have dubbed "lunar landscapes," chaotic areas many meters across that consist of broken and tumbled limestone boulders. These features are perhaps

to be identified as collapse dolines in the terminology of karst geomorphology. Collapse dolines (sinkholes or cenotes) are small enclosed depressions tens of meters in diameter formed by large-scale collapse of cavern roofs (Sweeting 1973:64-69). The "lunar landscapes" at Sayil, however, are very shallow and may result instead from shallow cavitation processes in soft sascab that eventually so undermined the hard caprock laterally that it collapsed in chunks. We suspect the process is natural, perhaps originating in a honeycomb of sartenejas or kluftkarren, and did not result from quarrying, because the collapse boulders form a continuous layer (as distinguished from the numerous and more obvious sascab quarries [sascaberas] with hollow centers where the caprock was removed). At present, we have no idea whether this chaotic terrain was present when Sayil was occupied.

There are no true cenotes, or sinkholes reaching to the water-table, at Sayil. There also are no known rockshelters, caves, or caverns. The nearest cavern is the tortuous Gruta de Chac near the intersection of Federal Highway 261 and the "Zona Arqueologica Puuc" highway that passes Sayil (Andrews IV 1965). It is located 3.6km northwest of the Great Palace at Sayil.

Filled sinkholes or aguadas also can occur in karstic country due to entirely natural causes. Aguadas are "Large, usually gently sloping depressions having soil-mantled slopes containing a shallow pond with a clay bottom" (Wilson 1980:15). No aguadas with standing water occur near Sayil. Two probable dry aguadas or reservoirs were located on East Transect I, both with low soil berms and channels. Only the deeper eastern aguada has a dimple on its floor that might

signal a connection either into a sinkhole (swallow hole or ponor) from which waters also might rise seasonally as a spring, or into a former chultun. This aguada, curiously, is aligned with several natural shallow sinkholes along the base of a neighboring uitz.

As a feature, it is not clear whether the Sayil valley itself is a very large karst doline, an uvala or interlinked series of dolines, or a karst marginal plain or polje. The latter are flat valleys with accumulated impervious floor deposits and surface fluvial modelling, set off from surrounding hilly terrain by lateral (often flood) corrosion on tectonic dislocations (faults and block movements) (Roglić 1972; Sweeting 1973:202-207; Janucs 1977:136). Conclusions with any validity at this level of analysis require a geological study, which we hope to have undertaken in a later field season.

### Siting

Having described the environmental situation of Sayil, it also should now be fairly clear how it is sited within that situation, on the floor and slopes of a large valley. Somewhat puzzling, however, given the great importance of scarce water in the Puuc region, is the fact that Sayil, and, indeed, all of the great Puuc sites, are not themselves built directly around the available natural permanent water sources. The nearest such source to Sayil is the Gruta de Chac, 3.6km to the northwest. Note, too, that Kabah is some 5km farther to the north of the Gruta, while Xlapak, Labna, Nohpat, and Uxmal are even farther from known permanent sources (Figure 3). From the Gruta de Chac it is about 19km to any of the nearby permanent water caves (see Figure 3): Xcoch past Santa Elena

(Stephens 1963,I:211-217), Loltun near Cooperativa (Mercer 1975:98-125), and Xtacunbil-xunan near Bolonchen (Stephens 1963,II:97-104). Perhaps significantly, the same settlement pattern existed in the recent past and persists today: the 19th century Indian ranchos of Chac and Xcavil lay 1 and 4km east of the Gruta de Chac, and of course the three modern towns mentioned above also are not sited directly about openings to underground water.

What was and is going on? First, it seems likely that flat land and good soil were more important to the siting of a settlement than a natural water source immediately at hand. Land was the primary factor and availability of permanent water "nearby" only a secondary factor. As one example, note that Uxmal has no known permanent water source anywhere nearby. For another example, the Maya inhabitants of Rancho Xcavil, when asked by John Stephens' party why they did not move elsewhere rather than arduously draw and carry water in gourds from the Gruta de Chac several miles away, "said their fathers had lived there before them, and the land was good for milpas" (Stephens 1963,II:4, emphasis added). From our visits to the various sites mentioned above, it does seem likely that all are located on relatively flat terrain. However, the site centers may not be sited directly on the very best soil. Second, there is some settlement around the permanent water sources, for example the huge pyramid at Xcoch (Stephens 1963,I:212) or a small vaulted building complex west of the Gruta de Chac that we visited this year. The significant point may be that it is major concentrations of architecture that are often missing about the water caves, as if the latter were deliberately avoided.

Third, it may have been an important ecological aspect of

sociopolitical organization in this part of the Puuc region that one of the most critical resources, permanent water available throughout the dry season, was not directly built upon in a major way. In other words, there is no evidence to date that these water sources were controlled or monopolized in a regular way that was materially expressed by the construction of major architecture close about them from which supervision and control would have been exercised. Is it not possible that this apparent pattern was deliberate? Did the peoples living in the region and using these sources purposefully avoid conflict over these vital water sources by concentrating their habitations and activities elsewhere and sharing rather than monopolizing access? If so, then it could be further speculated that one operative sanction to protect equal access might have been religious beliefs investing the water caves with a sacred aura that it was anathema to violate. There are reports of numerous beliefs, rituals, and other practices focused on water (rain) generally and cave waters in particular (Mercer 1975; Thompson 1970, among others), although none explicitly deal with insuring access or sharing of water.

Another possible explanation of the pattern of avoiding water caves, if deliberate, would be some form of overarching central power that enforced the apparent lack of local monopolization of the water caves. However, Kurjack, Garza T., and Lucas (1979) already have noted the rather extraordinary situation whereby Uxmal, Nohpat, and Kabah are not only linked by a causeway (not a rare event in Yucatan) but are also sites rather more similar in apparent size (in the absence of anything like full settlement maps) than is usually

the case for sites linked by causeways. They judge, from the relative equality of these linked sites, that "centralized authority could not have been as well developed as some Mayanists would expect" (Ibid.:40). The presence of some political and economic situation that we do not yet comprehend is suggested by the observations that permanent water sources were avoided as major settlement loci, that numerous more or less equal-sized sites exist in the region, that some were linked by causeways with little apparent evidence for dominance of one partner over the others, and that major sites like Uxmal appear to have been built just off the richest soil areas (modern irrigation projects are all to the north of the Uxmal-Nohpat-Kabah causeway; Figure 2).

Alternatively, however, perhaps water from the permanent sources was not actually so important in directly sustaining people during Terminal Classic times specifically. After all, numerous chultuns and some aguadas are known for eastern Puuc sites in those centuries, and may have supplied all the daily water needed, and much more conveniently than crawling through subterranean tunnels. Unlike later historic times, when chultuns had fallen from use, anciently the water caves may have been solely important for their well-documented religious uses in communicating with the underworld and as a source of holy water, zuhuy ha (see Thompson introduction in Mercer 1975:xxi). It is perhaps for this reason that a unique type of polychrome painted pottery, Chac Polychrome water jars, each bearing painted symbols of water, has been found only in the Gruta de Chac and not in any neighboring sites (Andrews IV 1965). Perhaps this type was restricted to special (religious?) uses of the water (although ancient gourds for ordinary transport of drinking water as

in Stephens' day might not have been preserved). Clearly, much more research is needed before this significant problem area is better understood.

The siting of Sayil and some of its neighbors, then, appears to favor areas that may well contain large pockets or expanses of better soils for agriculture. The main reason for their initial settlement, or eventual great size, may thus be agricultural (as most forcefully argued by Kurjack, Garza T., and Lucas 1979). If so, one must wonder about the apparently erratic settlement histories of these sites, their undoubted florescence in the Terminal Classic, and virtual abandonment soon after. Either the settlement history responded to, and was perhaps causally involved in, pulsations of natural soil formation, soil fertility, or rainfall (Dahlin 1983; Folan et al. 1983), or settlement was contingent on other factors such as innovative water management technologies (e.g., chultuns), high exterior market demand for agricultural produce (as historically and recently), demographic pressures (perhaps at the end of the Late Classic, a time of upheavals), and/or political machinations (e.g., the Postclassic alliances and tribute arrangements). There is also room for some major miscalculations in the traditional archaeological periodization of Northern Yucatan (see section XIV).

Two aspects of the specific siting of eastern Puuc sites relevant to agriculture should also be mentioned, both concerning the scale at which we view the landscape. First, Sayil, Kabah, and Labna are all located in the valleys themselves. Of these Sayil, at least, has its central axis and "public" areas in the very flattest

part of the valley profile and on what looks like inferior kancab soil. Thus, although its situation is in a flat area presumably with much good soil available, its specific siting almost carefully avoids what we think are the best soils along the valley margins. There on the valley margins we find the residential settlement in highest density. Maybe public (or at least big) architecture was put on the incidentally poorer local soils really because the kancab was flat, while most of the people actually thrived and lived directly on the rocky but richer soils of the valley margins. It seems soil was not "conserved" by not building on it.

Perhaps a different technique of soil conservation was practiced, not only by building occasional agricultural slope terraces to trap soil, but also by removing the natural soil before constructing a platform and redepositing it on household gardens. One way to test this subsidiary proposition is by checking for the absence of an old soil layer directly beneath platforms. It is our impression from the appearance of collapsed platforms that at least they do not contain much soil inside their fill. Another test, the presence of garden plot walls, is not applicable to ancient Sayil.

The final aspect here is that some other sites in the area are not built on the valley floor but right atop uitz ridges. By no means are all of these just small outliers like those near Sayil (section XII). Yaxche Xlapak is a major "group" if not "site" that extends over several hills on what seems to be good soil, located overlooking the southwestern toe of the J-shaped Sayil valley.



## V. FEATURE TYPES

Feature types encountered by the Sayil survey were defined and discussed in the preliminary report on the 1983 field season (Sabloff et al. 1984:17-18, 33-37, where maps illustrating the feature types will be found). The results of the 1984 mapping of 26 different feature types are summarized in Table 1 and briefly outlined below. This past season 973 features (plus 164 stone basins or metates) were mapped. The implications of the locations of the various features will be analyzed in the sections on the transects which follow later in this report and will be summarized in the final section.

### Platforms

Platforms are the most frequent feature found by the survey at Sayil. Basal platform/terraces are rubble filled structures of varying height which supported other structures, most often domestic, and/or chultuns. These platforms have vertical walls of from one to five courses which only occasionally are well-preserved. Many, if not most, appear to have been built over natural rock outcrops. Some basal platforms are multi-leveled with some indications that the platforms grew by accretion over time. Basal platforms appear to have had several functions including serving as catchment basins for chultuns, raising domestic structures off the ground, and leveling naturally sloping surfaces. There seems to be a general correlation between height of basal platforms and the elaboration of the structures they support.

Walled platforms which bear no visible sign of superstructures are labeled "undifferentiated bare platforms" in Table 1. The range

of size in this feature type, from 3 to 414 sq m, may well conceal differences between (1) a majority of building platforms for entirely perishable buildings and (2) a minority of small basal platforms that each supported several perishable superstructures.

Building platforms are low structures often situated on top of basal platforms. Each building platform supported one of the two types of buildings with visible floor plans and served to raise it above patio level. In some cases they extend beyond the building proper to form front or side areas that might be porches or even additional perishable rooms. Many more building platforms may lie concealed beneath fallen building walls.

Bak chich or cobble mounds, the most numerous type, are small platforms consisting of piles of cobbles or rubble without definite walls. Most are situated directly on the ground surface, while 33 are found atop basal platforms. These features appear to be the remains of platforms with tamped earth floors (see section VII). Many of these platforms may have supported perishable domestic structures, but perhaps not actual dwellings since they usually lack associated chultuns or basins.

Slope terraces have been found on some of the western and southern uitzes. Included here are only those terraces presently lacking any evidence of former superstructures. A few have chultuns or chich berms. In places apparently natural terraced outcrops or "staircase slopes" occur.

### Buildings

Definite buildings (superstructures) mapped during the course of the 1984 survey fall into two general types: perishable build-

dings with stone foundation braces supporting the perishable walls, and buildings with stone walls and often vaulted ceilings. Both types of buildings for which we have floor plans were easily expandable to accommodate the growth of residential groups.

Foundation braces (termed footing walls in Sabloff et al. 1984) are all that remain of perishable buildings that had stones supporting or bracing the lower parts of their otherwise perishable wood or thatch walls. These braces often are one course high but can reach several courses in height. The well preserved ones clearly define exterior doorways, partitions, and rooms. None have interior features. The doorways usually are marked by larger stones (jambs) which sometimes are significantly higher than the foundation braces. Rarely are these foundation braces entirely open across the front of the building as is common in Postclassic period examples in the Southern Lowlands. Multiple-room examples of braces are invariably linear, single-row roomblocks. It is probable that most of the buildings with foundation braces were dwellings, although this hypothesis needs to be confirmed by excavation. Only one pila (basin or metate) out of 164 was found actually inside a room rather than somewhere outside. These foundation brace buildings are very similar in size and features to some of the contemporaneous Single- and Multiroom Rectangular Unvaulted Structures at Dzibilchaltun (Kurjack 1974:58-62), but are quite unlike houses later at Mayapan (Pollock et al. 1962).

Buildings with stone walls often are vaulted although a few definite instances of structures with perishable roofs were encountered (a good example is the newly discovered "House with Ball Decoration" at N8699 E5076 on the North Transect). Our working

hypothesis is that the stone buildings were elite residences. They are actually rather numerous and broadly distributed. Unfortunately, 80% of these features are in a poor state of preservation, so that the architectural details and floorplans are difficult to perceive. This circumstance is one reason we have invited an expert, Prof. George F. Andrews, to study all the stone buildings at Sayil. A minority of these stone buildings are more than one room deep, and a very few have two or three stories. Despite the look of "communal houses" in the latter cases, they actually consist of strings and banks of rooms in highly varied arrangements, but with each "apartment" still having its own outside entrance. Only stone buildings have yet been seen to contain interior features like benches. The definite spatial patterning of these buildings found in the survey will be discussed later.

Figure 5 presents all potential "building" types of feature ("Fetype"), here including chiches and "bare platforms" as well as foundation braces and stone buildings, as one preliminary estimate of the proportions of each at Sayil.

#### New Structure Types

Six feature types were newly recorded this year. Three apparently historical types (pigstys, apsidal-ended houses, and perhaps field walls) will be discussed in section VI. Aguadas and ring structures will be examined in section XIII. One possibly circular foundation brace was located just off East Transect I atop a 30m high uitz. This circular structure is about 5m in diameter with an apparent doorway gap. Its wall consists of an irregular ring of roughly shaped rocks. The fact it is next to a rectangular ruined

foundation brace and both are on one side of a large basal platform suggests a genuinely ancient date for its construction.

### Depressions

Numerous chultuns have been located, 83% of them directly on basal platforms (Table 1), the rest off-platform but close by. A chultun is a flask-shaped chamber hollowed out of soft sascab reached through a narrow mouth tunneled vertically through solid caprock. Its interior surface was plastered to make it watertight to hold the rainwater that was seasonally drained into it from a sloping surface some 3m in radius around its mouth.

An exact count of sascaberas or quarries is difficult to achieve because the caprock over these undercut holes has often partially collapsed, or tool marks are not visible. Sometimes they could have been collapsed chultuns (or vice versa). They also resemble what we take to be entirely natural solution holes.

Regarding sartenejas, some outcrop surfaces are completely free of them while others are pitted with a whole swarm of them. Most have not been recorded. A few have been discovered with cover stones that may have been placed historically to prevent cattle or hunting dogs from stepping in them and breaking their legs.

### Feature Clusters

Feature clusters consist of one or more features that were mapped, judged spatially distinct from other features, and recorded by their own collective site coordinate location. Table 2 lists only the most general characteristics of the 565 feature clusters mapped this year. Bak chiches constitute the single largest category of

feature cluster as well as feature type at Sayil because most do not occur with readily determined orientations or in distinct groupings. It is evident why we are so concerned with elucidating their nature that we devoted our first excavations to them. Analysis of the combinations of features in clusters is just beginning with the identification not only of the six cluster-types listed first in Table 2, but also over 54 unique combinations of features among the 137 probably residential clusters. The clusters that are most likely to have been residential usually consist of some combination of basal platform with bare platforms, bak chich, building platforms, foundation braces, stone buildings, and/or chultuns. Over 34 different combinations occur with just those seven most common types of features alone. Analysis of the constituents, frequencies, and locations of feature clusters promises valuable information on household characteristics even before excavation is undertaken.

## VI. HISTORICAL REMAINS

Two abandoned historical Maya Indian villages were visited and up to 17 historical archaeological remains were mapped in 1984.

To the north of Sayil we revisited the sites of two Indian villages visited by Stephens, Catherwood, and Cabot 120 years ago, the now abandoned ranchos of "Chack" and "Schawill" (Xcavil) (Stephens 1963,II:2-5). Rancho Chac is located about 3.3km north by northwest of the Great Palace at Sayil, about 1km due east of the Gruta de Chac with its permanent water supply. The house lot walls and alleyways of Chac form a network some 500m across, on several knolls now under milpa. The favored milpa fields today appear to be

on the kancab soils in several small flat valleys, although the knolls were also in use a few years ago. In a flat valley said to have been the center of the village (with few walls in evidence) is a deep well or poza that was dry when viewed in April. Stephens (Ibid.:2) does not mention this well in his description of the amenities of the village square, not something he would have overlooked in his descriptions of this thirsty land, so either it was already dry or more likely it was not yet dug.

Rancho Xcavil is today a private cattle ranch located about 1.5km northeast of Sayil or about 3km southeast of Rancho Chac. The network of walls, alleys, and apsidal house foundations lies in a small dusty valley between two large uitzes. "The rancho had no well, and was entirely dependent on that of Chack" [the context makes clear this is the Gruta de Chac], but could still muster "a hundred...working men...since the reduction of their numbers by cholera" (Stephens 1963,II:3, 5). It contains easily 50 house lots or solares.

Both of these defunct communities lie outside the probable boundaries of the ancient Sayil main residential area as defined later. However, three types of archaeological remains from probably the same historical epoch have been located inside our mapped area, all three types new this year.

**Pigstys.** These chiqueros are hollow squares built of dry-laid rough rock walls, perhaps 0.5 to 1m high and 1 to 4m square. None have doorways, but one or two are attached to field walls (here probably house lot walls). All three are at the far end of the North Transect; that is, they are located on what should be the southwestern outskirts of historic Rancho Xcavil.

**Apsidal-ended building foundations.** Two examples have been detected, one again at the end of the North Transect proper by a pigsty and wall, the other just north of the modern highway near the North Group.

**Field walls.** We mapped 12 definite examples of linear upstanding rock walls or albarradas. They consist of dry-laid boulders or roughly shaped rocks laid one or two stones wide and one to perhaps three courses high. Five are on the narrow North Transect, six in the entire Western Transects area, and one in the South Survey Block. Four or five of them form the walls of house lots, while three of them may have served to control the movement of cattle. At least two of the house lot walls opened towards the now abandoned right of way of the single track Bolonchen-Ticul wagon road that meanders up the west side of Sayil and then cuts across the North Transect toward Rancho Xcavil. None of the walls form definite walkways or sacbeob, but one near the House with Ball Decoration might have served as stepping stones across a low spot.

#### Dating

We are fairly confident that most of the above remains are historical (perhaps entirely 19th century) and not ancient. They are rare items and are found in peripheral locations mostly towards the north near Rancho Xcavil and/or along the old road in the west. Furthermore, the house lot wall attached to the back of a platform supporting a vaulted building at N7574 E4578 does include reused Puuc veneer stones. This wall is obviously later than at least some ancient stone buildings, and may represent (Postclassic or recent?) squatters occupying the adjacent vaulted building before it collap-



sed (perhaps excavation could date the squatters and/or the building collapse and hence the associated house lot wall).

Only the solid and impressive wall in the south at N6939 E5209 looks ancient. It consists of large boulders precisely paralleling a basal platform on just those three sides that cut the platform off from the lower slopes of the uitz on whose shoulder the platform and wall stand.

Apsidal-(or round-)ended dwellings are the standard rural Maya house type in the area today. In contrast, 99.5% of the presumably ancient buildings are probably rectangular (not counting the buildings of unknown form located on chich mounds). The sole exception is clearly circular rather than oval.

Modern buildings are concentrated around the visitors' entrance to the archaeological zone. A recently collapsed Ticul farmer's hut was mapped in the North Transect within the confines of a large house lot enclosure wall with attached pigsty. Other recent (i.e., historical and/or modern) material elsewhere included iron barrel-hoops and a three-legged metate near another house lot wall and numerous rock cairns whose alignments (and faint brechas) assertedly mark the boundaries of several communal ejido farms. Forest openings for apiaries occur, about two active ones per sq km, and are equipped with box hives and stone or metal water receptacles. It is possible that beekeeping was a major ancient industry and that the functionally debatable stone basins or pilas were sometimes water receptacles for bees rather than metates. Possibly, also, the stone collars we occasionally found with chultuns, apparently formerly placed on their mouths, were intended to allow bees to get in to the stored water while keeping out detritus from the surrounding floor.

The potentially most destructive modern development is the 40m wide swath of highway right of way that slashes across the north end of the site. However, it passes through a flat area north of the Great Palace that according to Shook's map and our own observations in the area seems to have been only lightly built up in the past.

Comparatively, the 19th century must have witnessed a much larger local human population than we see today, and the largest since the Terminal Classic a millenium earlier. Whatever the actual date of the field walls, their numbers are too few to have been a common characteristic of ancient Sayil, in contrast to the Northern Plains sites of Cobá or Mayapan.

## VII. EXCAVATIONS IN CHICH MOUNDS

### Introduction

During the 1983 and 1984 surveys at Sayil, numerous chich mounds (piles of cobbles 5-15cm in diameter) were found throughout the periphery of the site. Many apparently similar chich mounds are recorded on the maps of Komchen (Andrews V et al. 1981) and a few at Cobá (Folan, Kintz, and Fletcher 1983), and perhaps at Dzibilchaltun as well (Kurjack 1979). Sayil chiches are informally categorized by their location and height: slope, toe, apron, or flat chich, chich on a platform, and low or tall chich. We decided to examine some of these features due to the importance of chich mounds in the general settlement picture, the variability of their location, and their unknown nature. Moreover, although it appeared that those chiches (33) which are situated on top of platforms were cultural features, it was unclear whether the vast majority of chiches which seemed to

sit on the ground surface were cultural or natural. Therefore, four chich mounds were excavated during the 1984 season, supervised by Bernd Fahmel Beyer, and their ceramics analyzed by Sylviane Boucher. The excavations were done carefully and slowly with fingers and hand tools in order to insure tight control on these excavations into an unknown sort of structure.

The excavations indicate that at least some (if not many) of the low chich mounds which appeared to be situated on the ground surface actually were placed on low basal terrace-platforms or leveled outcrops. The presence of pottery sherds well beneath the surface levels indicate that midden materials were used to help fill in and level off the platforms or outcrops on which chich mounds were placed. Chiches, in turn, seem to be the remains of low platforms, without retaining walls, for pole and thatch buildings. Whether all or some of these chiches were used for domestic purposes needs additional testing, although, as we will discuss later, arguments can be made for their domestic functions. Only six artifacts were recovered that were not sherds, none of them heavy utilitarian tools.

Our excavations have shown that under the typical 4x4m chich spread atop its basal platform (or leveled outcrop), rocks and boulders were originally hand laid in arrangements of about 2x2m (or 2x3m) in size. Sherds of different sizes and conditions indicate that the fill often came from primary or secondary middens. Now broken by roots and the harsh climatic conditions, these rocks, boulders, and smaller stone fragments must once have been cemented together by the red clayey soil of the area and topped by a tamped dirt floor.

## Results

OPERATION 2(A). For our initial chich excavation, we examined a chich which almost certainly was cultural. A 4x4m gridded excavation was placed on, and a 3x1m trench placed in front of, one (feature #03) of three chiches which sit on a large, 2m high basal platform (N7912 E4549 = Feature Cluster 25 on the Western Transect map in Sabloff et al. 1984). The sole additional feature on the platform is a nearly intact chultun (with a stucco figure on the wall inside). Underneath the humus in front of the excavated chich mound we encountered only a more or less level basal platform surface. This basal platform consists of large boulders (possibly an outcrop), smaller rocks, and soil. Cultural materials found within it include pottery sherds and a few fragments of obsidian blades. Above the basal platform surface a series of large rocks produced an abrupt rise in elevation of about 15-20cm, topped with small stones and humus, all parts of the original, now eroded, chich mound. The soil that once cemented together the larger rocks, smaller stones, and cultural debris must have been washed away after the abandonment of the site. Thus, all that can be seen today is the spill of broken and eroded stones.

OPERATION 3(A)-(D). This operation was undertaken at a feature cluster (N7903 E4510 = Feature Cluster 26 on the Western Transect map in Sabloff et al. 1984) which consists of two chich mounds and an alignment of large boulders (which turned out to be the side of a buried terrace-platform). In addition to a 4x4m gridded excavation placed on chich mound feature #03 within this cluster, suboperations (B)-(D) included 3x1m, 5x1m, and 3x2m trenches on and off the edge

of the "invisible" basal platform (feature #01) on which the chiches are placed. The edge of this platform is defined by a series of large boulders aligned on natural outcrop highs. Between this alignment and a neighboring uitz, against which the platform abuts, the central portion of the platform was built with small stones, soil, and sherds piled on huge outcrop slabs. Once this basal platform had been leveled (and eventually plastered [?]), a new pile of rocks and stones was set on it to form the nucleus of the chich platform (Figure 6). Of the latter, only fragments of the large rocks and small stones survived. Mixed into this matrix are the remains of past middens, represented mostly by sherds of varied size.

OPERATION 3(G)(H). Next to chich mound #03 in this same cluster, another, larger chich mound (feature #02) was partially excavated. This operation consisted of a 4xlm trench placed on the mound and the basal platform area in front of it (the same platform on which chich mound #03 was built, see OP. 3[A]). On top of the basal platform fill, a layer of large rocks produced a surface level which rises about 20-25cm above the platform surface. While many sherds and an obsidian blade were found in the basal platform fill here, no cultural materials were found among the larger rocks placed on top of it. In front of this chich we found a series of smaller stones, presumably washed out from the top of the chich, spread over an additional meter on top of the basal platform. This material, like the larger rocks forming the base of the chich, is characterized by a total lack of sherds.

Although it is perhaps unexpected to find imported obsidian, a possibly elite item of use, in these humble chich structures, it may prove significant that three of the five examples are from fill that

lies below the chich mounds. In other words, these pieces are several times removed from any direct activity association with the use of the chiches themselves.

OPERATION 5(A). A 4x4m gridded excavation was placed on a low chich mound (N8270 E4830) that seemed to rest directly on the flat ground surface of red kancab soil. The excavation showed that, contrary to our first impression, this mound was built on the leveled surface of an "invisible" outcrop. As in the previous cases, the depressions in the bedrock were filled in with stones, soil, and midden material and then leveled in order to support a "domestic" chich platform. Again, large hand laid rocks formed the core of the mound on which lay fragments of stones and a few sherds. In this case the quantity of small stones was slight in relation to the number of large rocks forming the core of the chich mound. Unless most of the small stones were washed away (something that is very unlikely if we consider that it did not happen in other areas), the remains indicate that this feature was a much lower platform than those excavated in OP. 2 and OP. 3.

In order to arrive at criteria helpful in distinguishing culturally formed chich mounds from natural stone piles, a series of excavations in slope, toe, and apron chiches at the bases of uitzes or outcrops was also undertaken, as these are least likely to have been artificial. OPERATION 3(B)south, OP. 3(E), and OP. 4(A) were pits to check whether chiches close to natural features contained any cultural materials. Although in all these cases the sherds were few and eroded, no conclusive negative evidence was actually obtained. More study is clearly needed.

### Surface Stripping

As a beginning to a long-range effort to learn about off-mound or between-structure activities, as well about the effects of the thick surface vegetation on masking potsherds from surface collecting activities, in OP. 6 we stripped away the surface debris on parts of three sides of the large basal platform at N7927 E4580 (Feature Cluster 24 on the Western Transect map in Sabloff et al. 1984). Behind (to the west of) a foundation brace on the west side of the platform (i.e., towards Feature Cluster 25) we found what appears to be a sizable midden. An area measuring 7x8m was gridded and intensively collected. A large number of sherds, which were not visible before stripping, were found on the original ground surface. Examination of root and animal holes indicate that the zone of dense sherds continues below the surface. A 12x5m area to the north of the basal platform near a possible flight of steps revealed some sherds but in far less frequency than to the west. A small area to the south proved to be sterile.

Clearly, the general lack of sherds on the surface of Sayil may be more apparent than real. Although attempts at surface collecting in the course of mapping have not been of value, more time-consuming surface stripping, tantamount to excavation, might prove to be valuable. Such activities are planned in future research.

As with other excavations, OP. 6 shows there is a significant dearth of easily recovered stone artifacts at Sayil, even around a place that nevertheless has the look of a residential cluster. With diligent clearance numerous ceramics can indeed be collected. Ground fires, as in burned milpas or in the 1983 Zacate Burn (see

Sabloff et al. 1984), also exposed ceramics, but, significantly, again very few stone tools or flakes were seen.

### Conclusions

Despite the ravages of time, the first excavations in chich mounds at Sayil have been very productive in terms of shedding some light on the structure and contents of these widespread, but enigmatic, features. Not only did we learn that many of them are cultural in character, but we also learned that burials and offerings were, apparently, not an integral part of such constructions. In terms of their internal structure, the way rocks and cobbles were laid down on the basal platforms and leveled outcrops indicates that chich mounds are the remains of raised foundations for perishable buildings. It was of much interest to discover that the construction techniques, no matter where chich mounds were built, were standardized - at least according to our very small sample - and that they resemble that of the large basal platforms, as well. Chich mounds consist of a basal layer of large boulders and rocks which were used to define the extension of the platforms and to level the terrain (outcrop) and then smaller stones and midden material which fill the gaps between the rocks and furnish the platform with a level surface. The latter we suppose was then topped with tamped earth (or plaster).

Although the size sequence within chiches from boulders to rocks to cobbles resembles natural degradation, nevertheless the presence of sherds and a few artifacts, together with the location of some of these chich mounds on definitely artificial platforms, argues for their artificial origin. At Preclassic Komchen, exca-



vations in and around similar small formless mounds produced numerous sherds only in the mounds (Andrews V et al. 1981). At Dzibilchaltun over 5000 Small, Low Platforms may represent transient Preclassic and Late Classic occupations from which all former retaining wall stones are presumed to have been salvaged for reuse (Kurjack 1974:tables 3, 5; 1979:12). Kurjack ((974:50) implies that metates/pilas were found with at least some of these Small, Low Platforms. At Cobá there are several unremarked instances of Late Classic field walls abutting or enclosing chich mounds (see in Folan, Kintz, and Fletcher 1983:map sheet Group B, and Zone 1 Sheet 8). The long duration of this type of feature bespeaks a set of particular uses for them. However, it is still quite unclear for what, precisely, these structures were used.

As a consequence of these excavations chich mounds must be found and recorded. The nagging question to be resolved by continued mapping, examination, and excavation is whether all chiches, in their endless profusion, are truly comparable to the artificial ones excavated this year, no matter their distance from site center. Possibly we shall find corroboration for distinctions between (1) chiches on platforms that served as supports for flimsy dwellings or household ancillary structures and (2) those chiches either in the open or beyond the contiguous borders of Sayil, either lacking chultuns, that served as field storehouses or shelters.

#### VIII. EAST TRANSECT I

The next four sections introduce the four principal areas in which we mapped in 1984. East Transect I was the principal test of the large eastern area of the site which we propose to fully map in

1985. The 200m wide transect was set out from the north-south baseline (E5000) between N7800 and N8000, between the Great Palace and the Mirador, with the intention of locating the aguadas which had been reported by the guardian of Sayil and of finding the eastern site border, if any, in order to complete a cross-section of the whole site from west to east (taken in conjunction with the 500m of settlement found in the 1983 Western Transect). The main brecha was cut eastward along N7900 for a distance of 1.5km. The first sector out to 1km was mapped in 20 quads of 1ha each. In the last 0.5km (east of the highway), no remains of platforms or definite chich mounds were seen along the brecha nor on the ridges overlooking it. The sole find was a pile of cut stones, presumably from a nearby quarry, which had never been taken away for use. Yet from reconnaissance along the highway due east of Sayil we know that small groups consisting of vaulted single-row buildings and chultuns do occur at distances of 2.6 and 2.8km on the way to Xlapak (at 4.8km).

Given these preliminary findings, we may have found the eastern edge of the Sayil settlement, or at least a very great change in its character, about 1km east of the main causeway. Considering that the western transects also encountered a similarly severe change in settlement character, but at about 0.6km west of the causeway, it appears that the civic-ceremonial core of Sayil is sited off center in its valley, closer to the western than the eastern margin of the valley, but at the very lowest altitude. As is expressed in our placement of the causeway area on the site map grid between N7000 and N8000, we also believe the center is at the far north end of the valley as well.

The area of East Transect I mapped in detail totals 200,000 sq m. From a flat plain at 70m elevation for the first half kilometer, the mapped terrain then rises to about 100m near its eastern end where it crosses the shoulder of the first uitz forming the eastern flank of the Sayil valley (Figure 7). The soil also changes from valley terra rossa to brown soil on limestone outcrops.

Virtually every type of ancient Sayil feature is represented in the East Transect. Including only those features which occur in clusters whose southwest corner coordinates lie within the transect proper, we mapped 21 chiches, 16 bare platforms, 15 foundation braces, and 8 stone buildings, plus 5 building platforms, 3 stone alignments, 18 basal platforms, 14 chultuns, 14 sascaberas, groups of sartenejas, 1 ring structure, and both of the aguadas known for Sayil. The structural features occur in 29 feature clusters as follows: 18 feature clusters on basal platforms (two including chich mounds), 3 consisting of bare platforms (one large enough to have borne several superstructures), 2 with stone alignments alone (possibly single house foundations), 4 of chich alone, 1 ring structure, and 1 collapsed stone building astride the causeway at the west end of the transect. Additionally the two aguadas were mapped, one near the causeway, the other at the foot of the first uitz.

Certain preliminary patterns already can be seen in East Transect I and will be tested by further analysis and by results from the proposed 1985 survey of adjacent terrain. Stone buildings, most of them vaulted, considered as possibly elite housing, are confined either to the very flat and, we think, relatively poor land near (accessible to) the site-core or to the first line of uitzes. Most

bare platforms and stone alignments are on the western end of the outcrop zone. Foundation braces are both more numerous and most widely distributed. Chich mounds mostly occur only on outcrops on the valley (west) side of the first uitz.

Calculation shows that there is an overall density of 1.45 feature clusters per hectare (100x100m map quad) on E.T. I. The overall mean area per feature cluster, 0.69ha apiece, is in line with calculations for similar assemblages at Classic Maya sites in the Southern Lowlands. But it seems to stand in great contrast to the much lower mean walled area per (household) cluster (<0.1ha) at northern sites like Cobá or Mayapan (Folan, Kintz, and Fletcher 1983:128; Pollock et al. 1962:map). However, the contrast disappears when, for example, the Cobá data is recalculated on a basis truly consistent with Sayil (or the southern sites), that is, without reference only to the areas of stone walled gardens or house lots that are visible at Cobá alone. When the total mapped area of "Zone I" at Cobá (289ha) is divided among the 356 "household units" in Zone I (data from Ibid.:141, table 7.2) the resulting mean total area per cluster is more like 0.81ha, actually 17% greater (less dense) than at Sayil. We shall not be able to pursue the provocative contrast between mean area per cluster and the much lower intramural area per cluster because Sayil is mostly lacking in such ancient imperishable walls (see section VI above).

At Sayil some most significant variations in density are revealed when analysis is carried out along the transect by pairs of quads from west to east, from the site core to the periphery (Figure 7). The density curve from west to east is essentially unimodal, peaking over the western or main valley-side approach to the first

uitz at 3.5 feature clusters/ha. Unlike the broad valley bottom to the west, corresponding to the Sayil site-core, narrow valleys east of the first uitz are virtually lacking in cultural features. It may be that dense habitation, as a rule, does not occur beyond the first uitz rampart (except where, as in the northwest and perhaps the south, the broad level central plain actually enters the encircling line of uitzes).

On average the amount of space per feature cluster (probably a household) decreases as one moves eastward toward the valley margin and its high cluster density (Figure 7), but whether this finding is due to (a) a proportionate increase in soil fertility, (b) an increase in suitable building and chultun locations on outcrops, (c) a decrease in social status, or (d) some other factor(s) is unclear.

The number of foundation brace houses and chiches increases in proportion to the increase in feature clusters. Simultaneously, vaulted structures happen to be lacking in the peak area of habitation density near the uitz, although Shook's map and our own reconnaissance elsewhere in the east cast doubt on the generality of this latter pattern. There is a perceptible reduction in the number of chultuns per feature cluster in the vicinity of the two aguadas which are a unique feature of E.T. I (Figure 8). There is still a reduction even if the chiches are omitted on the principle that they always exhibit a negative association with chultuns (and with pilas, too, whether those are basins for water or metates for grinding maize). In sum, there was an apparent substitution of collectively available aguada water for individual household chultun supplies near the two aguadas at Sayil.

### Basal Platforms

There are most revealing degrees of consistent variation in platforms and buildings when the feature clusters are examined more closely.

Basal platform/terraces, on which many of the features rest, show variations in surface area along E.T. I that appear to be responding to several factors. The four absolutely **largest** basal platforms lie 200 to 300m east of the sacbe, in a more central location than not (Figure 9). These four coincide with the first large outcrops east of the causeway where the flat red soil inter-fingers with the browner outcrop soils. Equally large outcrops occur to the east without comparably large platforms, so the size of the outcrop itself, or the amount of brown dirt on it, is not the contingent or secondary factor, but rather proximity of the outcrop to the central axis of the site.

There is no tight correspondence of possible **status markers** like chultuns or stone buildings with basal platform area. Three of the four largest platforms lack stone buildings, and the one with stone buildings lacks any known chultun. However, there is certainly an overall tendency here for stone buildings to occur on platforms larger than the median size.

**Duration** of use could contribute to the size of basal platforms, if they were expanded by succeeding generations of inhabitants. The largest platforms may often have been occupied the longest, having been the first to be settled and on the choicest terrain. As yet the only datum in support of this temporal speculation is that the stone buildings, when sufficiently preserved, are

of the Early Puuc style (as defined by Andrews 1982) and therefore may be among the earliest at the site. The E.T. I basal platforms are on average the largest we have surveyed.

The **distribution** of basal platform area along the East Transect is roughly bimodal, peaking at E5200-5300 as just discussed, but also exhibiting a lesser peak at E5700-5900 (Figure 9). The lesser peak correlates with the rugose uitz area close to the border of the site (as defined by the extent of platforms with walls). Proximity to good and open soils (perhaps the ones closest to the center) may have been the attractant. Duration of occupation should be least important if settlement spread evenly outward from the center. We shall have to see if this lesser peak occurs elsewhere as a general phenomenon.

Between the peaks in platform area along E.T. I are distinctly **smaller platforms** of remarkably compressed variability in size. Yet they occur on apparently the same sorts of outcrop as the biggest platforms to their west. Several factors appear to account for their smaller areas. Farther from site center, they suffered a comparative disadvantage as residential places (but one, oddly, that did not affect platform size still farther east on the uitzes). Speculatively, they are younger in origin, with fewer inhabitants, hence smaller. Appropriately, they all supported buildings with no more than one or two rooms (versus the larger buildings to the west or on the uitz). Most revealingly, they are the platforms closest to the East Aguada at the foot of the uitz. All platforms within 140m of this aguada lack chultuns, and thus were without their own individual water supplies.

A final aspect of basal platform area is vitally important. Platforms of some sort were necessary to provide carefully inclined **collection surfaces** for gathering rainfall into chultuns. A potentially powerful factor controlling basal platform size could therefore be the number of chultuns that were built in each. Figure 10 shows that on E.T. I no platform under approximately 200 sq m in area has a chultun, none under 500 sq m has two, and none under 1800 sq m has three. These stepwise breakpoints are higher than those found on the 40 basal platforms mapped west of the causeway in 1983 (Sabloff et al. 1984:36, Fig. 8), but the trend is similar. However, what is interesting is that the Coefficient of Determination is only a weak 35% (cf. 36% calculated on last year's data). Figure 10 graphically presents the problem for, among other things, 10 of the basal platforms (55%), which almost regardless of size, totally lack chultuns (versus only 30% in the 1983 sample). In fact, a typical chultun required only some 30 sq m of catchment area, and 17% of all chultuns at Sayil were not on basal platforms in any case.

In contrast, basal platform area is highly correlated with the area covered by its **superstructures** ( $r = .89$ ,  $p = <.001$ ). On the East Transect, then, the area covered by superstructures is a far better predictor of basal platform area. We have already shown in Figure 8, however, that a special factor affecting these calculations is the presence of only two aguadas here on E.T. I. Still, near the eastern aguada where chultuns are otherwise strangely absent, we find not only the smallest basal platforms but, predictably, few buildings with few rooms.

On E.T. I the major factors in basal platform area appear to be (1) the presence of outcrops/brown soil, (2) proximity to site



center, and (3) number of superstructures (inhabitants?); tertiary factors are size of outcrop, amount of brown soil, "stone building" status, number of chultuns, and possibly duration of occupation.

### Buildings

Buildings with **foundation braces** are frequent elements in feature clusters, averaging about one for every two clusters. Of the 29 feature clusters, 11 (or 38%) actually have foundation braces present. Foundation braces are rather widely distributed along E.T. I (Figure 11). Their frequency clearly peaks in the middle of the transect where the highest density of feature clusters is encountered, over the outcrop area along the valley margin, with most examples favoring the part nearer to site center.

The 15 foundation braces contained at least 31 rooms as determined from visible partition walls, or an average of 2.067 rooms apiece. In fact, only four foundation brace structures have but a single room, the mode is truly two rooms (eight examples), while two braces had three rooms. One exceptional case has five rooms (along with the second largest basal platform), equivalent to the maximum number of rooms per foundation brace yet mapped at Sayil. The average area per room for all foundation braces so far mapped at the whole site is currently  $\bar{x} = 7.77$  sq m,  $s = 3.83$ . There is apparently no particular correspondence between number of rooms in a structure and mean floor area per room.

Curiously, the number of rooms per foundation brace in E.T. I varies with distance west over the outcrops from the East Aguada. Those braces within 120m to the west have only single rooms to go along with their lack of chultuns, those braces beyond 120m almost

exclusively two rooms, with three rooms appearing only at 260m (the halfway point to the West Aguada!). As discussed earlier the proximate factor is probably basal platform area, smaller platforms bearing smaller and fewer buildings, ultimately traceable to some local restraining effect produced by proximity to that East Aguada. The "restraining" influence may actually have been exerted by the inhabitants of the feature cluster overlooking the aguada from the shoulder of the uitz to the east, for it contains not only a single-room stone building, but two- and three-room foundation braces too.

**Stone buildings** are less frequent elements in E.T. I feature clusters, but may still be more common than expected from site averages. They are present in six clusters (21%). Five of the six are relatively close to the causeway at the western end of the transect (Figure 11), forming a majority of the eight clusters there, and the other one overlooks the East Aguada. Notably, three of the six clusters have buildings of stone alone, all three in the west and all lacking chultuns. But two of these three clusters, both with single stone buildings each, are on or next to the sacbe, and are clearly quite special places. In the third case, with two buildings, one of them ("Templo II") has a relatively large number of rooms (five) and column altar 6 in front, so it, too, has unusual characteristics.

The eight stone buildings on E.T. I contain 15 rooms for a mean of 1.875 rooms apiece. Four stone buildings had only a single room each (so far as we know from totally collapsed ruins in all four cases), three had two rooms, and one had five. Deducting the probably special single-room buildings on and next to the sacbe (one of

which may be a collapsed portal vault), the average number of rooms for the remaining stone buildings is 2.167, indistinguishable now from the average number of rooms per foundation brace (2.067). Although the maximum number of rooms per single structure is exactly the same for both stone and foundation brace buildings on the E.T., at five, we know that elsewhere at Sayil there are numerous stone buildings - but never a foundation brace - with more than five rooms. It is not coincidence that both structures on the E.T. with five rooms occur on the very first visible outcrops east of the causeway within the transect: this is the location of the biggest basal platforms and still close to site center.

The current site-wide average area per room in stone buildings is 11.98 sq m,  $s = 4.21$ , higher than in foundation braces. From a construction point of view this is surprising, for surely it was easier to cover large spans in wood and thatch than in stone. Presumably this difference further compounded the already higher costs of the stone walled buildings.

Yet the spatial trend in average room sizes by quad across E.T. I is similar for both types of buildings (Figure 11). Average room size is lowest in the middle of the transect and increases toward the west and perhaps the east. In the case of stone buildings, the figures may be artifacts of the sample, for the sample is not only small but heavily influenced by the numerous smaller rooms in the exceptional tandem row "Templo II" with its five rooms. For foundation braces there is a curious trade-off of room size for total number of rooms per quad (but not per structure) across the middle of the transect (near the East Aguada). Unfortunately, it would have been much easier to suggest reasons for a decrease in room size

per structure (rather than as observed per quad) with increased numbers of structures, most of which are only one- or two-room affairs (e.g., increased specialization of room function, addition of space for newly formed families).

Note in Figure 11 that the individual mean room sizes per quad suggest both types of buildings on the E.T. are above their respective sitewide averages for room size, although for presently unknown reasons. Perhaps significantly, the basal platforms in E.T. I also have much larger mean and maximum sizes compared to any other transects mapped this year. These size differences can have nothing to do with the presence of aguadas and their potentially great water capacities only on E.T. I because the feature clusters closest to them tend to be smaller than average and have few rooms.

Although it seems likely that all foundation braces were once used as part of dwellings, this is not certainly the case for all stone buildings. There are, for example, the two one-room buildings on or next to the causeway, an unlikely location for dwellings. The other two one-room stone buildings on E.T. I are not such obviously special structures, although in both cases they could have been nonresidential shrines because both are accompanied by foundation brace buildings as satisfactory "dwelling" candidates. But the clusters having only stone buildings also present another problem, for by this reasoning they could be entirely nonresidential.

#### IX. NORTH TRANSECT

The North Transect was basically a prolongation of the E5000 site baseline for a distance of 1.1km from N8100 by the Great Palace out to N9250, the first 400m later incorporated into the Western

Block. At N8547 a 92m offset to the east was taken in order that the main brecha might bypass three rugged uitzes. The N.T. subsequently followed the line E5092 out to N9250, with cross-brechas restricted to the interval between E5050 and E5150. The brecha alone continued on to about N9600, some hundreds of meters short of the private road into Rancho Xcavil.

Five significant discoveries were made along this transect. First, no evidence whatever was seen of a causeway, although this area was the logical course for one to have covered if a sacbe had once existed directly between central Sayil and Kabah 8km to the north. Kabah in turn is linked to Uxmal by a causeway 24km long that continues past the center of Kabah in the direction of Sayil for a few hundred meters until terminated (?) by a large pyramid complex. If the presence of a sacbe between Uxmal and Kabah suggests close political ties (Kurjack, Garza T., and Lucas 1979:40), the apparent absence of one between Kabah and Sayil suggests a frontier may have existed between the two (cf. Kurjack and Andrews 1976), provocatively coincident with the border between the Santa Elena and Bolonchen physiographic districts.

Second, once the three uitzes are passed at N9000, the transect moves into a more level countryside that appears to continue for some kilometers towards a distant isolated uitz near Kabah. It is in this open or valley countryside that the historic ranchos lay. The North Brecha seems to be following a rocky ridge into the plain.

Third, the North Transect and Brecha encounter historic remains on the outskirts of Rancho Xcavil, the center of which is still visible about half a kilometer to the east of the brecha, nestled

between two uitzes (see section VI). An extremely long field wall was traced part way around the third uitz at N8750. The North Transect crosses the old rutted Bolonchen-Ticul wagon road near N9200. The North Brecha bisects an apsidal-ended house foundation at N9300 and passes the large walled enclosure with the recent farmer's hut (see section VI).

Fourth, a very significant change in settlement occurs out past N8750, for stone buildings, definite platforms, all cut stone, and chultuns vanish, leaving only several poor terraces and platforms and many chich mounds. We think this shift is a genuine change in the character of the settlement, for none of the historical remains, which begin to appear at this point, has been seen to contain a single piece of cut stone, effectively refuting the hypothesis that the ancient remains had been stripped for reuse. The virtual absence of sherds with these chiches, despite kicking away the surface litter on several of them, coupled with the lack of pilas and the feature types and attributes mentioned above, does not contradict the hypothesis that we have found a limit to ancient Maya residence in this direction as on the East Transect. It is possible that there exist so many chiches beyond N8750, every one of them on an outcrop, because there really was no occupation there that would have scavenged them for the construction of platforms. Obviously we shall need some direct testing to see whether these chiches are natural, or cultural like the ones excavated in the Western Transects Block, or, if cultural, to see whether their function was different.

Could the narrow area covered by the transect actually have been locally unsuitable for settlement just by chance? We do not

think so, for similar areas elsewhere closer in were indeed occupied, recent milpas along the transect indicate adequate soils, and historical settlement remains are definitely present.

Fifth, then, we believe that we have encountered the northern border of contiguous residential settlement at Sayil. A similar change beyond N8600 involving the loss of definite platforms and cut stones also occurs farther west. Accordingly it appears that the northern border of Sayil lies only some 700m north of the Great Palace. This border does not appear to have been demarcated by any positive feature still surviving, i.e., a wall or ditch. It may prove significant, however, that the last (most northerly) definite platform feature cluster (N8699 E5076) includes an elaborate core-veneer walled (but not vaulted) building (the House with Ball Decoration), bearing symbols of lordship, that directly overlooks the obvious route of entry to Sayil from immediately to the north. On its eastern front side, centered between the two doorways to its two rooms (provision was made for a third room which was never erected) is a unique wall panel design consisting of two columns of carved mat symbols (repeated on the exterior corners of the finished south end wall) that flank a single column of nearly spherical tenoned stones. Similar vertically arrayed ball-like elements occur on Almuchil Str. 3 (Ball Palace) 25km west by southwest of Sayil, while horizontally arrayed balls occur only 8km to the east on Chunkatzim Str. 2 and on the Chacbolay Castillo 20km to the southeast (Pollock 1980:Figures 685-687, 115, 589). In none of these three other occurrences, however, do the ball elements appear on the wall of the lower zone or play so central a role. Isolated stone buildings are

known to occur on the first uitzes bordering the Sayil valley not only here in the north, but on East Transect I, West Transect III, and in the South Survey Block as well, and thus suggestively close to the site borders.

#### X. WESTERN TRANSECTS BLOCK

The Western Transects comprise a huge block of contiguous and now continuously mapped terrain west of the baseline for 500-800m and from N7500 up to N8600. Some 549,000 sq m have been surveyed here, 449,000 sq m of that in 1984 alone, plus some 64,000 sq m of adjacent reconnaissance. We are only beginning to analyze the great mass of data now available for this area, having begun with the smaller, more manageable tracts. Some general figures have been obtained for the W.T. and they initially appear to confirm the major patterns and trends discovered on the East Transect this year.

Topographically all western transects (either 100 or 200m in width) originate on the flat, red soil at the center of the site, cross expanses of outcrops at variable distances in their westward progression, and end at high uitzes in the line of hills that mark the western fringe of the valley and, we think, the border of the main site. Only the 1983 Western Transect (I) crossed uitzes within 500m of the baseline.

In general, the settlement distribution noted on the longer East Transect I appears to be reiterated on the western side of the site as well. As soon as outcrops are encountered, beginning at about E4800, platforms and other features proliferate, peaking at a density of about 5 feature clusters per hectare in the northwest.



This is the highest density yet encountered at Sayil. The western and northern boundaries of settlement are along lines of high uitzes at about E4400 and N8600 respectively. Frequently the tops of this rampart of uitzes are occupied by basal platforms and even stone buildings. Beyond, as far as E4000, we have yet to find anything but chiches, at least one of which is definitely artificial because it incorporated a pila.

Preliminary tabulation of features found in the 1984 portion of the Western Transect Block includes about 53 basal platforms, 247 chich mounds (many of them in a cleared milpa area at the far northwest corner of the surveyed area), about 77 foundation braces, about 27 well distributed stone buildings, 9 slope terraces, 57 chultuns, 9 ring structures (many located at approximately E4500 along the base of the uitze rampart [see section XIII]), 6 field walls (all west of E4600), and numerous ejido boundary cairns.

One prominently terraced hillside is capped with a large platform bearing a spectacularly sited vaulted roomblock having a splendid view of the center of Sayil, such views being perhaps a major attraction of uitz-top locations. Numerous small one- and two-room stone buildings are scattered through the northern part of the survey block on the low outcrops in the direction of Chac, all of them badly ruined.

In the cleared milpa mapped in the northwest, on the route to Chac, visibility of the ground was excellent, allowing a view of the surface unequalled since the Zacate Burn area in 1983 (Sabloff et al. 1984:Figure 5). In contrast to the densely occupied and equally flat Zacate Burn area, just one platform was encountered, on an outcrop in the eastern part of the milpa (i.e., within the projected

western site border). Only numerous small chich mounds were found farther west, and strictly on outcrops. A more recent occupation demarcated by a house lot wall had occurred near the chiches but strictly on the flat, red kancab area devoid of all stones. Iron barrel hoops, a legged metate, and a small ring structure were nearby in the flat.

Across the entire Western Transect Block the numbers of basal platforms, stone buildings, and foundation braces, among others, increase dramatically west of E4700, 350m west of the central sacbe (Figure 12). This peak area coincides with most of the outcrop areas on the plain to the east of the steep uitzes. Another smaller peak in some features occurs at approximately E4800, or within 250m west of the causeway, coinciding with the few close limestone outcrops. The pattern is generally a mirror reflection of that seen on the eastern side of Sayil on E.T. I. Here, however, the frequency of chultuns appears to keep pace with other features, for there are no aguadas to mar the linear relationships.

Data from the western transects currently provide most of the examples of the feature types at Sayil, exhibit the highest density yet calculated for chich mounds and non-chich clusters alike, appear to confirm the presence of northern and western limits to the distribution of recognizable platforms, and verify the view of intra-site settlement patterns thus far postulated at Sayil, subject to fuller and more detailed analysis.

## XI. SOUTH SURVEY BLOCK

The South Survey Block adjoins the south side of the Zacate Burn area surveyed in 1983, extending some 600m to the south from

the South Palace and Ball Court area over an irregular area equivalent to some 16 contiguous quads. These extend south over the first uitz, with an extension onto the next uitz to the south that was surveyed with compass and pace. The two uitzes here are apparently quite isolated rather than part of a true valley rampart. The first uitz here serves conveniently to delimit the northern third (?) of the Sayil valley wherein is located the civic-ceremonial center of the community. The top of the first uitz is located over 1300m south of the Great Palace, which in turn is nearly 500m south of the North Group which approximately marks the north end of known settlement (determined by direct EDM theodolite shots).

For a surveyed area that is smaller than E.T. I, the South Survey Block appears to have a higher frequency of features, a number of them in clusters that sprawl down the slopes of the first uitz here. We recorded 19 basal platforms, 9 stone buildings, 21 foundation braces, 3 slope terraces, 13 chultuns, 2 ring structures, and 1 (possibly ancient) field wall, but only 6 chiches. Basal platforms on average are larger here than in the west, but not so large as in the east. The same appears to be true regarding the areas of foundation brace buildings, but the stone buildings tend to be the smallest yet measured.

We seem to have here the same patterns found elsewhere as one moves out from site center to the borders of settlement, but the existence of a border immediately south of this Block has not been verified. To the west, several informal reconnaissance trips have produced nothing to suggest much occupation in that direction (immediately south of the extremely dense "southwest elite zone" mapped

by Shook between N7000 and N7500). In the other direction, due east, however, we know that significant construction continues for hundreds of meters, so the matter of site limits has still not been resolved here where, judging by general topography, the site may have the best chance of continuing farther outwards. The low frequency of mapped chiches may also indicate we have not yet reached the border in this direction.

Among the patterns we see here as elsewhere are stone buildings occupying the first uitz, nothing more than foundation brace buildings on the second, and the very heaviest occupation on the side of the first uitz that overlooks the site center (the north side here). The outcrop area here seems more restricted in size than elsewhere except on the North Transect, but the north slopes of that first uitz are more gradual and much more heavily built up than seen elsewhere. In this area a few structures have been seen on the flat, red valley bottom.

At the end of the season the beginning of an eastern transect along N7200 encountered a surprising concentration of stone buildings about 600m out, in the southeastern part of Sayil. The ground up to that point was the perfectly flat valley bottom, then on what are probably the very first good outcrops some five clusters with stone buildings occur. Judging by the well preserved rear walls of several of these buildings, their now fallen facades once must have been rather elaborate. We are anxious to see whether the same patterns seen elsewhere will still apply to these clusters and whatever lies beyond, but simply displaced 300m farther east than on E.T. I because of what seems to be a wider valley just here. On the basis of what we have seen, this southeastern area is the area most

likely to have more distant borders or none at all. Reconnaissance off to the south and east for 1.6km along the old road towards Xlapak and into a hillside milpa found remains indicating that definite ruins are to be found as far as we went, many of them on the small uitzes between which the track winds.

## XII. RECONNAISSANCE

One of the essentials for a settlement pattern approach to archaeological remains, and one of the objectives of our mapping program, is the location of networks of neighboring or functionally interrelated sets of sites. We now have brechas or transect mapping from near the Great Palace at the north end of the causeway out 1.6km north towards Kabah, 0.7km west towards Chac, and 1.5km east towards Xlapak (Figure 3). Additionally, from the South Palace area, we have compass and pace recordings 1.6km out southeastwards towards Xlapak, and 600m to the south onto the second uitz.

We also reconnoitered several places that may be discontinuous outliers of Sayil. The Rank IV site of Chac (visited by Stephens 1963,II:2, 15-16) has been exactly relocated 1.7km northwest of the Great Palace, putting it about 2km south of the Gruta de Chac which we also visited. A rough sketch (Figure 13) of Chac gives an idea of the vast size of the platform on which its buildings rest, the single tall pyramid, and the four vaulted buildings spotted so far, one of them three stories high and containing at least 13 rooms (two of these latter rooms are not shown because they directly overlie the two in the southwest corner). The small three-room vaulted structure has a simple "Early Puuc" style facade that is about to

collapse. This building, in conjunction with the lone pyramid, the tallest yet seen in the vicinity of Sayil, suggests that Chac is as early as, if not earlier than, any part of Sayil proper (many pyramids tend to predate the Terminal Classic period [Kurjack 1974:70; Pollock 1980:566]). If so, then Chac probably does not represent a late expansionary growth out from Sayil.

The Gruta de Chac (Andrews IV 1965) was visited and located 3.6km north-northwest of the Great Palace (Figure 2). On an elevation a short distance to the southwest was found a large stone building complex with four ruined wings arranged somewhat like an "X" in plan.

A few collapsed masonry buildings were sketched in the northeastern part of Sayil we plan to map next season, in a pasture on the outskirts of Rancho Xcavil. Two more substantial groups with vaulted buildings were visited and sketched farther to the east near the highway. One lies on quite low ground about 2.5km east of the Great Palace, the other just beyond that on a commanding ridge. Both groups had several chultuns, the latter group also overlooking a possible aguada.

In the far southeast, besides ruins mentioned in the preceding section, the "La Reina" chultun group was located with its stuccoed chultun and two collapsed stone buildings, amidst low outcrops dotted with basal platforms. Nearby between two conical uitzes lies a huge natural sarteneja with an artificial wall that is said to still supply the rancho of Chimay.

Finally, we sketched a hilltop "Column Group" of vaulted buildings located off to the southwest of Sayil (Figure 3). It is named for a curiously grooved columnar altar (?) stone in its courtyard.

### XIII. WATER MANAGEMENT

Devices for storing water were needed by the ancient inhabitants of much of the Puuc region in order to survive the long dry season during the winter and spring. There are no natural wells or cenotes near Sayil like those at Chichen Itza or Dzibilchaltun, the nearest permanent water source lying 3.6km distant at the Gruta de Chac (see section IV). Not until perhaps the last century did local people have access to the technology to drill deep wells to tap the deeply buried water table. Thus, if they were to support permanently large numbers of people, the residents of Sayil needed to capture and store sufficient rainwater during the wet season to survive the dry.

#### Chultuns

Chultuns are the most numerous water storage devices thus far observed at Sayil (natural sartenejas aside). They are underground cisterns with constricted necks and mouths that drained specially constructed rainwater catchment surfaces. Chultuns are highly associated with areas of limestone outcrops and with platforms. Because none occur on flat kancab terrain in the valley, we suspect the central "palaces" with chultuns may well conceal outcrops beneath them. The absence of outcrops in much of the valley bottom is believed to account for the frequently observed dip in settlement density there.

Only 17% of chultuns are not on a basal platform, but they are always located very close to (associated with) a structure of some type. Surprisingly, about three-quarters of the off-platform chul-

tuns are associated with basal platforms that already have a chultun; off-platform chultuns must usually have been no more than supplements to the regular on-platform chultuns, not substitutes. Our impression is that these off-platform chultuns are smaller than those found on basal platforms and, perhaps fortuitously, often lack still-plastered interiors.

In order to make chultuns, the ancient Maya cut through the hard surface of an outcrop and hollowed out large chambers from the softer sascab or degraded limestone lying beneath. Sascab was immediately useful in plastering the chamber walls to make a water-tight cistern and probably for plastering the dished catchment area surrounding the opening to the chultun. The reasons they carved chultuns from bedrock rather than construct them from masonry may well be due to the much greater ease, inexpensiveness, and indeed safety to be gained from using the naturally occurring hard caprock as a roof. Occasionally chultuns were embellished with stuccoed figures on their interior walls or the addition of a carved stone collar about the rim of their mouth. We have found no feature associations for these embellishments that indicate they related to high social status.

In rare instances chultuns were placed on artificial slope terraces on uitzes overlooking the site. Perhaps they were intended to catch run-off down the slopes. However, the actual size of chultun catchment areas when these are still clear is very small. The reason for this must be the limited capacity of the chultuns. Brainerd (1958) found that the average capacity of a sample of chultuns was about 28,000 liters. Since rainfall in the Puuc area



is about 1m per year (1000 liters per sq m), it only takes about 28 sq m of collection surface (a circular catchment less than 7m in diameter) to fill a chultun.

One good reason there is really not that close an association between chultuns and the areas of basal platforms (Figure 10) would be that chultuns did not in fact drain the entire open surface. One indication of this is the small area of dished catchments whenever these are clearly defined. Another is that chultuns seem rarely to be placed at the edges of platforms as if to receive sheet wash, but rather were sufficiently centered that collection surfaces radiated in all directions from the mouth for only 3-4m to collect clean fresh rainfall.

There is a negative relationship between the probable aguadas (artificial reservoirs) on the East Transect and the presence of chultuns in nearby feature clusters (Figure 8). Either the inhabitants used the aguadas for water, however impure, or they were dependent on other clusters farther away from the inexplicably baleful association with the aguadas. The vicinity of these aguadas provides one exception to the ubiquity of chultuns.

Two further negative associations may be significant. No chich that is off a platform ever has a chultun on it or anywhere nearby. This is one material consequence of the hypothesis that they were not dwellings but ancillary structures, since water was vital to everyday functioning. The other provocative negative association of chultuns is with the South Palace, which has no chultuns, and indeed with its adjacent complex of buildings where only two have been found (one of them located in an extraordinary position beneath the

ball court end zone!). Either this complex at the south end of the causeway system was not primarily residential, as we suspect, or its people were supplied from outside.

### Aguadas

Aguadas are large, roughly circular, artificial reservoirs excavated into soft soil with spoil banks or berms on their outer edge. Two have been mapped at Sayil, on East Transect I, and another seen 2.7km farther east. The two E.T. aguadas appear to have had similar capacities but there the resemblance ceases. The wide but shallow West Aguada is located near the central causeway at the lowest altitude yet known for the Sayil valley. The 5m deep East Aguada is located at the base of the first uitz at the valley margin and could have received channeled sheet wash from it. It appears to have inlet channels on the sides adjacent to the uitz, a possible outlet channel on the north away from the uitz, and a central "dimple" that might be either a swallow hole or filled chultun. This aguada may be related to several small karstic solution holes lying in line with it along the base of the uitz.

In view of their suppressive effect on chultuns in the neighboring feature clusters, water from collective aguadas may actually have been preferred over domestic chultuns, although the strange preference can only have been a local phenomenon. The only two clusters having chultuns within 140m of an aguada (Figure 8) are both near the West Aguada or virtually within the site-core, and both have stone buildings as well as a foundation brace apiece. Either some of the water from this centrally located aguada was diverted to public activities and construction nearby, "forcing"

some neighbors to maintain their own chultuns, or perhaps some "elite status" factor was at work.

### Ring Structures

Several newly discovered enigmatic features, nominally designated as ring structures because of their form in plan view, may also have had a role in water management. Ring structures are chich mounds or berms up to about 2m in height and some 6-10m across, with a central depression penetrating to bedrock that is topped by a boulder wall of one or more courses apparently to keep the chich "exofill" out. Thirteen are known so far, most of them along the valley margins close to the base of a uitz.

The ring structures appear to be ancient. The use of chich appears to be an exclusively ancient practice. Also, the overall distribution of the known ring structures is not that of known historic remains, for the latter are concentrated farther north and beyond the edge of Sayil. No chich mounds, let alone ring structures, have yet been seen in historic Rancho Chac or Rancho Xcavil.

The function of these ring structures is not known. Three possibilities are being examined. One of our workers suggested they were caleras, features constructed for the purpose of converting limestone into quicklime (cal) by burning. In accordance with this hypothesis are the observations that most of these structures are close to uitzes where there is exposed rock and are not often close to probable households. Against this hypothesis is the apparent lack of evidence for burning, the penetration of bedrock, and the superfluous chich berms.

A second possible function of ring structures is suggested by the Spanish term for apparently similar structures seen elsewhere in Northern Plains and East Coast sites, where they have been called corrales (Carlos Perez, personal communication). This appellation is due solely to their shape, not for their construction or size (neither of which seems suitable for the likely mid-size domesticated or tamed animals). Recall, too, that ring structures are not usually built-in as part of domestic feature clusters (e.g., for dog or turkey).

A third possible function is suggested by their frequent location near the bases of uitzes on the valley margins. In some way they may have tapped into supplies of water coming off the uitzes or collecting at seeps or springs. Why, then, were household feature clusters not built closer to them? Would they have worked in the dry season? Unlike aguadas they appear to have had no effect on the number of nearby chultuns. For these ring structures we are clearly in need of further data on locations, associations, construction, characteristics, and natural water flow. Information on possible changes in precipitation and water table levels over the centuries may be required to resolve questions of water management.

#### XIV. CERAMIC ANALYSIS

Ceramics from the chich excavations have been analyzed in detail by Sylviane Boucher, chief ceramicist of the Centro Regional del Sureste (C.R.S.) in Mérida, whose report is abstracted here (Boucher n.d.). The 6,107 sherds were found to belong to 19 already familiar type:varieties that span five Yucatecan ceramic horizons,

including Late Preclassic (0.10% of all sherds), Terminal Preclassic (0.02%), Early Classic (0.02%), Terminal Classic (97.74%), and Postclassic (0.79%).

There is reason to continue to believe we indeed have an essentially one-period site. The Postclassic sherds (48 total, Hocaba horizon, Middle Postclassic) came predominantly from the surface (21 sherds) or the first level of excavation (12 sherds) versus all deeper deposits (15 sherds). They were heaviest (39 sherds) in OP. (Operation) 2 on Feature Cluster 25, the only excavation of a chich on a very obvious basal platform. One unidentified sherd may be Late Postclassic (Tases horizon). Jumping back in time, one type from the Late Classic was recently found by C.R.S. during reconstruction work at Sayil. The only Early Classic sherd in our collection came from the base of the chich in OP. 2. Not a single sherd of Chac Polychrome (Timucuy Orange Polychrome) water jars was found at Sayil, although it is the predominant type observed at the Gruta de Chac (Andrews IV 1965). One Late Preclassic sherd was found in the basal platform also in OP. 2 while the other six Late Preclassic /Protoclassic sherds came from near the surface in the chiches of OP. 3 in neighboring Feature Cluster 26.

At the least there were both Late Preclassic and Postclassic occupations somewhere near Feature Clusters 25 and 26, if not actual construction then. Without exception, however, Terminal Classic (Cehpech horizon) type:varieties were otherwise predominant in every operation and every stratigraphic level at every feature tested.

The length of this major Terminal Classic (Cehpech) phase at Sayil may be some four centuries rather than the two originally envisioned by Smith (1971). Some of the Muna Slate forms at Sayil

are securely dated in contexts at Cobá to the earlier Late Classic period (8th century) on the early end, and other Cehpech materials at Cobá are stratigraphically associated with the Early Postclassic Sotuta complex that is otherwise completely missing at Sayil on the late end (Boucher n.d., citing Robles Castillanos 1980; cf. Ball 1979). If such an expansion of the Cehpech ceramic complex can be validated in future excavations, then the mysterious abandonments indicated for Sayil, and other Puuc sites, in the Late Classic and Early Postclassic disappear into a more substantial continuity that, as an example, has already been hypothesized for Puuc architecture (G. F. Andrews 1982). The anomalous breaks in the sequence of occupation that occur only immediately before and just after the massive outpouring of Puuc Florescent culture would then largely vanish.

Reinforcing other evidence that chich mounds were probably domestic structures is the fact that 51.4% of all Terminal Classic sherds come from Yokat Striated:Yokat Variety water jars. This is an unusually high percentage of water jar sherds (and perhaps whole vessels) in a collection, possibly hinting at special use or status for chiches. The activities on chiches did not go without water, hence chiches need not have been used only as, for example, storage sheds or corn cribs (facilities not needing water). Another 40.9% of Cehpech sherds consist of plain Muna Slate:Muna Variety cooking and serving vessels and chultun jars with handles. A few rims from possible ceramic drums (Tekit Incised:Tekit Variety) were also found in several chiches, but clearly in their fill. In contrast, the Ticul Thin Slate bowls, which have excellent fabric, were also rare

(2.5% of Cehpech sherds) but occurred mostly on the surface and in upper levels as if possibly used in connection with the basal platforms on (OP. 2) or next to which (OP. 6) most examples were found. No Fine Orange or Fine Grey imports at all were found, nor were there any ritual censers. All the Postclassic sherds (mostly from OP. 2) were just striated or plain domestic jars and bowls.

Overall the ceramic analysis of our first sample of pottery from Sayil appears to confirm prior information on the periods of occupation present and the essentially one-period florescence of Sayil. The chich mounds belong to the same period of time as presumably all the rest of the remains, although some feature clusters may have been first settled far earlier. The analysis confirms, too, that ceramics are overwhelmingly domestic in the enigmatic chich mounds. Analysis also begins to give us some data on more detailed contexts: a lot of the domestic wares are very simple, and a possibly unusually high percentage of water jars points to an intensive concern with liquids. A similar predominance of water jar sherds also occurs in OP. 6 near a foundation brace building, however.

#### XV. COMMUNITY PATTERNS

The center of Sayil is located on the floor of the northern end of a long valley. Settlement of predominantly residential appearance extends outward to the valley margins wherever survey has reached, but continues only slightly beyond. Distant outliers are known but it is not yet clear whether settlement is continuous out to them. No sign of a causeway linking Sayil to any other site has yet been seen. Fairly distinct and characteristic limits have been

established for the eastern, northern, and western borders of the type of settlement on platforms that is found in the main valley. Feature clusters with platforms and other features like buildings and chultuns virtually disappear between 600 and 1000m from the central causeway axis, yielding to the increasing number of shapeless chich mounds lacking chultuns that, within the site borders, occupy the space between platform clusters.

There is no permanent natural source of water within Sayil or most major Puuc region sites; the closest water cave is 3.6km distant. Good land, a term containing subtleties at different scales of reference, appears to have been the primary locational consideration. Some definite, albeit preliminary, impressions of the major factors controlling gross settlement location within the community of ancient Sayil have emerged from our mapping of contiguous areas in the valley and on radial transects.

(1) Flat land with indifferent red soil is favored as the location for the major architectural complexes and public structures: the center of the valley. Conversely, very few small structures of residential appearance occur there.

(2) Probable residential locations are concentrated on limestone outcrops of low relief bearing darker, presumably better agricultural soils: the ground towards the margins of the valley as it rises gradually to the encircling lines of cone karst uitzes.

(3) Locations on the outcrops closer to site center were preferred over more distant locations presumably because of their greater access to control and services, their perhaps greater efficiency, and perhaps greater duration of occupation as a result.



Proximity to the center overrode any tendencies yet seen to disperse onto available, suitable outcrops that were in the more distant countryside.

(4) These low outcrops were also probably the best locations to find suitable places to dig chultuns to provide the vitally necessary year-round supply of water.

(5) Outcrops also made it easier to build the basal platforms that may have been desired to keep house floors up out of the wet season mud (as a ready source of building materials as well as "preformed" cores for the platforms); these platforms comprised most of those platforms that actually supported the catchment basins required by the chultuns.

#### Tentative Site Zonation

Within its borders Sayil appears to be roughly divisible into two concentric zones, the narrow 1.2km long central axis of the site-core on flat ground that is comprised of the causeway and its various appendages like the Great Palace, Mirador, South Palace, and ball court, a high percentage of the stone buildings and sculptured stone, and all multi-story buildings, versus the site-periphery located on the outcrops with a high percentage and density of the perishable structures, chultuns, and pilas.

Within the site-core the series of building complexes linked by the causeway may be heuristically and tentatively subdivided into (A) an elite residential area at the north, perhaps for the ruling family, (consisting of gradually expanded multi-story and "palace" complexes with some 11 chultuns, pilas, and an aguada) and (B) a civic-ceremonial area at the south (consisting of the formal South

Palace bureaucratic office and hall [?], an adjacent vast and empty market [?] platform , a stela platform with eight stelae and seven altars, and a ball court, but only two chultuns, and no pilas). All of the compact multi-story Sayil "palaces" offer a striking contrast to the more private Uxmal quadrangle arrangements comprised of many range-type buildings.

In the site-periphery there appear to be three high density elite zones comprised of numerous vaulted buildings and chultuns, (A) the "single-story elite" zone west of the South Palace adjacent to the site-core, (B) perhaps the apparent row of elaborate clusters mapped by Shook east of the North Palace, and (C) the zone of vaulted buildings newly discovered in the southeast. The fine structures in and near the North Group, including the House with Ball Decoration, constitute only a relatively minor zone. In the site-periphery we are also beginning to pick up several zones of dense habitation with many perishable structures and most of the chultuns, plus a few small stone buildings. These high density zones for, by implication, "commoners" are located on outcrops in the northwest some distance beyond the Great Palace, and apparently also on the outcrops traversed by East Transect I.

Amongst the feature clusters in the site-periphery are found numbers of chich mounds that may have served as platforms largely for ancillary domestic structures. Beyond the site-periphery these chiches are virtually the only potentially artificial features found, and represent a great change in the character of Sayil settlement, if they do not actually reflect its termination. The distant chiches may really be field rather than domestic structures.

The proposed continuation of mapping at Sayil will not only serve to complete the first comprehensive and detailed map for a Puuc region center with its circumambient settlement, but will also serve to test our formulations concerning the concentric, zonal, and boundary characteristics of the ancient Sayil community

More broadly, a complete map of Sayil will provide us with a splendid platform from which to delve into a sample of its ancient remains through excavation. Hopefully as a typical example of a Puuc settlement it will help us to understand where its builders came from, how they were organized within the community and their situation, what role chultuns played in their survival (and perhaps isolation from contemporaneous turmoil in neighboring regions), and the true extent of interaction with the larger sweep of tropical Maya civilization.

#### XVI. SUMMARY

The major effort on mapping in 1984 proceeded at an accelerated rate with new machinery and streamlined field procedures developed from the initial reconnaissance of 1983. About 1 sq km was mapped this year. We estimate there is only about 1.5 sq km yet to map, because we believe we have a good idea of site limits in the northern part of Sayil and have preliminary hypotheses concerning their causes. The borders seem to lie not over 1 km distant from the site-core, corresponding to the ring of hills that flank the valley floor.

Preliminary analysis of the results of mapping and encoding data on 973 features suggests their distributions will prove to contain many provocative associations with natural features and each

other. The highest concentrations of what we believe, in the absence of direct excavations, to be dwellings are on the margins of the main valley, perhaps forming a hollow ring, or oval, around the grandiose but less densely occupied site-core. The concentrations of dwellings have a high correlation with areas of low rock outcrops on the flanks of the valley (A) into which were dug their water cisterns and (B) in association with apparently richer soils. Farther out chich cobble mounds may occur to the virtual exclusion of other, more elaborate feature types, although a few small, separate groups of vaulted buildings are known at distances over 1 km from Sayil. The apparently total absence of chultuns and basins near the most distant chiches leaves one uncertain of either their artificial or domestic nature, for the ubiquity of both chultuns and basins on definite platforms nearer the site-core suggest all three were essential to the functioning of most households. Indeed, without chultuns for the storage of water it is difficult to imagine how people would have survived the annual drought season. We recovered evidence that aguadas could substitute for chultuns, but the few known aguadas were clearly accessible to only a very tiny portion of the people.

The limited excavations in 1984 showed that small chich mounds on or between basal platforms and near the site-core are artificial in origin with sherds of pottery throughout, but few other artifacts. A high frequency of domestic water jar sherds may indicate these chiches, near the center, once supported perishable dwellings rather than unoccupied storage buildings. If so, these mounds will seriously inflate our population estimates for Sayil, because chi-

ches are the single most common feature there. They could also expand downward the range of social classes inferrable for the community.

The potential significance of the Sayil Project resides in its contribution to the study of tropical civilizations, and to resolving the pressing problems that have arisen in the study of the Maya variant. Among the questions are the former size and splendor of a once populous region now almost destitute of water and people, and the former role of water storage in household and community life (and its relation, if any, to the brief florescence of the Puuc region). Our map will also provide an excellent basis for correlating soil quality and agricultural potential with settlement choices at various spatial and social scales of analysis. The exact dating of the Puuc florescence has become a controversial issue: on its resolution, with contributions from excavations at Sayil, hinges the whole relation between the florescence of the Puuc and (A) the rolling collapse of the earlier Classic civilization to the south, and (B) the development of an allegedly total dominance of the north by Chichen Itza (traditionally, but perhaps incorrectly, assigned a later date than the Puuc sites like Sayil).

One of the burgeoning fields of study in history, anthropology, and archaeology is that of households, one of the elemental units in society. Positive knowledge of households and their range of variations in studies of population and organization has too often been passed over in favor of assumptions or the literate elite. We are primarily concerned with gathering data on a fuller range of remains to be incorporated with earlier attention to the impressive standing buildings of stone. Ironically, many of the discoveries to come at

Sayil cannot be mapped beforehand. A neglected aspect of household archaeology is the time-consuming clearance of off-mound "backyard" features of such humble uses that they left no readily mapped indications at all. We intend to integrate their study with that of the more visible dwelling structures to delineate a fuller range of household forms, facilities, and practices. Indeed, in this way coming through the back door, so to speak, we may be better able to settle the long debated question of how the spectacular Puuc "palaces" were used than earlier attempts made with virtually no information on the ordinary, expectable contents of household remains.

A major focus of the Sayil project is on the structure of ancient Maya society as exemplified under the stringent natural conditions at Sayil. We are engaged in the first attempt to completely map any one of the hundreds of ancient Puuc communities. This effort is not mere butterfly collecting, just another map to pin on a wall (although there are still few decently complete maps of any sort). We are, instead, looking beyond the sparkle and glitter of "downtown" and "Park Avenue" to investigate the range of ordinary lives that sustained and gave form to the whole culture. Mapping is essential to rational planning of the later excavation objectives and strategies. A map indicates some of the parameters for and within which explanations need to be sought: the probable limits of residence, counts of many types of structures and large objects, differential distributions of these things, and eventually a basis for estimating the number of people who had to be organized, sustained, and supplied within a viable community. This report serves to illustrate how, and how far, we have proceeded to illuminate these and other areas of concern.

#### ACKNOWLEDGMENTS

We gratefully acknowledge that our research at Sayil was made possible by a grant (No. BNS-8302016) from the National Science Foundation. We are deeply appreciative of the support, encouragement, and cooperation received from our friends and colleagues at the Centro Regional del Sureste (Instituto Nacional de Antropología e Historia) in Mérida and at Monumentos Prehispanicos (I.N.A.H.) in Mexico City. We are particularly grateful to Ing. Joaquin García Bárcena, Soclgo. José Luis Sierra V., and the members of the Consejo de Arqueología for their help in obtaining the official permit for our project. We wish to thank, too, Tomás Gallareta Negron, Edward Kurjack, and others from Mérida who helped us numerous times with advice and fieldwork. Special thanks are due to Don Miguel Uc, his wife Doña Eulalia, and their family for their continual hospitality, friendship, and many services at Sayil that made our time there so very much more productive and pleasant. At Uxmal our work was most kindly facilitated not only by I.N.A.H personnel but by Sr. Antonio Bustillos C. and his most cooperative staff at the Hacienda Uxmal. Joann Andrews again performed many acts of kindness for her sometimes scruffy visitors. We were most pleased to cooperate with Prof. George F. Andrews and his wife Gerrie and to benefit from their knowledge of Puuc architecture. We also wish to thank the numerous administrators and staff people at the University of New Mexico and the Latin American Institute who have ensured in many capacities that our project always ran so smoothly. By no means least do we wish to acknowledge the splendid effort and interest displayed by our workmen from the Santa Elena district.

In the preparation of this report we have benefited from the assistance of Signa Larralde in historical research, James Snyder in data input, and Matt Schmader and LuAnn Wandsnider on illustrations. Matt also checked the final drawings and is producing a stunning set of maps. Sylviane Boucher was assisted in her ceramic analysis in the Ceramoteca at C. R. S. by Luis Alberto Chac G. and José Evaristo Sánchez C. of the Universidad de Yucatán.



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TABLES

TABLE 1. Feature Totals for the 1984 Mapping Season at Sayil

<u>FEATURE TYPE</u>	<u>SUBTOTAL</u>	<u>TOTAL</u>	
		N	%
<b>Platform</b>			
basal platform		97	17
building platform		43	7
undifferentiated bare platform		63	11
bak chich		<u>381</u>	<u>65</u>
	total platforms	584	100
<b>Building</b>			
foundation brace, well-preserved	30		
	poorly preserved	92	73
stone building, well-preserved	9		
	poorly-preserved	35	26
circular foundation brace	1	<u>1</u>	<u>1</u>
	total buildings	167	100
Stone alignment		6	
Slope terrace		13	
Ring structure		13	
<b>Chultun</b>			
on platform, intact	37		
	collapsed	36	83
off platform, intact	11		
	collapsed	4	17
	total chultuns	88	100
<b>Depression</b>			
Walled depression		2	
Aguada		2	
Sarteneja		3+	
Sascabera/quarry		57	
Miscellaneous		1	
Field wall		12	
Recent building		5+	
Pigsty		3	
Apsidal-ended house platform		2	
Stone basin		164	

TABLE 2. Composition of Individual Feature Clusters

<u>TYPE</u>	<u>N</u>
Single bak chich mound	351
Lone sascabera	48
Aguada	2
Sarteneja	3+
Recent feature	15
Lone ring structure	9
<b>"Residential" cluster</b>	<u>137</u>
Total	565

FIGURES



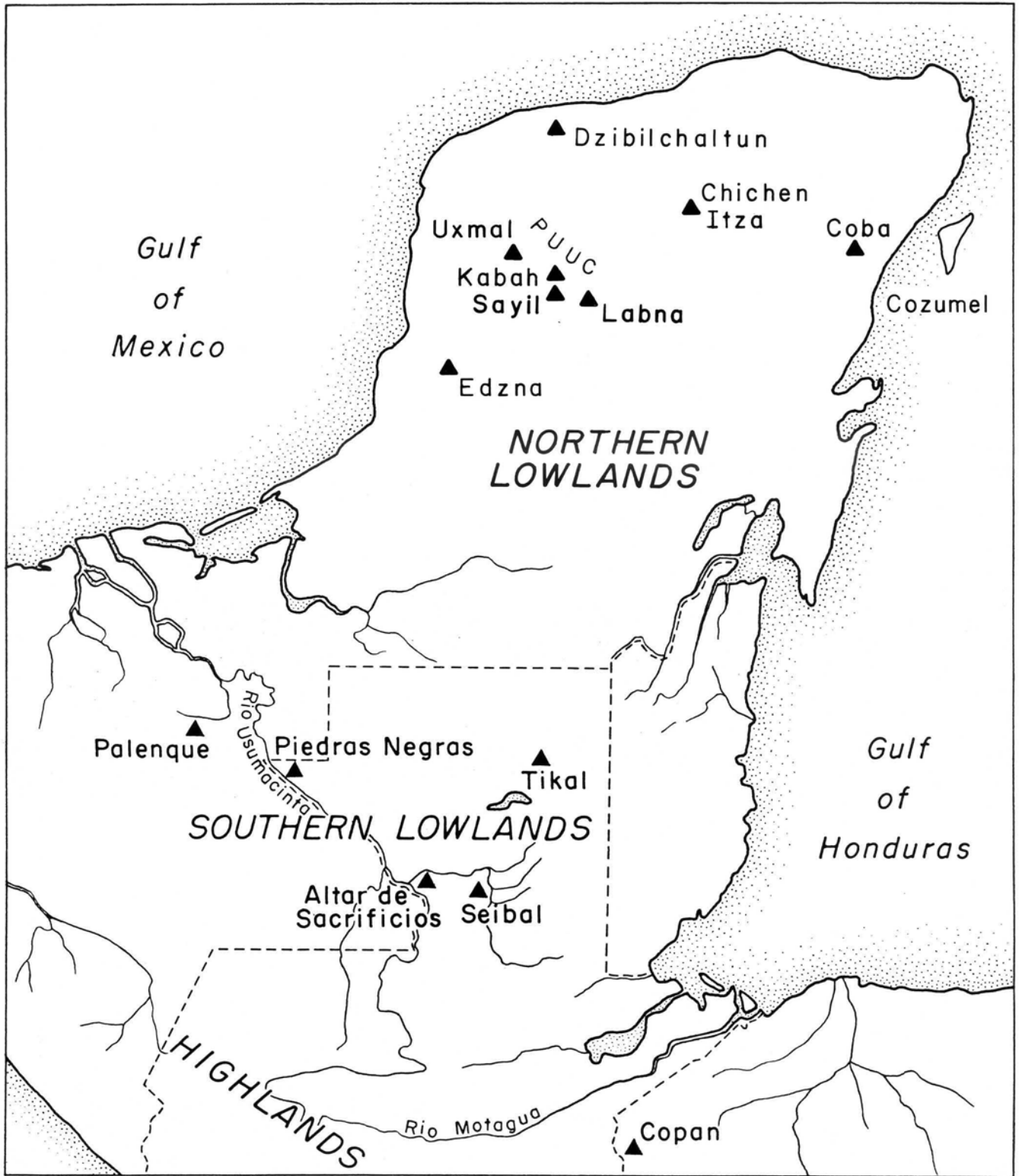


Figure 1. Location of Sayil in the Yucatan



Figure 2. Eastern Puuc heartland (after Garza T. and Kurjack B. 1980 Quadrangle Ticul 16Qd[10]).

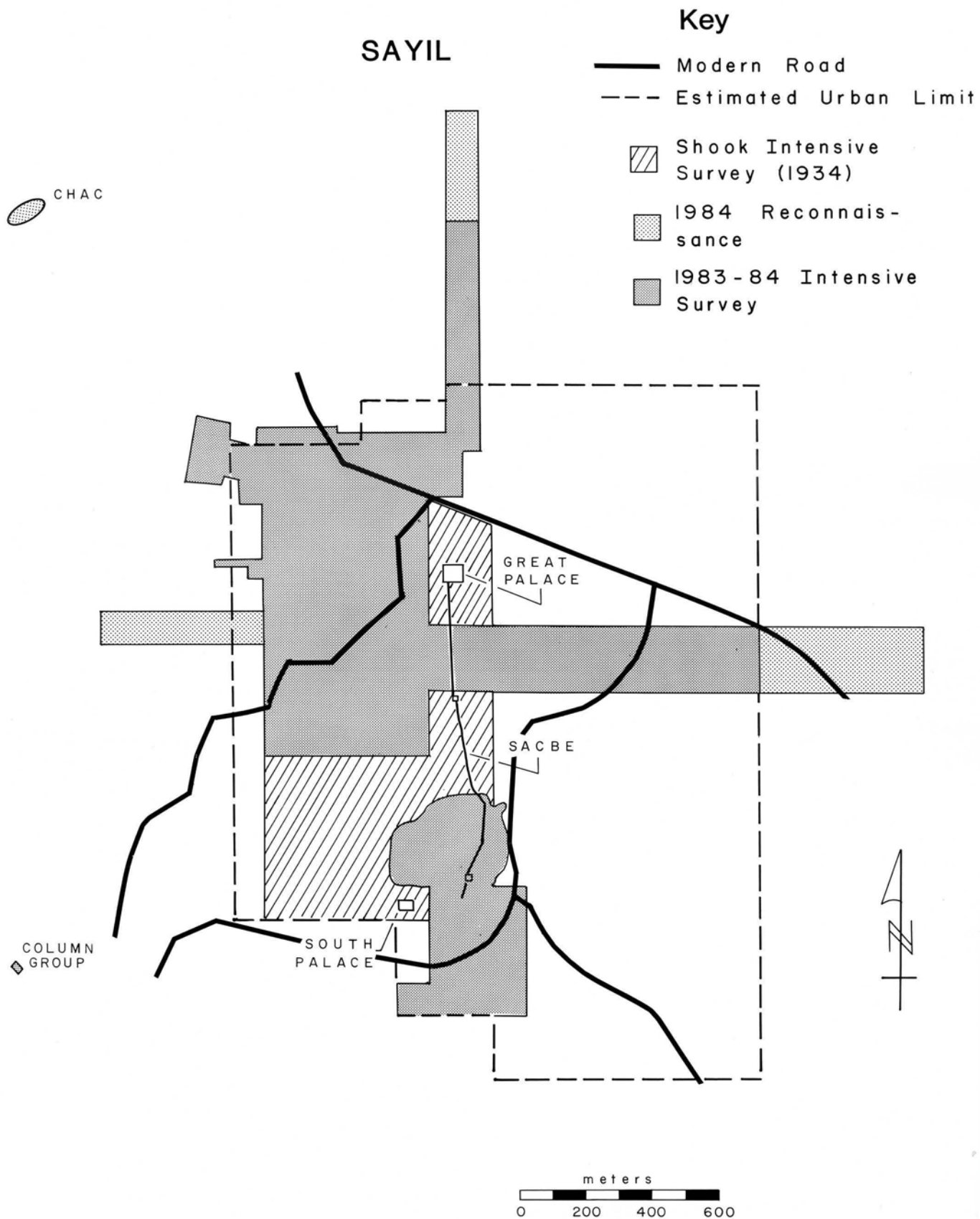


Figure 3. Schematic map of Sayil showing location, limits, and survey areas.

# Pie chart of Sayil feature types

## Percentage of feature types

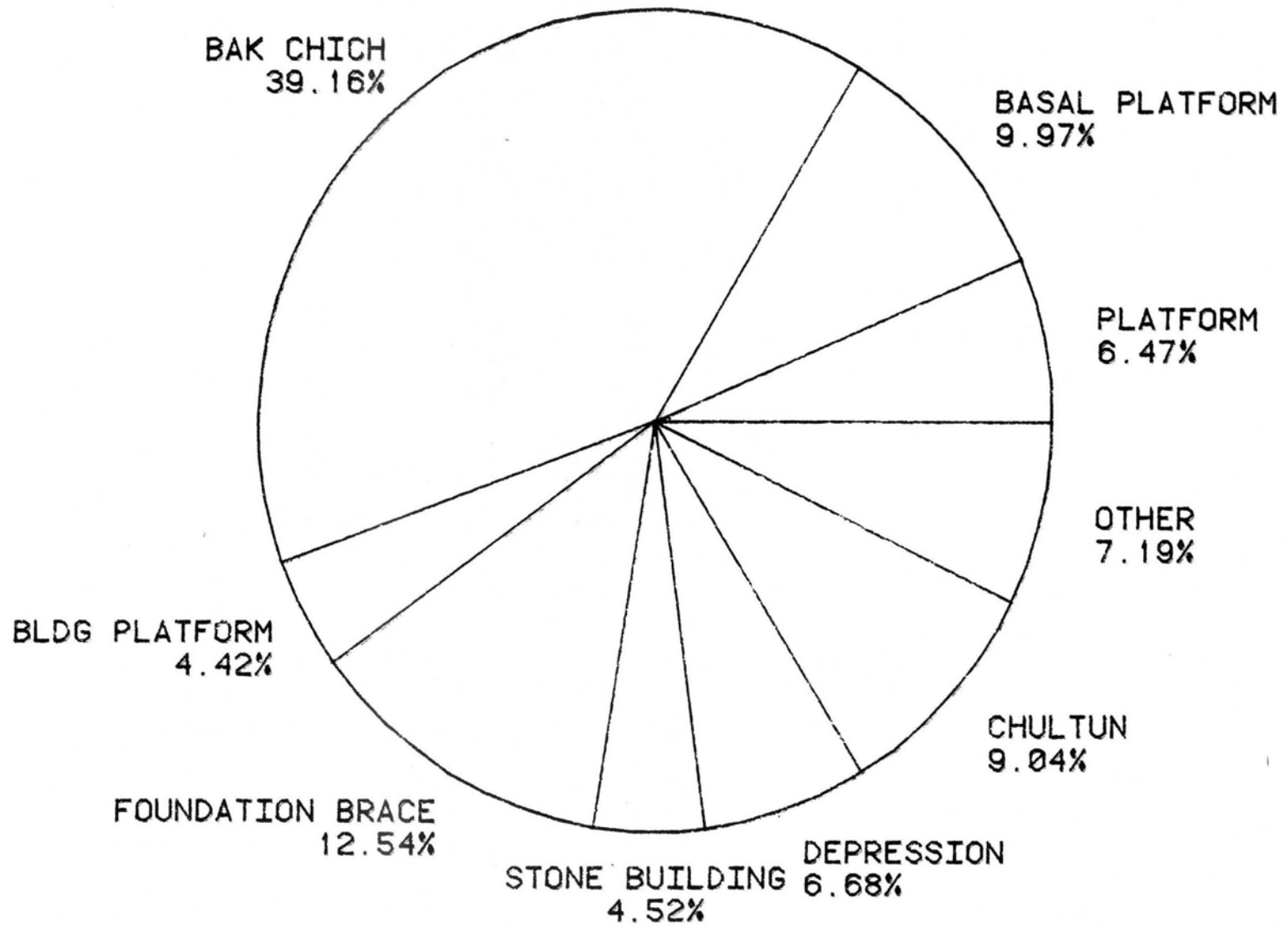


Figure 4. Percentages of feature types at Sayil (1984).

SAS  
PERCENT PIE CHART OF FETYPE

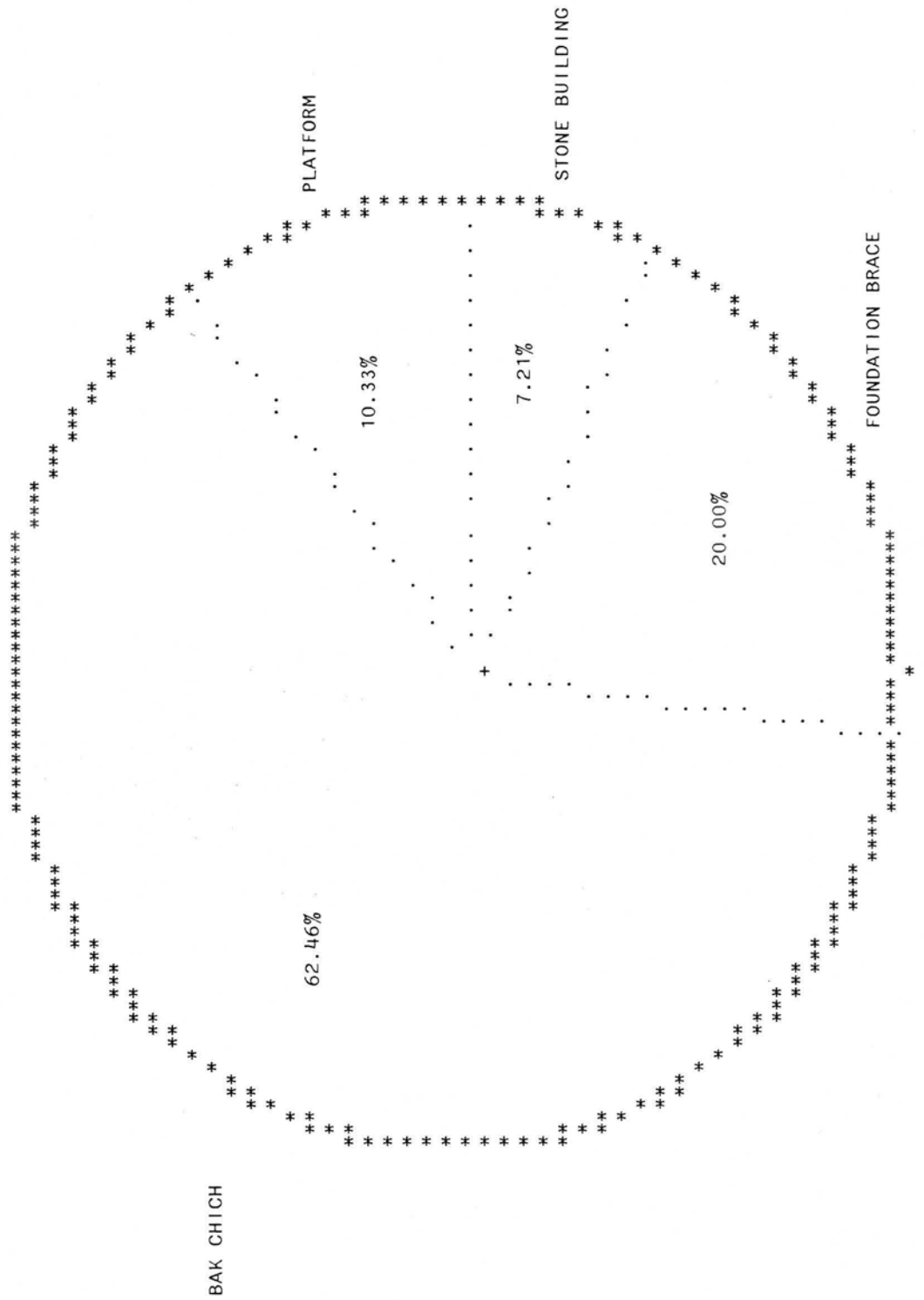


Figure 5. Percentages of potential dwelling features.

Operation 3(A)-(D)  
Feature Cluster 26  
N7904 E4510

Wall Profile

Chich #03

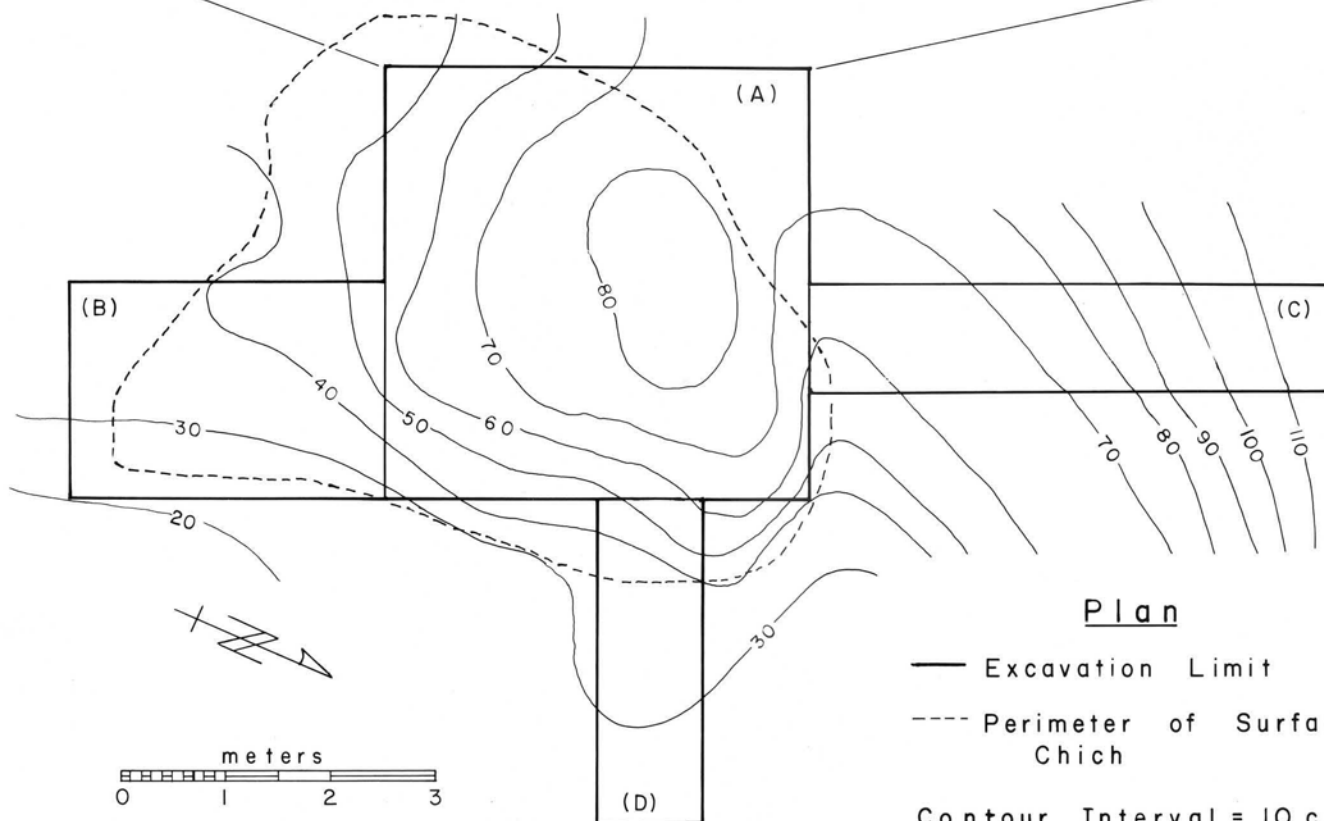
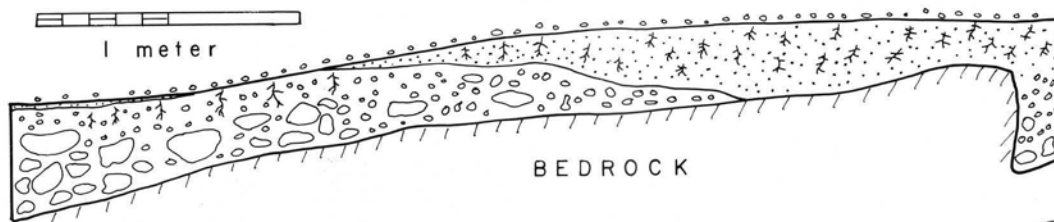


Figure 6. Example of a chich mound excavation atop a nearly invisible low terrace-platform.