ASPECTS OF URBAN DESIGN IN AN ANCIENT MAYA CENTER: EL PILAR, BELIZE

by

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. William J. Kennedy, Department of Anthropology and has been approved by the members of his supervisory committee. It was submitted to the faculty of The College of Social Science and was accepted in partial fulfillment of the requirements for the degree of Master of Arts.

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ABSTRACT

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Research on Maya centers have focused on monogenic descriptions assuming a uniqueness of design rather than looking at Maya centers as systems encompassing multiple functions as well as an innate strategy of urban design. The analysis of Maya architecture, in particular, has often become a pseudonym for the study of individual structure's chronology rather than an examination of structures using architectural theory and method. Using data from the site of El Pilar, this thesis examines the restricted ways in which Maya urban centers have been architecturally analyzed in the past and will incorporate those methods, into the wider scope of architectural theory to propose a holistic analysis of one center. This analysis places ancient Maya regional centers, such as El Pilar, in a broader comparative context, one that readily enables comparisons between other regional Maya centers as well as the cities of other world cultures.

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INTRODUCTION

> ...Even in supposedly unplanned cities, object-space relations are not produced haphazardly. Rather, they manifest a coherent order, a constructed logic, which is to say, an architectural convention worked out in different historical contexts. (Holston 1989: 125)

Since the first descriptions of the European adventurers who "discovered" the remains of the Classic Maya civilization there has existed a fascination with these majestic sites. These first descriptions did not hesitate to christen these ruins cities of the ancient Maya. Anthropological study of Maya cities has not advanced much since that time however. Great strides have been made in studies of ceramics, structures, subsistence, and social structure yet almost no study has been made of the sites as holistic urban systems.

Until recent years, archaeological research in the Maya lowlands concentrated almost exclusively on the monumental architecture of the site centers. Although archaeologists have come to the conclusion that this emphasis gave us a narrow view of ancient Maya society, the move toward more comprehensive settlement surveys left a fundamental gap in our understanding of these centers. The site cores of regional centers have been examined in minute detail on the scale of individual structure chronologies and from regional perspectives. Yet, a great deal of information remains to be discovered in between these two ends on the continuum.

Research on Maya centers had, in the past, focused on monogenic descriptions assuming a uniqueness to each center. Studies have described them as pilgrimage

sites, ceremonial centers, monuments, and market cities, but usually as something uniquely Maya. The data available today, however, suggest that these centers are cities not unlike pre-industrial cities elsewhere. Following this reasoning, the data should be studied anew examining the assumption that these urban centers were complex systems encompassing the multiple functions common to pre-industrial cities. A critical aspect of such an examination would focus on the Maya knowledge of urban design and architectural design principles thus filling in the gap between structural chronology and regional analysis.

Using data gathered by the author in two field seasons of work (1993 and 1994) at the recently explored site of El Pilar, Belize, this thesis will propose a new, more comprehensive analysis of a Maya center using the concept of urban design. Chapter One describes the environmental and geographical setting of El Pilar in an effort to illustrate the resources and natural forms the Maya had at their disposal. Chapter Two gives a regional and chronological perspective to ancient Maya history while Chapter Three describes the Belize River Archaeological Settlement Survey (BRASS) project and the site of El Pilar itself.

The discussions in Chapter Four cover a broad range of anthropological, architectural, and ethnohistorical studies that touch on urban design in Maya centers. Chapter Five uses these studies along with architectural theory and archaeology, in a combined, holistic examination of El Pilar's urban design structure. Lastly, comparisons are drawn between El Pilar and other regional Maya centers, as well as with urban centers of the Roman civilization, to demonstrate that the Maya knowledge of urban design was extensive, but not unique.

The relationship of humans to urban centers has long been recognized as a dynamic one. Winston Churchill once said that "first we shape our buildings and afterwards our buildings shape us" (Pearson and Richards 1994: 3). But to look at Maya centers ignoring the terms of their overall design, we are denying a fundamental

component of the thought processes of the ancient Maya civilization. The purpose of this thesis is to address this problem and suggest a different path of research for the study of ancient Maya centers.

CHAPTER 1

THE ENVIRONMENTAL SETTING

Location and Description of the Study Area

The modern nation of Belize lies on the eastern coastline of Central America. It is bordered in the north by Mexico, in the west and south by Guatemala, and in the east by the Caribbean Sea. Belize is 290 kilometers long by 109 kilometers wide and encompasses 23,000 square kilometers (approximately 8,866 square miles) of mainland plus more than 200 offshore cays. The eastern boundary of the country is marked by the world's second longest barrier reef.

Belize was known as British Honduras from 1862 to 1973 and gained full independence from Great Britain in 1981. It is presently divided into six internal districts: Corozal, Orange Walk, Belize, Cayo, Stann Creek and Toledo. Belize's current population is estimated at around 235,000 with fully one third living in the area of Belize City (Barry 1992).

The Center of El Pilar

Western Belize was an integral part of the ancient Maya world and one of the more important centers found there is that of El Pilar. Though first recorded by the government in 1973, and initially mapped in 1984 by the BRASS project, a detailed mapping survey and excavations in 1993 found the site to be larger than previously assessed. Revised estimates of the center's size make it one of the largest in the region covering more than thirty-six hectares (approximately 89 acres) and includes some seventy major structures situated around a minimum of twenty-five plazas.

The site is located a forty-five minute drive north of the Cayo district capital, San Ignacio. El Pilar is ten kilometers north of the Belize River, presumed to have been an important Maya trade route, and is situated amidst fertile upland soils still extensively utilized by the local Belizeans (Figure 1). The geographical and environmental descriptions are specific to Belize and the physical site of El Pilar. It is important to note that El Pilar probably interacted with the wider region of the Central Maya Lowlands which embraces the greater extent of the Southern Yucatan Peninsula.

The Geography of Belize

The Natural Regions

Belize has been divided into six natural regions (Figure 2). These regions are each unique due to relief, geology, vegetation or climate and the changes between them are so apparent they can be readily identified from the ground. Due to the relief and drainage patterns the country can be roughly divided into two halves on a line just south of the Belize River Valley. The northern half of Belize is primarily low-lying coastal plain and swamp. The south is made up of the Maya Mountains and a narrow stretch of coastal plain (Furley and Crosbie 1974; Robinson 1983).

The six natural regions are: 1) the northern lowlands; 2) the coastal plains; 3) the karst country; 4) the Maya Mountains; 5) the southern lowlands; 6) the cays. The first, the northern lowlands, makes up most of the northern half of the country. This area is mostly rolling limestone hills and level plains. The terrain is similar to that of the Yucatan with slow-moving rivers and poorly-drained swamps. In areas of good drainage there are fertile soils and, originally, large stands of hardwood timber that attracted settlers in the nineteenth century. In the west, near the Guatemalan border, the lowlands rise abruptly over 200 meters to meet the Petén plateau.

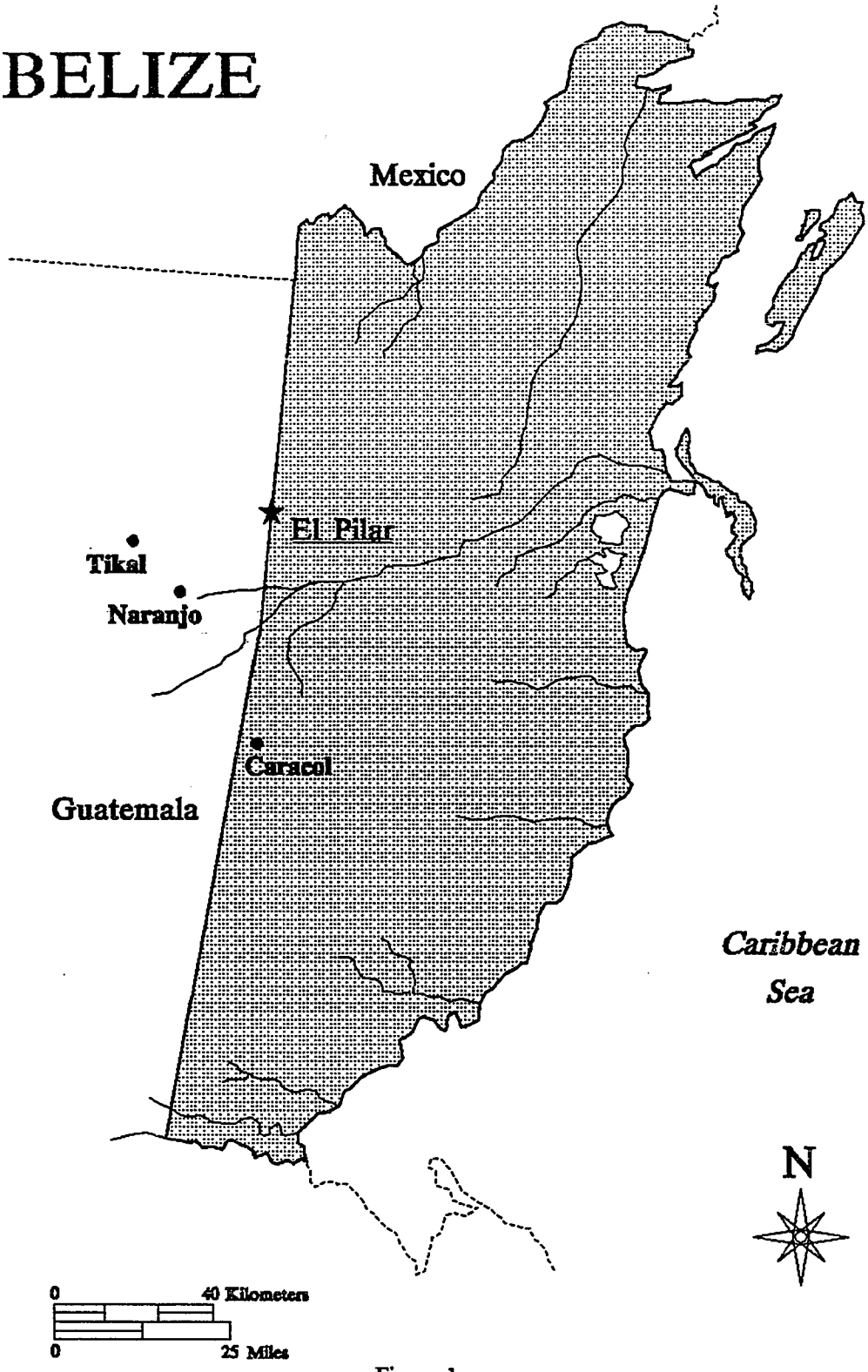


Figure 1
The location of El Pilar

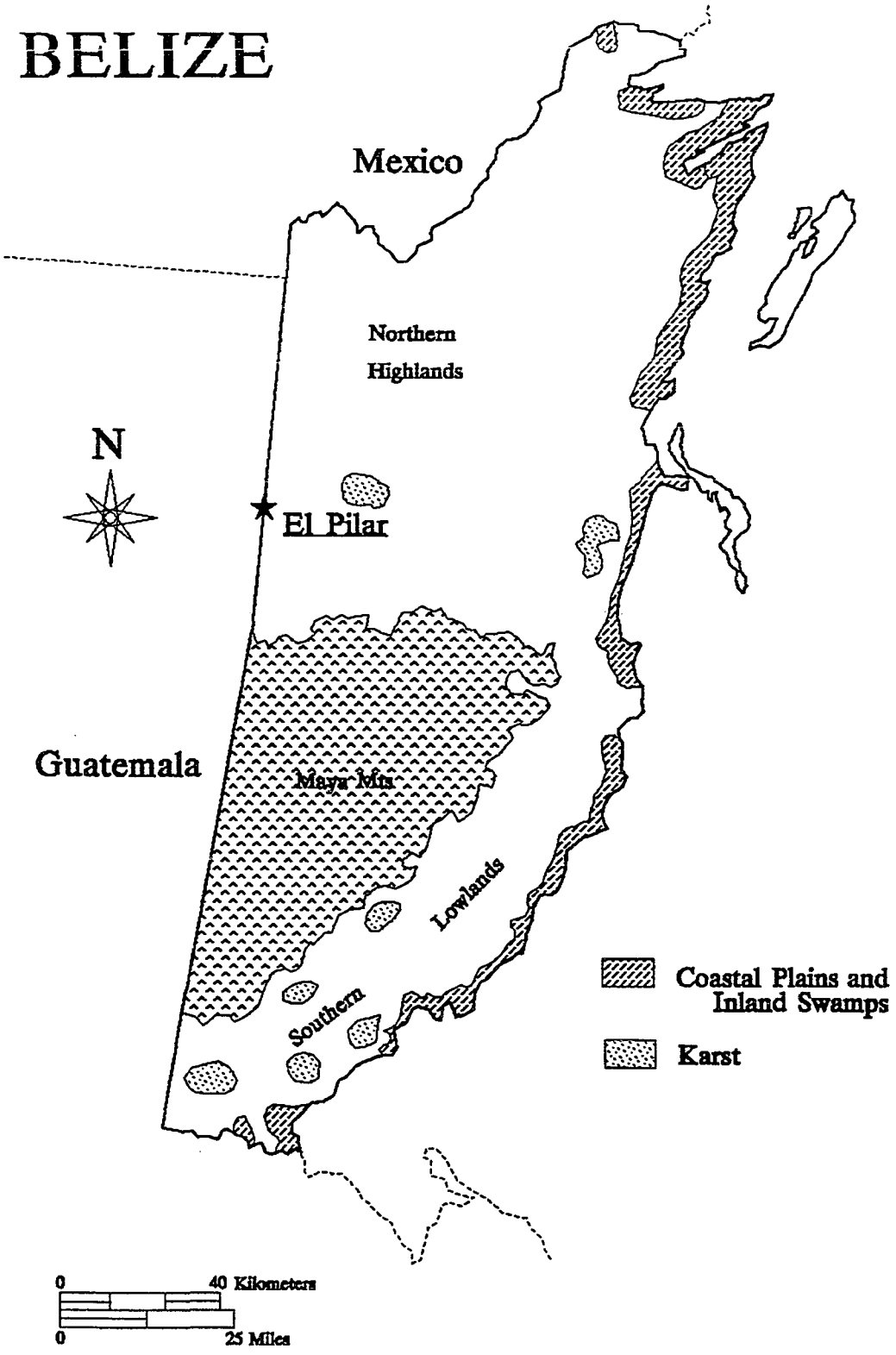


Figure 2
The natural regions of Belize (after Furley and Crosbie 1974)

The coastal plains are low-lying, periodically inundated plains and swamps stretching the length of the country. The largest cities in Belize are found here but most of the coastal area is mangrove swamp, fetid lagoons and few stretches of sand beach. Most of the land is barely above sea level exposing settlements here to periodic floods and the worst kind of hurricane damage - a factor that caused Belize to move the capital to Belmopan in 1971 following Hurricane Hattie in 1961. The land gently rises toward the interior and is covered with the sand and gravel of ancient Pleistocene raised beaches.

Karst topography is a distinctive landscape associated with limestone regions with little surface drainage. Sinkholes, caves, underground passages and lakes are typical features. The large sinkholes filled with water, called cenotes in the Yucatan, are one form of karst feature. Another form of karst topography, cone or tower karst, is caused by the erosion of limestone to form distinctive column-shaped hills. Karst topography is found in several places in the center of Belize as well as in the southern lowlands.

In the southern half of Belize lie the Maya Mountains, a range of quartzite, limestone and granite peaks (Furley and Crosbie 1974). These hills are the highest features in the country. Victoria Peak, in the Cockscomb Range, is over 1000 meters high. This area is little developed, has limited access and has hardly been explored.

The southern lowlands region differs in several ways from its northern counterpart. This area is more hilly and, because of a wetter climate is primarily covered with dense rainforest vegetation. There are also large lagoons and swamps reaching inward from the coast. The southern lowlands have been historically isolated from the rest of the country and today it is still an undeveloped region apart from a few coastal communities.

The last natural region of Belize is that of the cays which form part of the great barrier reef. This reef runs almost 650 kilometers, from Yucatan to Honduras. The

cays are made up of coral atolls between sixteen to seventy kilometers from shore. There are more than 200 of these islands in Belizean waters.

The Rivers

The commanding natural features of Belize are its rivers which form the traditional highways of the area, particularly in the dense vegetation of the rainforests (Figure 3). The rivers drain the Petén of Guatemala in the northern half of the country and the Maya Mountains in the south. The Rio Hondo forms part of the northern border and flows northeast to Chetumal Bay past major Maya centers at La Milpa and Nohmul. The New River drainage includes most of the central northern lowlands and flows northward, also to Chetumal Bay. The south has many shorter rivers flowing east and southeast from the Maya Mountains to the sea. The most important of these are the Sibun, Monkey, Rio Grande, Moho, Temex, and Sarstoon Rivers (Mallan 1991).

The most important river in the country, the Belize River, effectively cuts Belize in two as it winds its way from the Guatemalan Petén to the Caribbean. The Belize River Archaeological Settlement Survey (BRASS)/El Pilar project is located in the northern catchment area of the Belize River. Numerous small creeks and springs in this catchment area provide an unusually, for the Maya lowlands, plentiful supply of fresh water.

The Climate

The Seasonal Cycle

For the ancient Maya as well as the Belizean farmer of today the seasonal cycle of rain, heat and storms was of primary importance. Although all of Belize is classified as a tropical rainy climatic zone there is a significant difference between the northern

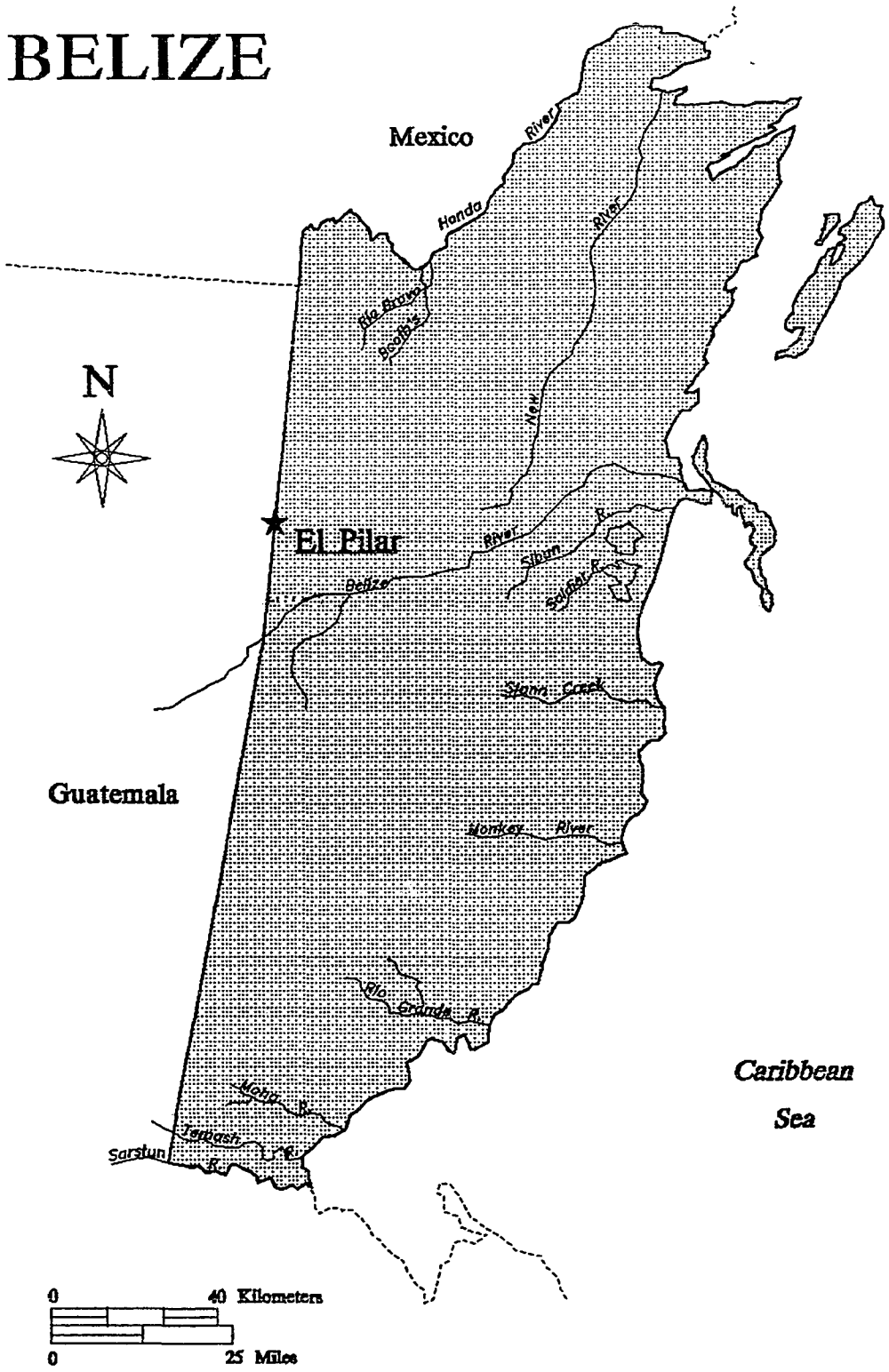


Figure 3
The rivers of Belize

half of the country and the southern. The area north of the Maya Mountains receives notably less rainfall - half or less of the maximum rainfall to the south. The northern lowlands have also shown more seasonal fluctuation than the south (Fedick 1988).

The agricultural cycle is divided into a rainy season and dry season. The Summer months are hot, and tend to be drier, than the "rainy" months of July through January. In the hurricane season, July through October, Belize can be subjected to violent storms. Since 1787 Belize has been hit by twenty-one hurricanes and three since 1931 have caused significant damage and loss of life (Mallan 1991).

Rainfall, Temperature and Humidity in the Study Area

Belize's climate is greatly determined by the presence of the easterly trade winds. From May to November each year the trade winds blow warm, moist air from the Caribbean over the country. During this period Belize receives approximately 70% of its annual precipitation. December through January the winds shift and bring moist air from the Gulf of Mexico to the north. Lastly, from February to April, the trades shift to the south leaving light variable winds and a drier climate (Robinson and Furley 1983).

This warm, moist air over the country is what makes it a tropical rainforest. Rainfall is heaviest in the south and diminishes gradually to the north (Figure 4). In the area around El Pilar and the Cayo capital of San Ignacio annual rainfall is only about half of the 4572 mm in the southern Toledo district (Figure 5; Rice 1974). Although no data has yet been collected on rainfall at El Pilar it appears that the site may get less than San Ignacio due to the abrupt rise in elevation between them.

Temperatures in Belize can show a wide range but, on the average, there is little variation. The warmest months are those of May through September with highs at El Pilar reaching over 38° C (100° F). Lows can be expected from November to January and rarely dip below 18° C (65° F) (Furley and Crosbie 1974). The effective

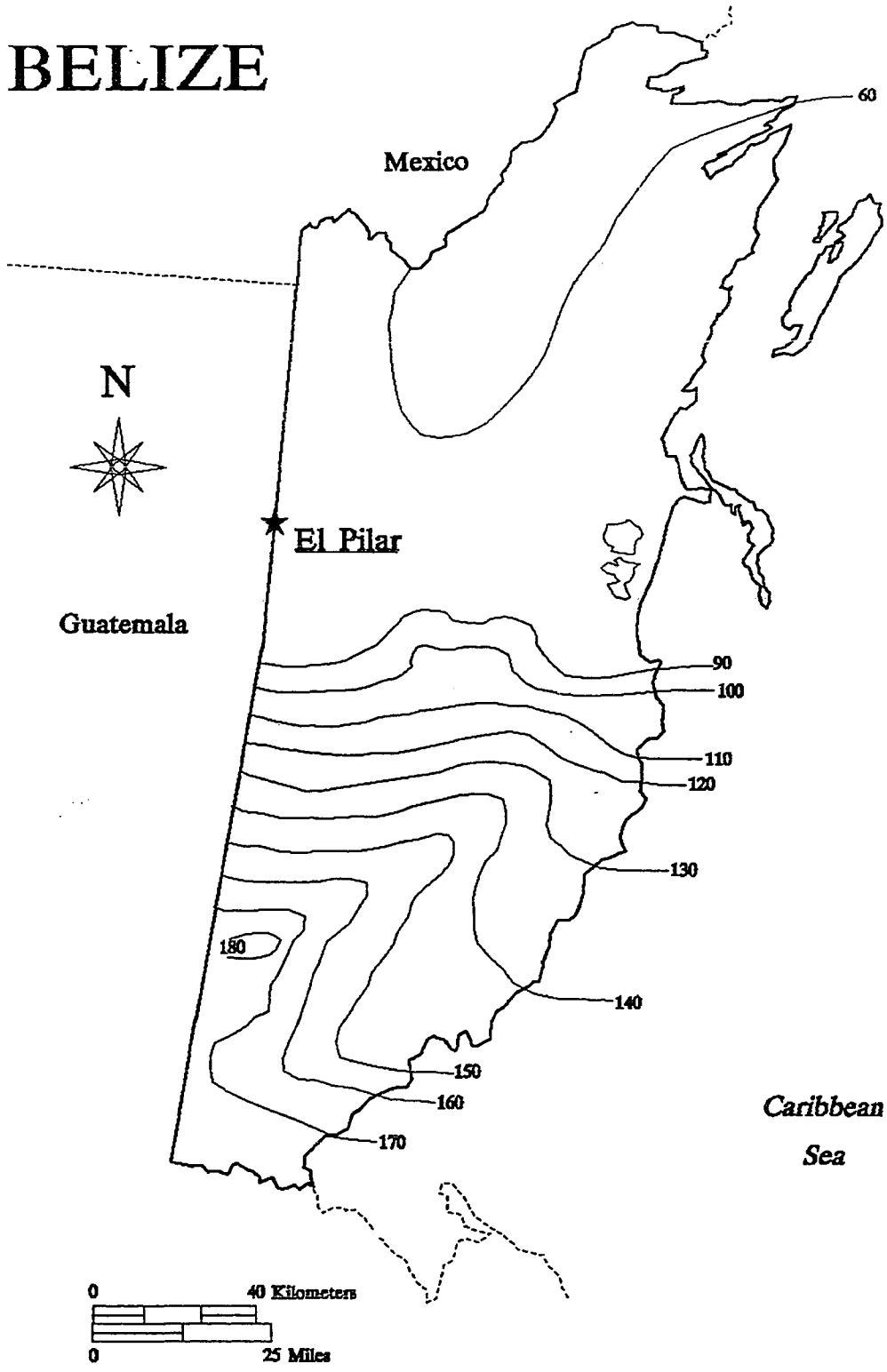


Figure 4
Rainfall isolines in inches for Belize (after Robinson 1983)

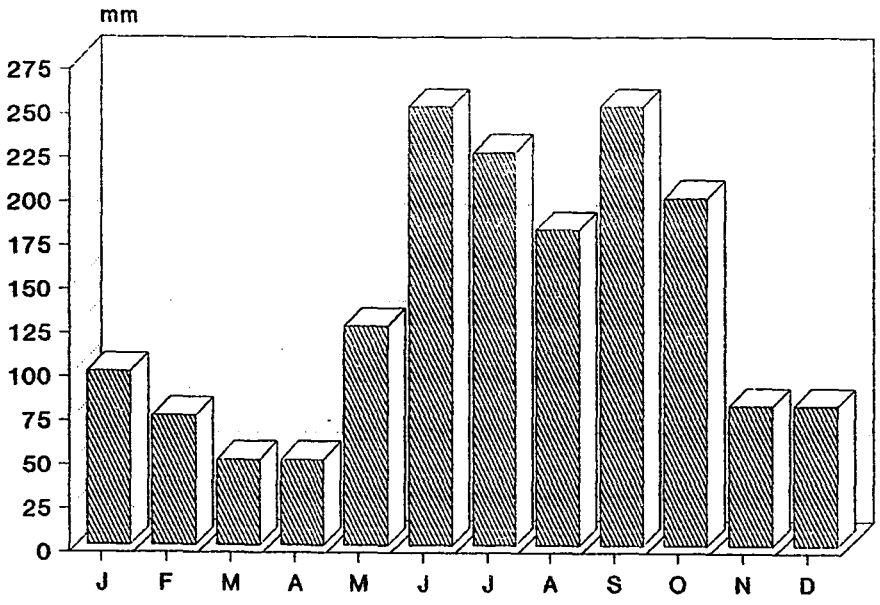


Figure 5
The mean monthly rainfall in San Ignacio (1930-1959) (after Robinson 1983)

temperature is mediated by the trade winds along the coast and aggravated by an average humidity of 80-90%. Inland, the winds diminish but the humidity does not.

Flora and Fauna

Vegetation

A number of botanical expeditions to Belize in the 1920 and 1930's have left a great deal of information on the flora of the country. The BRASS/El Pilar project is also involved in a long-term project with the Ix Chel Tropical Research Centre and the New York Botanical Garden to gather information about the vegetation of the immediate El Pilar area.

Cyrus Lundell developed a classification of five general types of vegetation in the country (Lundell 1942). Two of these types, the rainforest and quasi-rainforest, make up more than two-thirds of Belizean territory (Figure 6). The study area, as does most of the northern lowlands, is covered with quasi-rainforest vegetation. This type is generally a deciduous broadleaf forest characterized by the sapodilla (Manilkara zapota), ramon (Brosimum alicastrum), mahogany (Swietania macrophylla) and, in moister areas, the cohune palm (Orbignya cohune).

The upland area around the site of El Pilar has long been used for milpa (swidden) farming and much of it reflects the associated secondary growth. This secondary growth is characterized by dense thickets of tigerbrush (Pteridium aquilinum), bay cedar (Guazuma ulmifolia), black chichem (Metopium brownei) and, red gumbo limbo (Bursera simaruba) (Fedick 1988). All the quasi-rainforest vegetation may be secondary growth reflecting land use by the ancient Maya (Rice 1974).

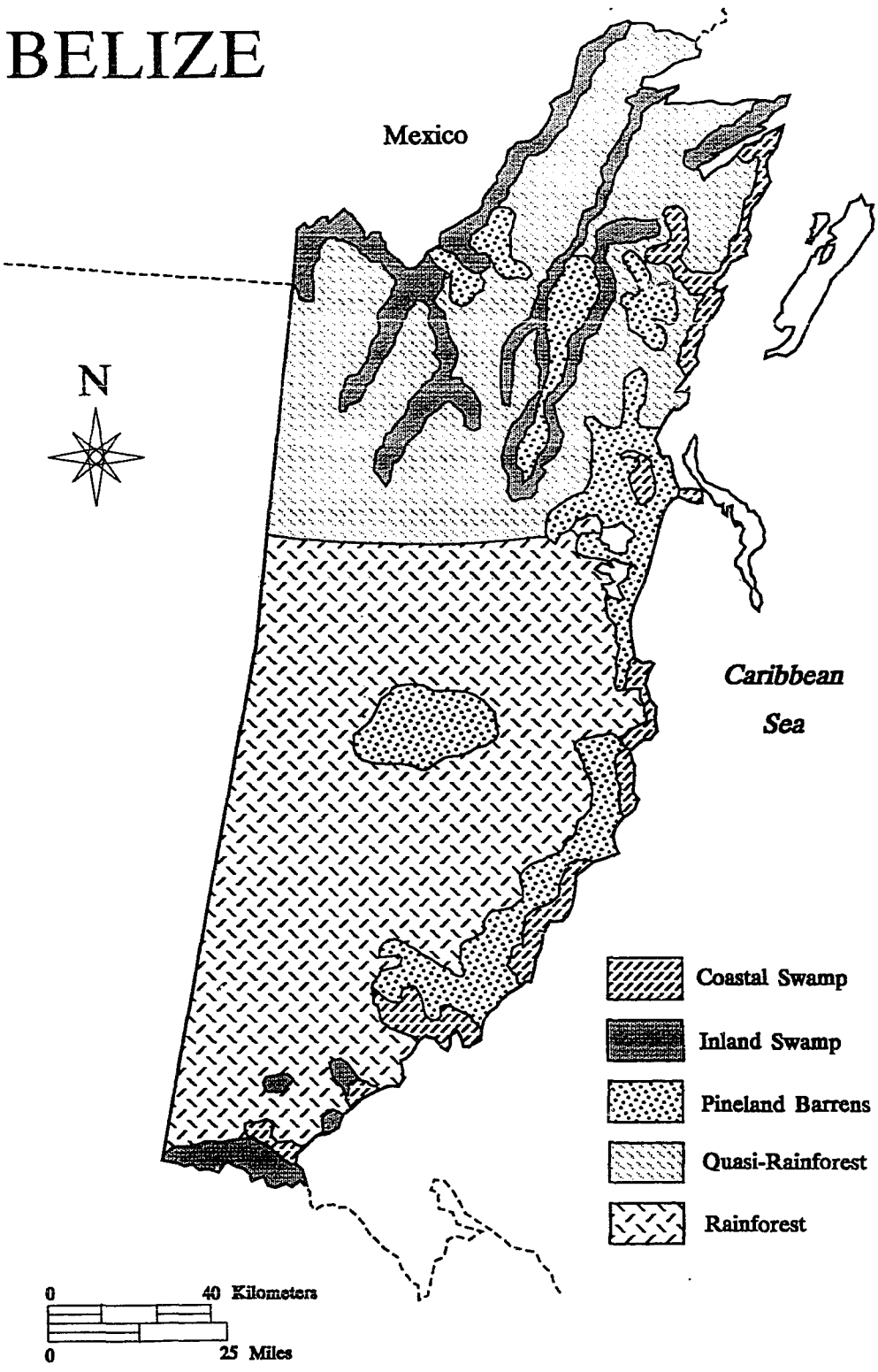


Figure 6
Vegetation zones of Belize (after Lundell 1942)

Wildlife

The rainforest is home to myriad species of animals. One survey found more than fifty types of mammals and ninety-eight varieties of reptiles (Wright, Romney, Arbuckle et al. 1959). The BRASS/El Pilar project is currently involved in a joint survey project with Wildlife Conservation International to determine what species inhabit the study area. Of the mammals, bats (Chiroptera), howler monkeys (Aloutta palliata), armadillo (Dasypodidae), agouti (Dasyprocta), paca (Coelogenys paca) and deer (Odocoileus truei) are seen often in the area. Coral snakes (Micrurus), Pit Vipers (Bothrups nummifera) and Boa constrictors (Boinae) are also found. The area jungle is also alive with birds with woodpeckers (Picidae), flycatchers (Tyrannidae), red-eyed cowbirds (Tangavius aeneus), keel-billed toucans (Ramphastos sulfuratus) and wrens (Troglodytidae) being encountered frequently.

CHAPTER 2

LOWLAND MAYA RESEARCH AND CULTURE

Previous Research in the Upper Belize River Area

Belize was central to many of the early expeditions into the heartland of the lowland Maya but as an easy access point rather than as a object of archaeological attention. The expeditions of Stephens and Catherwood, Walker and Maudslay all used Belize as an entry point but none of them mentioned the many large ruins in the interior (Hammond 1983). In fact, it was not to be until the late nineteenth century that any study of Belize's ancient monuments was made.

The first mention of the Maya ruins in the country was made by Dr. Thomas Gann, the Colonial Medical Officer for British Honduras. Gann was an Anglo-Irish doctor who was posted to the colony in 1893 and stationed in the north at Corozal. Local finds of pottery and skeletal material interested Gann and he began a hobby of digging in the ruins that was to last him the next forty years.

Thomas Gann is one of those historical figures that people tend to either like or passionately hate. His crude methods of exploration at ruins such as Lubaantun, Xunantunich, and Santa Rita have earned him the disdain of many of today's archaeologists. To be fair, with the exception of his occasional use of dynamite to explore mounds, his methods were as good as anyone's at that time. He tried to carefully record his finds under adverse conditions and published his findings, something that is a challenge for modern archaeologists. He was the first to explore the ruins of the Upper Belize River area, looking at the ruins of Xunantunich (Benque Viejo) in 1894-95 and again in 1924 (McKillop and Awe 1983).

Xunantunich, long thought to be the administrative center in the valley, has been the most investigated ruin in the area (Figure 7). Not only was it very accessible but it also was located near the village of Benque Viejo, the starting point of many expeditions to the interior of the Petén and Tikal in Guatemala. In 1905, Teobert Maler spent a month exploring the Castillo, the large pyramid at Xunantunich, before starting his own journey to the interior. This expedition was chiefly concerned with the site of Naranjo, only twenty km southwest of El Pilar, but also mentions the site of Yaloch, nine km northwest of El Pilar, though it does not appear that Maler visited the Yaloch (Maler 1908). The proximity of Naranjo to El Pilar may prove very significant as it is generally accepted that Naranjo was an important regional capital with ties to Tikal. A 1972 article by Kent Flannery examining central place theory and the positions of major centers in the Maya Lowlands seems to predict the existence of a major center at the location of El Pilar.

The period from about 1925 until 1960, has been called the institutional period of lowland Maya exploration. Expeditions sponsored by the British Museum, Peabody Museum, University of Pennsylvania, Cambridge University and the Carnegie Institution of Washington were in Belize looking for major centers and acquisitions for their collections. Oliver Ricketson, with the backing of the Carnegie Institution, conducted limited exploration along the Belize River, including excavations done at the minor center of Baking Pot in 1929.

Like Maler, Raymond Merwin came to the area with the backing of the Peabody Museum of Archaeology and Ethnology. His explorations into the Petén of Guatemala focused on the ruins of Holmul and are considered pioneering work in the study of the lowland Maya (Merwin and Vaillant 1932). Holmul, a minor center of only five plazas, is located approximately twenty-five km northwest of El Pilar.

In 1931 the eminent British archaeologist, J. Eric Thompson, began work in the Belize River area. Under the auspices of the Carnegie Institution, he began

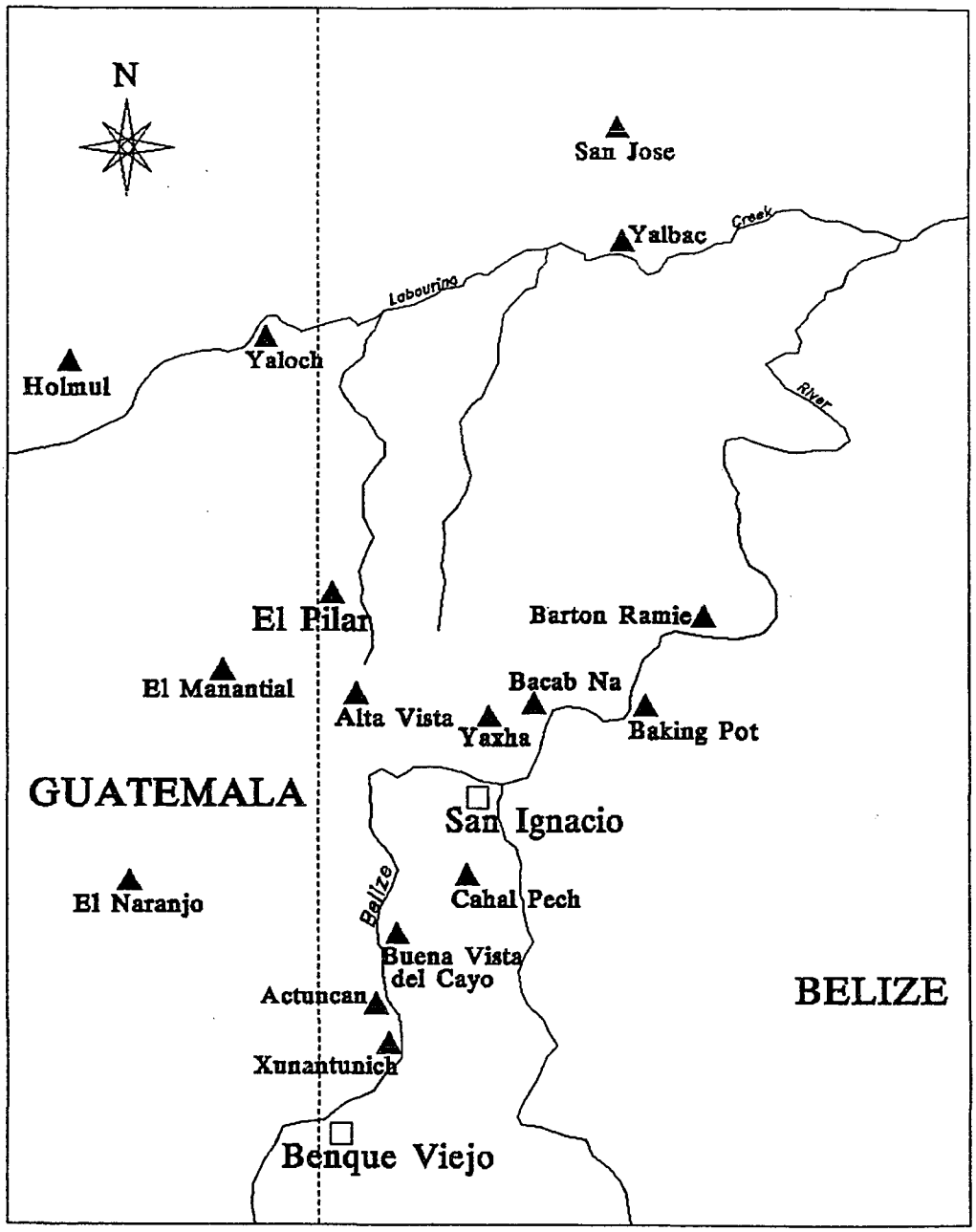


Figure 7
Maya centers in the Upper Belize River Valley area

excavations at San José, a minor center northeast of El Pilar. He also made some mention of the ruins at the nearby village of Yalbac. Thompson returned to San José in 1934, 1936 and 1938 to continue work on San José. He reported that it cost him $1500 per year, including transportation to and from Chicago, to continue excavation (Thompson 1939). Thompson also excavated at Xunantunich in 1938. There was a pause in archaeology during the war years and research in British Honduras began again with excavations conducted by William and Michael Coe at Nohoch Ek, a small site midway between Cahal Pech and Xunantunich, in 1949 (Coe and Coe 1956).

The Belize River valley was the focus for a great deal of excavation and settlement survey work in the 1950's. Once again, Xunantunich received attention starting with work done in 1949 and 1950 by Linton Satterwaite, from the University of Pennsylvania Museum, and A.H. Anderson the District Commissioner for Cayo (later the first Commissioner of Archaeology). Satterwaite also conducted limited excavations at Cahal Pech in 1951. They were followed by Michael Stewart, an amateur archaeologist working for the Cambridge University Museum, who studied Xunantunich in 1952, 1953 and 1957. Euan MacKie, the head of the Cambridge Expedition to British Honduras in 1959-60, also worked on a number of structures at Xunantunich (MacKie 1985).

Among the important work done in the Belize River valley at this time was the settlement survey done in the Cayo area by Gordon Willey 1953-56. Willey looked at the ruins of Cahal Pech, overlooking San Ignacio, and the nearby Melhado site before turning his attention to the mounds at the newly cleared farm of Barton Ramie (Willey and Bullard 1956). His surveys of the settlement patterns in the valley and, more importantly, the establishment of a comparative chronology of local ceramics, continue to greatly influence work in the upper Belize River area today (Willey et al. 1965; Gifford 1976). Willey's Belize River Survey was the first systematic study of

settlement patterns in the Maya lowlands. Subsequent archaeological projects in the Central Maya Lowlands have included this aspect in their research projects.

The center of Cahal Pech was examined again in 1960 and in 1969 by the first Archaeological Commissioner, A.H. Anderson, and his successor, Peter Schmidt. Unfortunately the visits were prompted by the need for salvage work due to looting. Today, looting remains a problem for the more accessible sites in the valley (Pendergast and Graham 1981).

Currently there are four major projects at work in the study area of the Belize River Valley. Richard Levanthal and Wendy Ashmore's Xunantunich Archaeological Project (XAP), from the United States, is continuing archaeological research and building consolidation efforts while recently initiating a settlement pattern study of the district. Jaime Awe, a Belizean archaeologist, is conducting an investigation of the Formative occupation in the Cahal Pech area. James Garber, of Southwest Texas State University, is conducting a settlement survey of the Belize River floodplain in the area of Blackman Eddy.

Lastly, the BRASS project, under the direction of Anabel Ford, UCSB, has concentrated on surveying settlement patterns north of the Belize River up into the ridgelands. The BRASS project has established a regional data base for the examination of both residential and public architectural patterns. The combined information gathered by these projects has great potential to provide a revised picture of the nature of Maya settlement.

Lowland Maya Culture History

The ancient Maya did not suddenly disappear from the lowlands as many authors and scriptwriters would have it. Today there are 3-4 million Maya, speaking twenty-nine separate Maya languages of the same family, living in Central America (Vogt 1990). The mystery is not where they went but why they abandoned the trappings of their advanced civilization in the Central Maya Lowlands. The civilization

studied by archaeologists began approximately 4,500 years ago and peaked between the years A.D. 250-900 after which the great cities of the Central Maya Lowlands were mostly abandoned. For convenience, archaeologists have divided the cultural history of the lowland Maya into four periods: the Archaic, the Preclassic or Formative, the Classic, and the Postclassic (Figure 8).

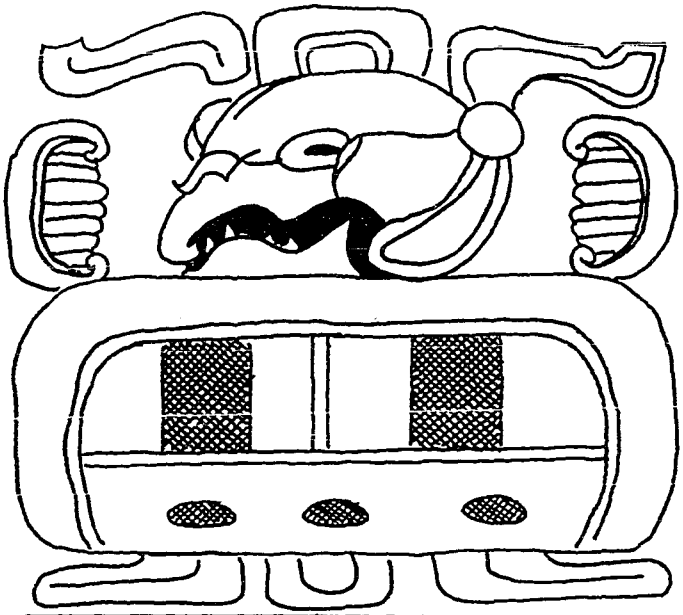
The Archaic (prior to 2000 B.C.)

Before 1975 preceramic sites in the lowlands were unknown to archaeologists. The prevalent theories were that the ancestors of the Maya had migrated into the lowlands at some late date from either north or south. Surveys of the coastal area, particularly the Belize Archaic Archaeological Reconnaissance (BARR), under the direction of Richard 'Scotty' MacNeish, found hundreds of preceramic sites establishing a much longer cultural history for the area (Zeitlin 1984). These paleo-indians are thought to have been the ancestors of the Maya and the fact that they had arrived in the area so early made the development of the Maya civilization much less mysterious.

The first occupants of the lowlands were foragers who utilized the multiple environments found in close proximity to the coast. Although seasonal occupation of sites was apparently the norm, the evidence suggests more long term occupation began as early as 4200 B.C. in northern Belize (Zeitlin 1984).

The Preclassic (2000 B.C.- A.D. 250)

The Preclassic, also known as the Formative, has been divided into three periods, the early, middle and late. This period was identified early in the history of lowland archaeology at Uaxactun but has since been redefined several times and pushed back further in time (Smith 1955).



Post-Classic		1575 1000
Classic	Late	600
	Early	250
Pre-Classic	Late	B.C. - A.C. 300
	Middle	1000
	Early	2000
Archaic		

Figure 8
Lowland Maya chronology

The early period of the Preclassic saw the beginnings of sedentary agriculture, ceramics and household architecture. This phase is now defined as roughly 2000 - 1000 B.C. Much of what we know about this period, and the earliest ceramic evidence, come from the site of Cuello, Belize. Although the dating is still controversial, the Swasey complex defined at Cuello undoubtedly predates any previously known lowland ceramics (Andrews and Hammond 1990; Hammond, Clarke and Robin 1991).

These early agriculturalists grew maize, cacao and a selection of root crops (Hammond et al. 1979). Hunting and gathering still provided much of the subsistence for the first Maya. Estimates have been made that only 20% of their diet was supplied by maize and related crops while the faunal evidence shows a dependence on hunting (Hammond 1980; Hammond and Miksicek 1981).

The Middle Preclassic is the interval between 1000 B.C. and 300 B.C. Settlements were more widespread and the Maya began to move from the coast, up the river valleys and into the interior (Puleston and Puleston 1971). There is palynological evidence for clearing and the cultivation of maize around 2000 B.C. in the Petén but no archaeological evidence until around 900 B.C.(Rice 1976).

The Middle Preclassic also witnesses the first evidence for large-scale public architecture. Evidence from northern Belize at Cuello, Cerros and Lamanai, show temples and pyramids dating from this period (Pendergast 1981; Hammond 1986). Evidence also suggests some occupation and construction in the Belize River Valley area (Awe

From 300 B.C. to A.D. 250 the lowland Maya continued to expand in population. The population growth and ensuing competition for available land probably led to further expansion of Maya settlement as well (Hammond 1974). Maya civilization began to grow more complex and elaborate as reflected in their social structure, architecture and agricultural methods (Culbert 1977; Willey 1977;

Scarborough and Robertson 1986). One socially important development during this time may have been the advent of Maya kingship, a development that would shape the social history of the lowlands into the Postclassic period (Freidel and Schele 1988). This is important in the context of this thesis as social hierarchy is often reflected in the scale and type of architecture. It is at the outset of the Preclassic that we find clear evidence for construction at the center of El Pilar (Ford and Fedick 1992).

The Classic (A.D. 250 - 900)

The Classic era is defined by the appearance and use of dated monuments. Although monuments dated earlier than A.D. 250 are known, they apparently came into wider use toward the end of the third century (Marcus 1991). Stela and altars recording the political, social and religious history of the Maya began to show dates using the Long Count, a calendrical count based on multiples of a 360-day year with a starting point of 3114 B.C.. These seven centuries exhibit a tremendous increase in population and the building of much of what we see today - monumental stone vaulted buildings and huge temple pyramids. There was also an increasingly complex social structure as reflected in sumptuous elite burials.

The Classic is often divided into two periods, the Early and the Late, which was separated by the "hiatus." The hiatus was a time in which there seemed to be a marked decrease in building and the erection of dated monuments. Recent studies have pointed to this as a Central Petén phenomenon probably brought on by Tikal's involvement in a series of destructive offensive and defensive wars (Chase and Chase 1987; Schele and Freidel 1990).

Toward the end of the Classic the elaborate civilization of the Maya began to come apart at the seams. Notably, there was an increase in conflict, probably as a result of competition over scarce resources, culminating in a drastic reduction in population. This most likely was the result of a number of interrelated factors rather

than any one cause (Sabloff and Willey 1967; Santley, Killion and Lycett 1986; Culbert 1988). In any case, the great Classic centers in the central lowlands collapsed first - Tikal was abandoned in the ninth century. Building activity continued at many of the eastern centers right to the end of the Classic and, in a few cases, into the Postclassic.

The Postclassic (A.D.900 - 1550)

The Postclassic has been generally seen as a decadent, militaristic, and terminal phase in Maya history. The focus moves from the southern Maya lowlands to the north, the Yucatan, where the Spanish first made contact with the Maya culture (Sabloff and Andrews V 1986). Although the southern lowlands were greatly depopulated there still were Maya living there, building and maintaining the new cities. There have been many attempts made at estimating the Maya population in the Lowlands during the various phases. It is important to state that the author does not attempt to give population estimates for either regions or specific sites in this thesis. Population estimates have been based on too many assumptions (average household size, uniform structure density and concurrency of occupation) to be a reliable reflection of actual numbers (Ford 1991).

The site of Lamanai, in Belize, is one of the few sites of this period to be examined in detail. Not only did the people of Lamanai continue to build and trade with their neighbors but they continued to occupy the center until around 1675 (Pendergast 1985, 1990). The Spanish founded a mission at Lamanai in 1570 and another at Tipu/Negroman in the Upper Belize River valley. These were abandoned during of a revolt of the Maya in the 1630's (Bolland 1974). It was not until 1696 that the Spanish conquered the last of the independent Maya city-states, the Itza of Tayasal.

CHAPTER 3

THE EL PILAR SITE

Site Background

The site of El Pilar is located twelve km north of the western Belizean city of San Ignacio immediately on the Belize-Guatemala border. The area has long carried the name of El Pilar and the origin of this name is not at al clear. The center was reported to the Archaeological Commissioner of Belize in the 1970's but its true extent was not known. In 1983 the Department of Archaeology showed the site to Dr. Anabel Ford, of the University of California-Santa Barbara, and a rough preliminary map was made of the major architecture in 1984 (Figure 9). In 1986, as part of the larger area settlement survey, minimal excavation and rescue work was pursued at the site. The first full-scale investigation of El Pilar was begun in 1993.

El Pilar has more than twenty-five identified plazas in an area exceeding thirty-six ha and ranks equally with major centers of the lowland core area. It is the largest center in the Belize River area, almost three times the size of such well-known centers as Baking Pot or Xunantunich. The site is divided into three primary areas: northeast Pilar, southeast Pilar and Pilar Poniente. The eastern sections are connected to the western section by two causeways extending between two large public plazas. Survey and excavations have been concentrated in the two eastern sections of El Pilar within the border of Belize. The western section, Pilar Poniente, across the border, in the Republic of Guatemala.

The construction at the site has been found to be of a fine and durable limestone and the preservation is exceptional. Beautifully plastered masonry rooms,

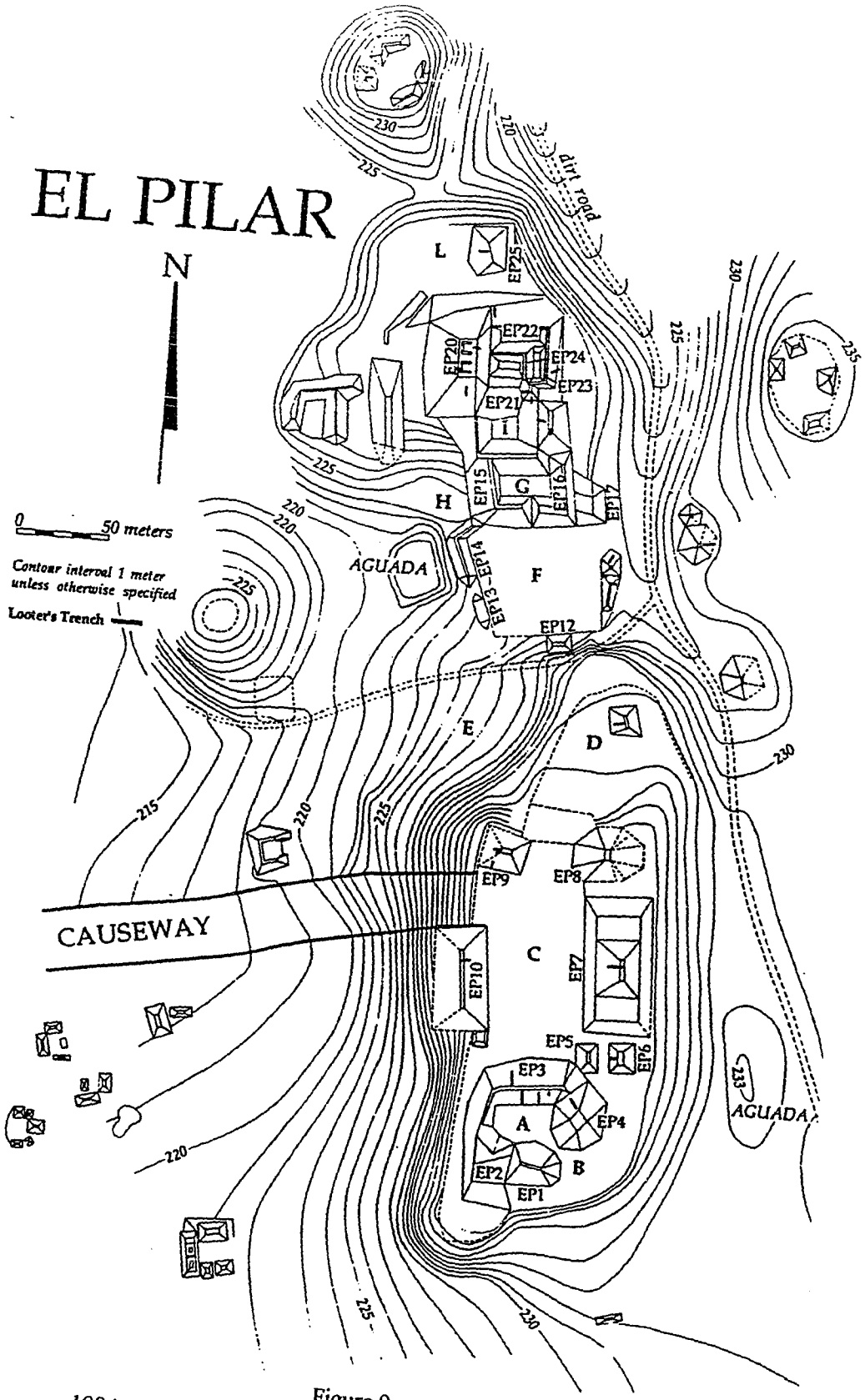


Figure 9
1984 preliminary map of El Pilar (BRASS/El Pilar Project)

imposing corbel vaults and monumental stairways have been identified in looters' trenches and controlled excavations conducted for structure-mapping purposes. Initial chronologies based on ceramic seriation have found that construction of El Pilar may have begun in the Middle Preclassic and continued with major remodeling completed in the Terminal Classic.

The BRASS Project

The Belize River Archaeological Settlement Survey (BRASS) was initiated in 1983 by Dr. Anabel Ford of the University of California - Santa Barbara in the upper Belize River area surrounding San Ignacio, Belize. Previous pioneering work in settlement survey has shown that this region was occupied very early and continuously and could have been logistically important for the ancient Maya, situated on a major seasonally-navigable river between the Caribbean and Tikal in the heart of the Maya Lowlands (Willey et al. 1965). In order to further our appreciation of Maya social complexity, it is imperative that the development process of the household be understood. With this in mind the BRASS project was designed to closely examine the relations between house sites and the natural environment and their spatial patterning in a representative sample of the Belize River area.

The 1983 and 1984 field seasons involved the survey of all obtrusive cultural remains within three 250 m wide transects, one ten km and two five km long. The three transects were designed to traverse a range of natural environmental zones (from the river bottom to the ridgelands peaking 300 m above) as well as include the variation of settlement sizes, from individual farmhouses to the major center of El Pilar (Figure 10). Excavations were made at a stratified random sample of 12.5% of residential middens within the various land resource zones defined (Ford and Fedick 1992).

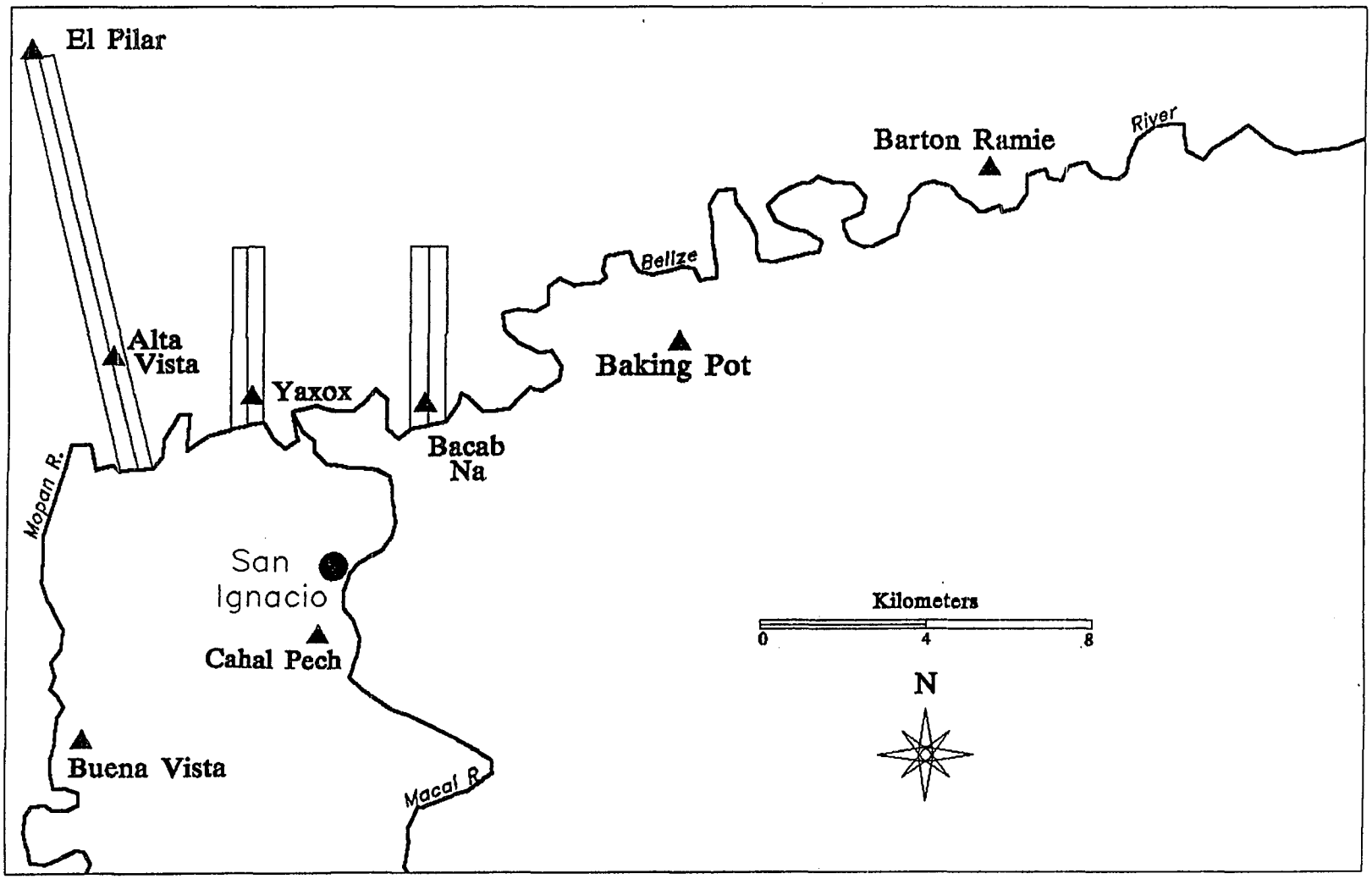


Figure 10
BRASS settlement survey transects in the Upper Belize River Valley

Test excavations revealed an obsidian production site in the ancient settlement cluster at Laton about 4.5 km south of El Pilar. The 1985, 1989 and 1992 seasons concentrated on further excavation in this important area. Laton is the first identifiable obsidian production site found in the Central Maya Lowlands. The site yielded thirty-three exhausted prismatic cores and debitage densities as high as 1.7 million obsidian pieces/m^3 (Ford 1994).

The 1986 field season was dedicated to rescue and test excavations at the minor centers of Alta Vista, Yaxox, Bacab Na and the major center of El Pilar. Valuable construction sequence and chronological data were recovered from looters trenches and those that threatened the stability of structures were backfilled. Test pits were also excavated in plaza areas to identify the nature of rebuilding in open areas.

The analysis of data from the 1983-84 survey transects suggested a relationship between the land resource zones and settlements that was further tested in the 1987 field season. Systematic surveys were made of small areas (82.2 ha total), supplemented by a general reconnaissance in the study area, to further examine these inferences (Fedick 1988; Fedick and Ford 1990; Ford 1990).

The BRASS/El Pilar Project

In 1993 BRASS began a detailed study of the center of El Pilar which sets the foundation for a long-term study projected for five or more years. The research plan is segmented into mapping, excavation, and consolidation components. The 1993 season involved clearing large portions of the site, the fine scale mapping of the major architecture and limited excavation of structure corners to assess siting, building types and preservation (Wernecke 1993). Twenty-four excavation units and eleven looter's trench operations provided a preliminary chronology and information regarding the preservation levels at the site. Based on area ceramic chronologies there was construction continuously from the Preclassic through the Terminal Classic, 250 BC to

AD 1000 (Smith 1955; Willey et al. 1965; Adams 1971; Gifford et al. 1976; Sabloff 1975).

In 1994 the mapping project was completed and limited exposure excavations were conducted to assess the lines of communication between the plazas in the northeast portion of the site. In addition, with the assistance of personnel from the Instituto de Anthropologia e Historia de Guatemala (IDEAH) and the Consejo Nacional de Areas Protegidos (CONAP), Pilar Poniente was explored and mapped. In cooperation with the Government of Belize, an environmental and archaeological reserve of over 2100 acres is being established around the site core and the preliminary work done to establish a similar reserve on the Guatemalan side of the border (Figure 11; Ford and Wernecke 1994).

Site Description

This thesis will deal primarily with the analysis of the eastern sections of El Pilar as the work to date has concentrated in that area. Accordingly, the site description will also concentrate on this area. Data used in this study was gathered by the author during field seasons in 1993 and 1994. The core zone of monumental architecture in eastern El Pilar is approximately 600 m by 200 m and includes seventeen major plazas. This description will limit itself to a detailed portrait of seven major plazas and the acropolis, itself including five plazas. The plazas were initially lettered sequentially which were given Maya or Spanish plant names to match their letters.

Plaza A (Axcanan)

Plaza Axcanan is the southernmost plaza in the eastern complex and its interior size is 35 m by 20 m (Figure 12). It is an intimate plaza surrounded by two major

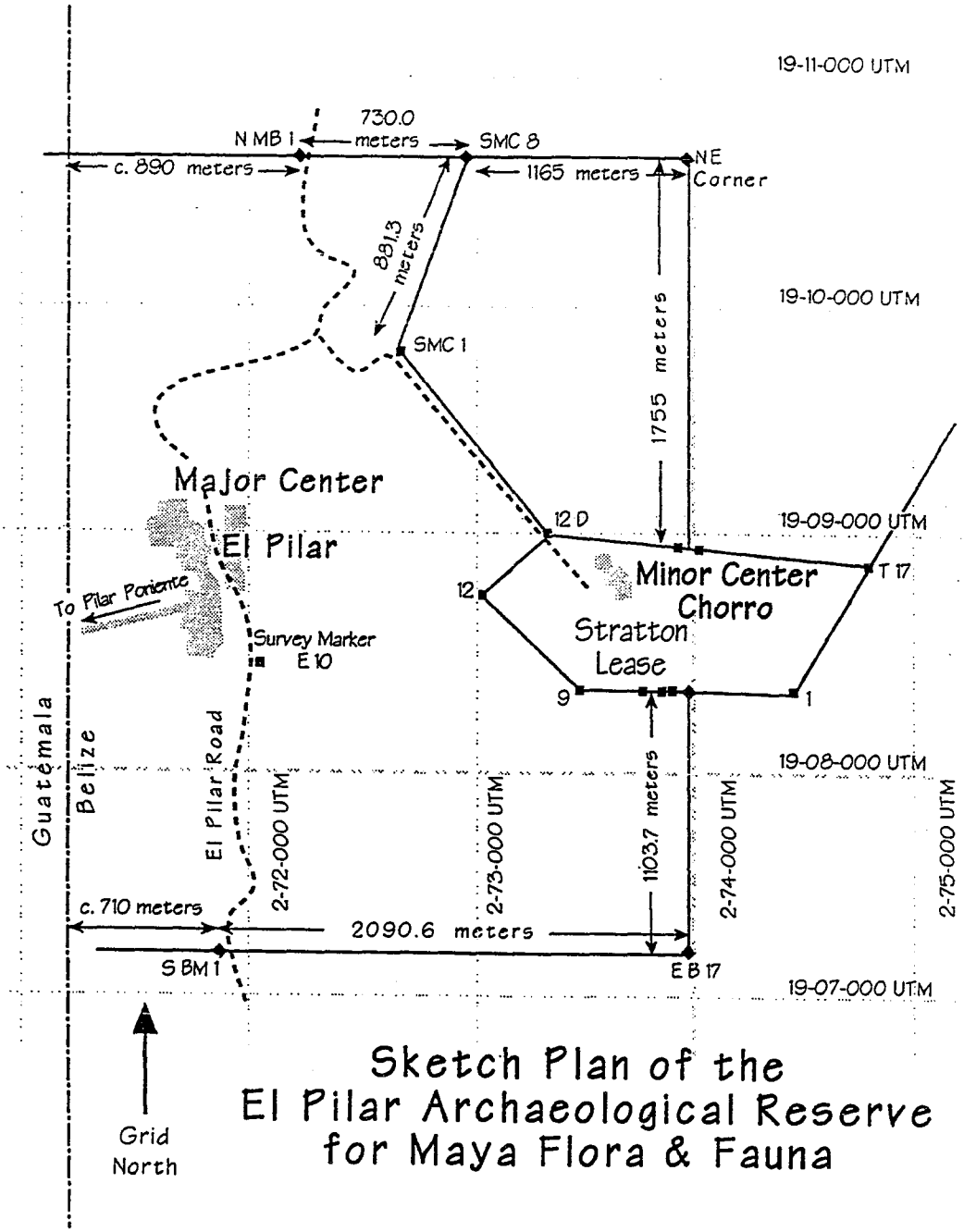


Figure 11
Proposed boundaries of the El Pilar Archaeological Reserve for Maya Flora and Fauna
(BRASS Project 1994)

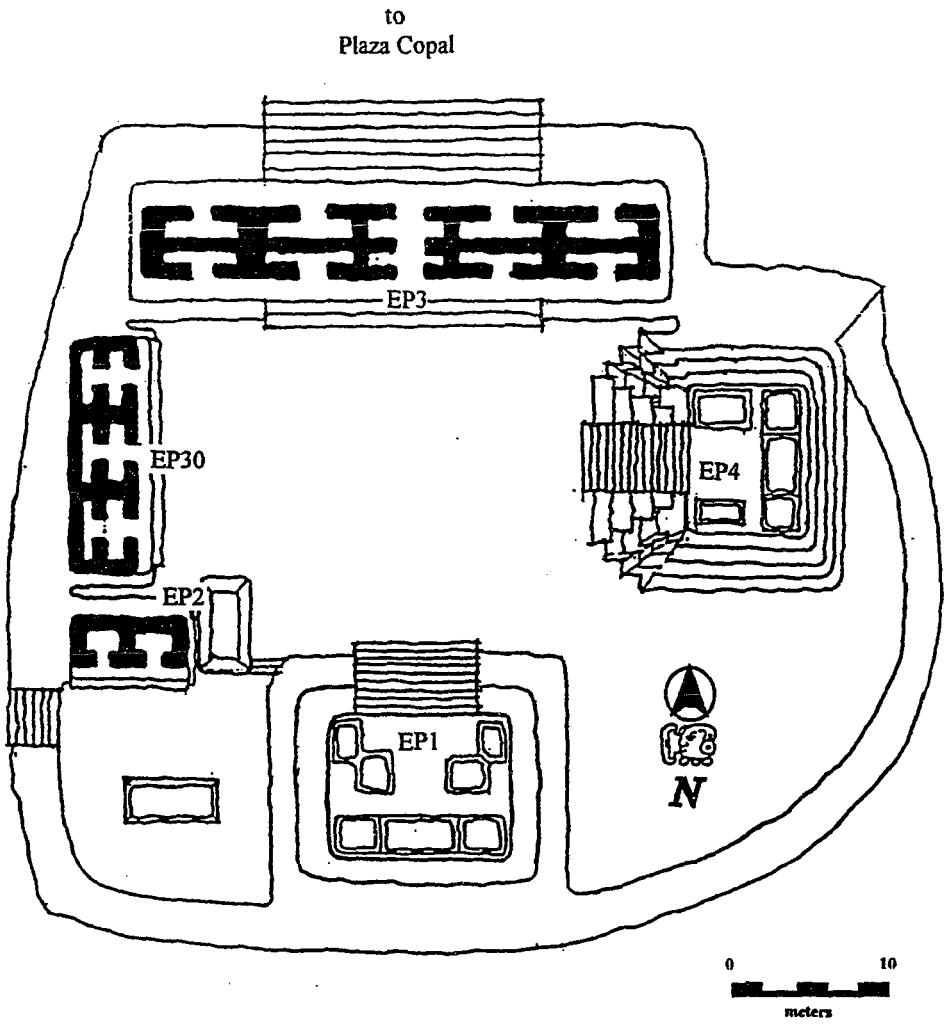


Figure 12
Plaza Axcanan, El Pilar (by John Yust, 1994)

pyramids, structures EP1 and 4, and three range buildings, structures EP2, 30 and 3. The plaza has very limited access, apparently there is a small stairway into the back of the plaza (between structures EP1 and 2) and we have confirmed a corridor passing through structure EP3 from the north. Another interesting aspect of this group is the presence of the "terrace" on the east side of the two pyramids with access evidently only from the interior of Plaza Axcanan. Test excavations were done in this plaza in 1986, 1993 and 1994. Excavation revealed chronological sequences from the Preclassic to the Terminal Classic including a substantial amount of building or remodeling in the Late Classic-Terminal Classic periods.

Plaza C (Copal)

Plaza Copal is the largest plaza in the eastern complex and is characterized by its wide-open public accessways (Figure 13). Two of the three known sacbeob ("white roads", from their plastered surfaces) at El Pilar begin (or terminate) here, one from the east and a group of buildings on a ridge and one from the west and the direction of Pilar Poniente. The plaza is approximately 55 m by 115 m (all plaza measurements will be given as interior) and is surrounded by major public architecture. To the south, structure EP3 stands on an imposing platform and forms the restricted entrance to Plaza Axcanan. To the north a monumental staircase opens Plaza Copal to Plaza Duende. Two square pyramids, structures EP8 and 9, flank the stairway entrance. Dominating the sides of Plaza Copal are two of the largest structures at El Pilar, structures EP10 and 7. Structure EP10 is a rectangular pyramid more than 60 m long with a 14 m wide outset apron stairway in the center reaching up to a long, probably seven rooms wide, range structure on top. From the current elevation of Plaza Copal, structure EP10's seven platforms rise twelve meters with the tops of the buildings rising another 4-5 meters. Structure EP7 is an unusually shaped pyramid standing on top a basal platform, a base which also supports two smaller foundation

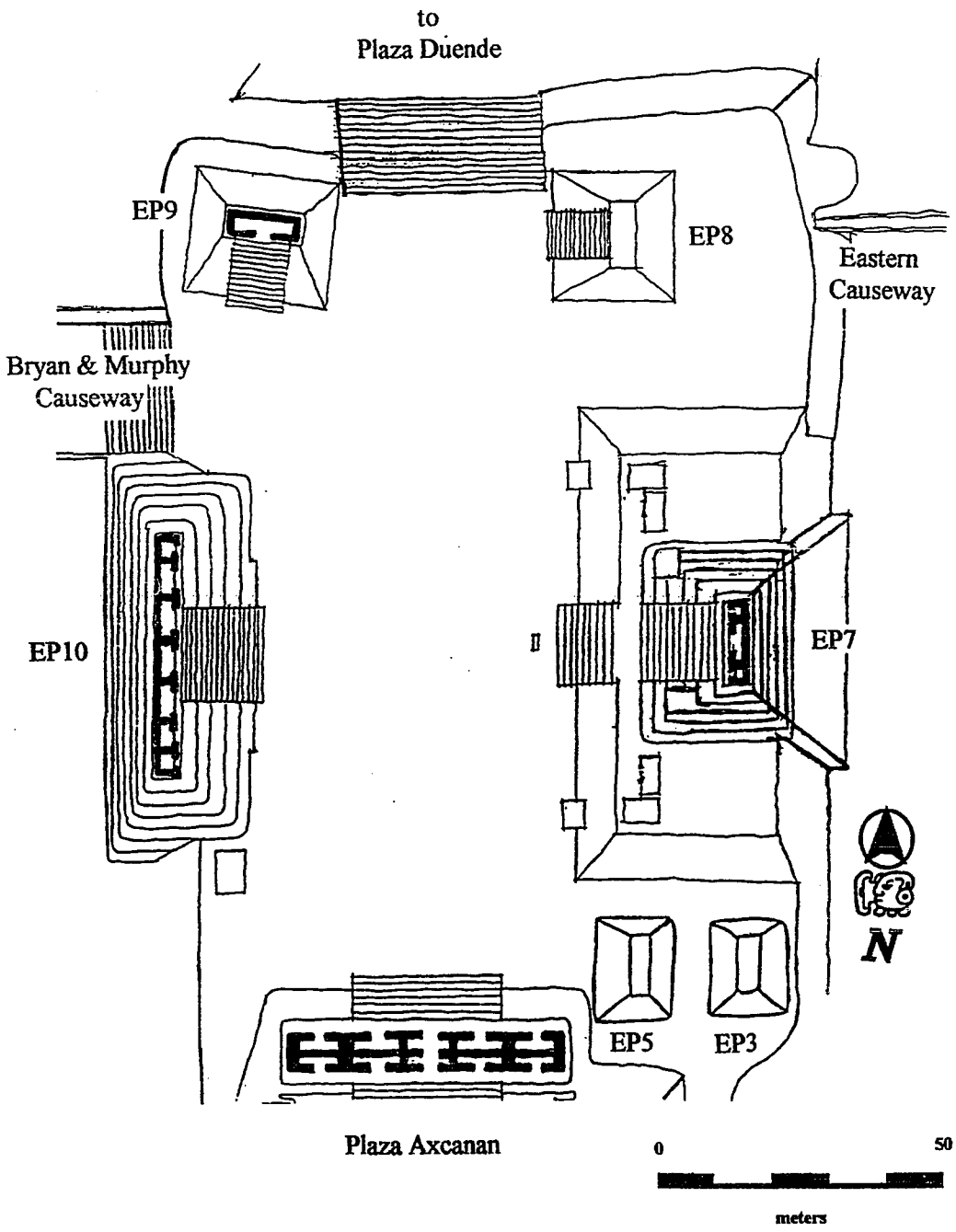


Figure 13
Plaza Copal, El Pilar (by Yust and Wernecke, 1994)

platforms on either side. Viewed from Plaza Copal structure EP7 towers seventeen meters high. This structure may owe its unusual shape (the southwest side appears to project further westward than the northwest side of the stair) to an incomplete remodeling project - more excavation will tell. The other significant structure in Plaza Copal is a ballcourt located in the southeastern corner in an alcove between structures EP7 and structure EP4. This ballcourt is rather small, narrow and crowded by its surroundings and has been theorized to be for ceremonial reenactments of the ball game. Plaza Copal was also tested in 1986, 1993 and 1994 and has shown Middle/Late Preclassic to Late Classic stratigraphy.

Plaza D (Duende)

A duende, in local legend, is a small elusive being not unlike a leprechaun and, like the duende, this plaza has proved elusive (Figure 14). Plaza Duende is not as well defined as either Axcanan or Copal but it covers an irregular 50 m by 70 m which is rounded off toward the north probably in conformation to the natural topography. There is only one major structure identified in this plaza, structure EP11, a four meter high pyramid supporting a single-room building. This structure had been looted and the looter's work revealed an older corbeled building within the pyramid. Plaza Duende is defined by the monumental stairway to the south inset into Plaza Copal, steep slopes to the west and north, and exits to the east. One of these potential exits is an access in the southeast corner of the plaza to the large sacbe stretching to the east. Although presently ill-defined it is possible that the access to this sacbe is from Duende, Copal (from behind EP8), or both. The other is a large two-part stairway exiting down the eastern slope, behind structure EP11, and into Plaza Escoba.

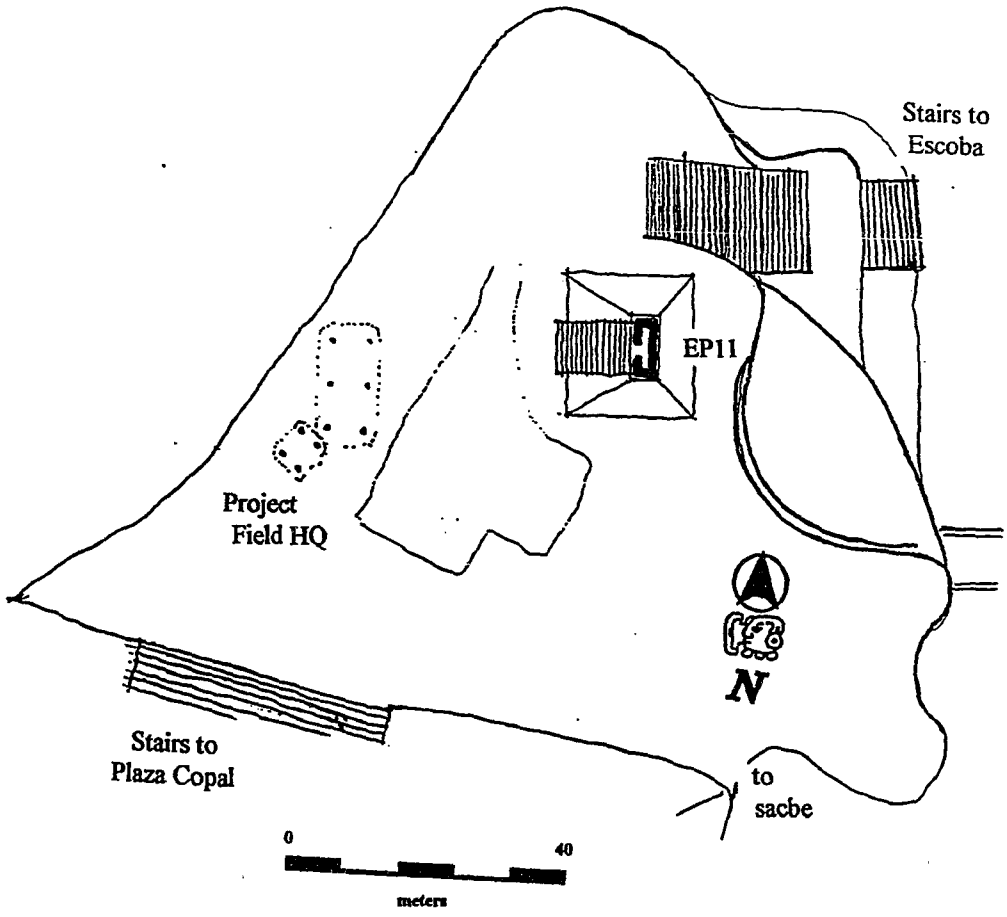


Figure 14
Plaza Duende, El Pilar (by John Yust, 1994)

Plaza E (Escoba)

Plaza Escoba is probably the least understood plaza in the eastern complex primarily because the bulldozers that built the Pilar road in the 1960's crossed right through the center of it and obliterated two of its structures (Figure 15). Plaza Escoba lies eight meters below the level of Plaza Duende and overlaps both Duende and Faisan to the north. The south end of this plaza is defined by the balustrade of the eastern sacbe and the remnants of a platform structure, EP43, stretching east-west and abutting the edge of Plaza Duende. Another range structure, EP47, apparently also continued across the present access road. Structure EP44 is the largest structure in Plaza Escoba and is a square pyramid five meters in height. No excavation work, other than the exploration of a looter's tunnel in structure EP44, has been conducted in Escoba.

Plaza F (Faisan)

Plazas Axcanan, Copal and Duende make up the southeast group at El Pilar. Starting with Plaza Faisan and continuing north, the plazas make up a very coherent group of their own, somewhat different from those to the south (Figure 16). Plaza Faisan is the largest of these, seventy by fifty-seven meters, and is surrounded by low platform architecture. On the south side, structures EP33, 12, 32, and 51 are low platforms flanking a small three meter high pyramid. On the west side there is a small platform, EP13, and a range structure, EP14. The east side of Faisan has a platform structure, EP18, with three meter pyramid. There is a fifteen-meter wide entrance from the northeastern end of Plaza Escoba. The north side of the plaza is enclosed by the imposing structures of the next plaza north, Gumbo Limbo.

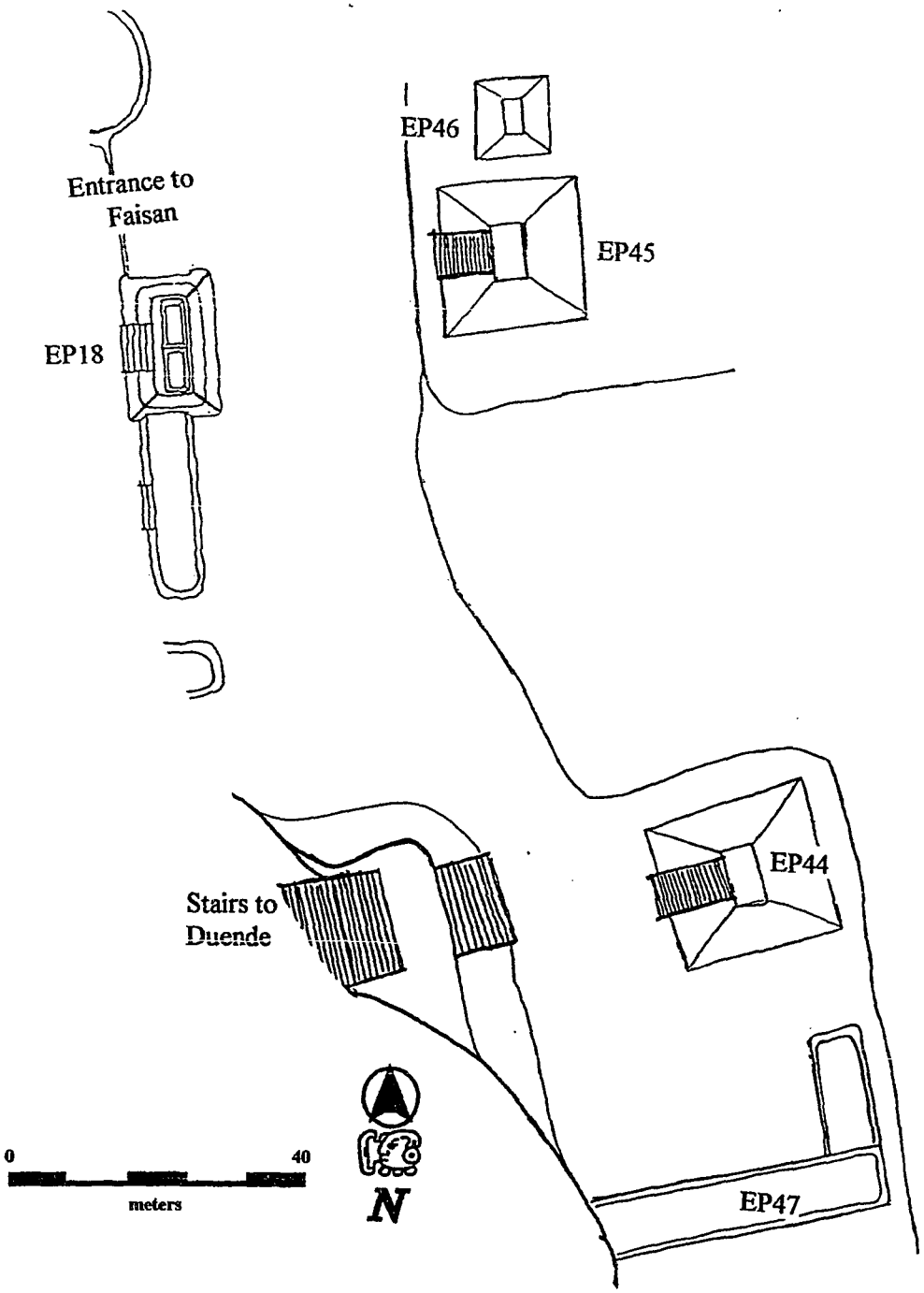


Figure 15
Plaza Escoba, El Pilar (by Yust and Wernecke, 1994)

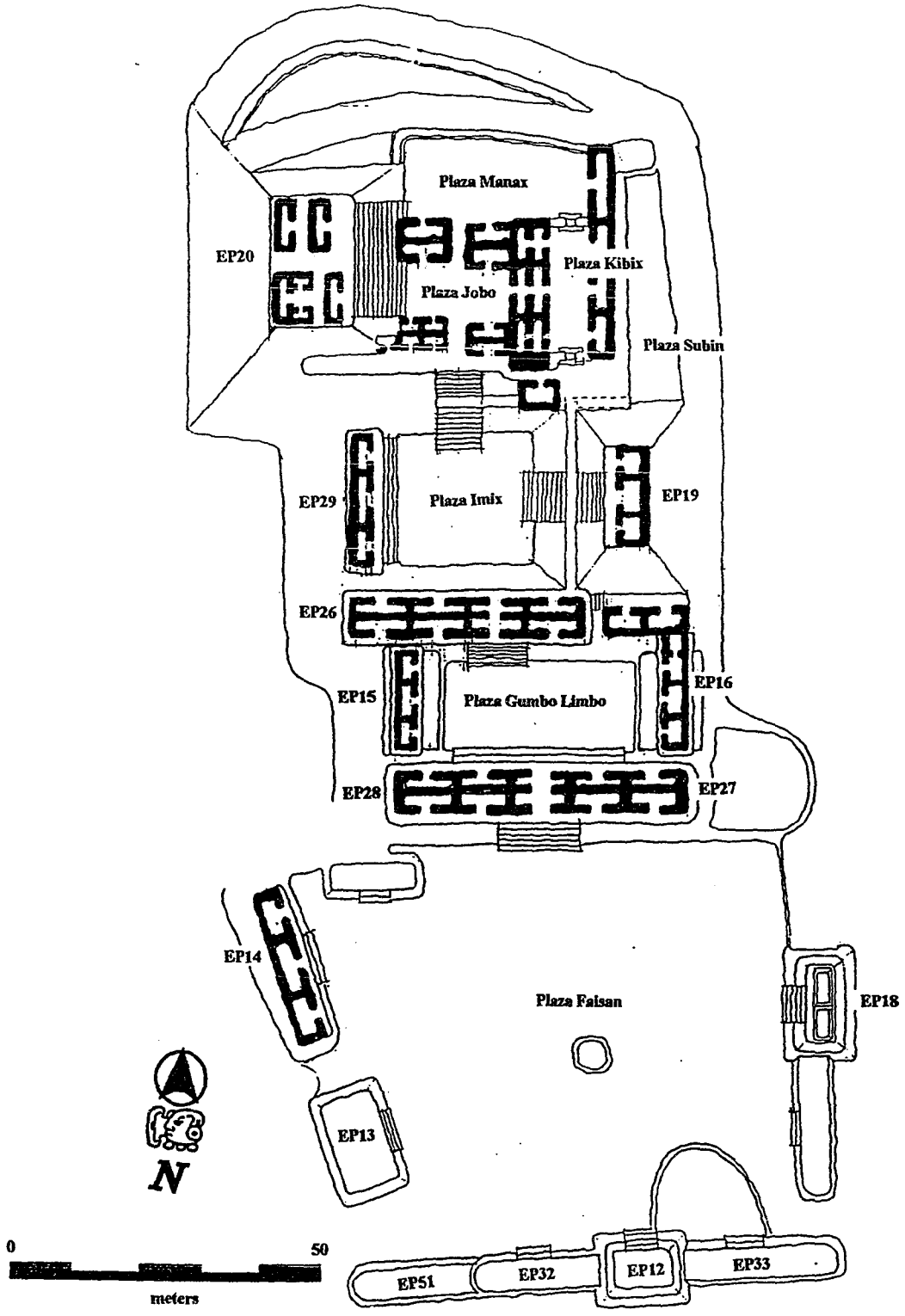


Figure 16
The northern plazas of El Pilar (by John Yust, 1994)

Plaza G (Gumbo Limbo)

The present surface of Gumbo Limbo is three meters higher than Plaza Faisan and considerably smaller in area, thirty by fifteen meters. The south side of the plaza is defined by a long range structure, classified as EP27 and 28, though probably one continuous building with a pass-through corridor similar to structure EP3 in Plaza Axcanan. On either end of the plaza, east and west, are low platforms with range structures on top. On the north side is an apron stairway ten meters across continuing north to Plaza Imix. Excavations in Plaza Gumbo Limbo in both 1993 and 1994 have helped to define its architecture.

Plaza I (Imix)

Imix is also small, thirty by eighteen meters, and lies about one meter below the level of Plaza Gumbo Limbo thus giving the appearance of a dry swimming pool. It is completely enclosed by large structure reaching from three to thirteen meters high. Once again, on the south side of the plaza, the structure (EP26) appears to be a continuous range structure with some sort of pass-through. On the west side, structure EP29, is a shorter platform with a small building on top. The eastern side of the plaza is dominated by the thirteen-meter high pyramid EP19. On the north side a large multi-stage stairway continues up to the acropolis of the site. Excavations in this area, in 1986, 1993, and 1994, reveal chronologies from the Late Preclassic to the Late Classic.

The Acropolis (H'men Na)

The acropolis has been grouped together under one description because of the integral way the architecture is all tied together. The acropolis has several small plazas on it; Hatz 28 by 5 m, Subin 17 by 40 m, Jobo 18 by 7 m, Kibix 4 by 24 m, and Manax 14 by 55 m (Figure 16). All of these are surrounded by range structures on a

subplatform that rises ten meters above Plaza Imix. On the west end of the subplatform the acropolis base is a pyramid, structure EP20, which is nineteen meters high. Plaza Manax, which forms the north edge of the acropolis is flanked by a low balustrade or wall-platform with a sheer drop of over ten meters with no apparent access to the north. Excavations on the acropolis in 1993 and 1994 have revealed multiple building episodes and ceramics from the Terminal Classic period.

CHAPTER 4

ASPECTS OF URBAN DESIGN

Lowland Maya Architectural Analysis

This chapter will deal with aspects of urban design in lowland Maya centers in general before continuing on to the site of El Pilar. In order to examine a Maya center in this way, however, it is important to look at archaeological areas of interest that contribute valuable information to this study. Very few archaeologists have looked at Maya architecture and planning holistically (Hardoy 1964; Hammond 1972; Andrews 1975), more typically they have looked at individual aspects or site groupings . These studies fall into five major categories: the city controversy, settlement pattern research, iconographic studies, orientation, and functional typologies. With this important background, I propose a comprehensive method of archaeological analysis focused on urban design. This method builds on research of the ancient Maya by incorporating principles of architectural design that have the potential to reveal critical aspects of Maya architectural planning.

The City Controversy

The exact nature of ancient Maya urbanism is an ongoing controversy that is germane to this study. For many years archaeologists have taken different positions on what constitutes a city as well as whether or not the ancient Maya centers even had a population. Despite the polar positions in this debate - Maya centers were empty ritual centers utilized by a scattered farming population or they were true cities with all the trappings - markets, specialists, etc. - today, most archaeologists agree that the ancient centers were well-populated urban centers. Becker (1979) covers the history of the controversy from around 1838 up to the 1970's and shows how information collected in field research since 1970 have led most contemporary archaeologists to

the view of large Classic sites as cities. He concludes with the hope that a new awareness of the complexity of Maya society and, in particular, their centers will provide us with a new direction for integrated settlement research. Even so, there are many who still avoid the use of the word "city". The controversy has now shifted from city vs. center to discussions of proper ways to estimate population or evaluate distribution (Haviland 1970; Ford 1991).

This scholarly debate, and its historic context in Maya studies, established a tradition of archaeological research in the Maya lowlands that included the avoidance of looking at centers in a holistic fashion. If the sites were vacant ceremonial centers, research looking at urban design is not important, but the presence of urban design assumes much greater importance if centers were the hearts of cities. Early work concentrated on chronologies and functional studies basic to all subsequent developmental studies focused on all aspects of Maya civilization So the early studies provide a foundation for moving onto the 'big-picture', what I want to consider as Maya urban design.

Current research in this area has begun to focus on the study of urban form and variation (Sanders and Webster 1988; Chase, Chase and Haviland 1990). More importantly, a recognition of the difference between a city and the "elite/ceremonial core" has broadened this examination to include references to urban planning (Von Falkenhausen 1985: 504). The concept of the "urban revolution" and its implication for Maya "civilization" called for a closer look at their settlements.

Settlement Pattern Research

Settlement pattern research refers to the study of the total disposition of ancient remains over the landscape. Thus, such research is usually more interested in a regional perspective than in the analysis of the monumental architecture of the site core. This research has, however, contributed a great deal to our knowledge of site

core architecture. First, interest is in the search for patterns in the data, one pattern being that of the urban design represented by the core structures and public spaces. Settlement surveys have also identified fortifications, sacbeob and outlying communities previously ignored or unrecognized when the concentration of archaeological work was on monumental architecture. This research also bears heavily on questions regarding Maya urbanism. Large projects, most notably the Tikal project, have established that Maya urban centers were heavily populated (Haviland 1970).

Settlement surveys in the Maya lowlands predate the use of the term "settlement patterns" in Willey's Viru Valley of Peru study (Willey 1953). In the 1930's, J.E.S. Thompson did a systematic survey in the Mountain Cow region of southern Belize and O.G. Ricketson extensively surveyed a transect at Uaxactun (Thompson 1931; Ricketson and Ricketson 1937). It is with the publication of Willey's Viru Valley study and the subsequent Belize River Valley project data, however, that the importance of settlement surveys in the Maya lowlands became generally recognized (Willey et al. 1965). Today, nearly every ongoing archaeological project in the lowlands includes an archaeological settlement survey component.

These types of settlement survey projects not only provide the data and site maps needed for further study of urban design but also explore other aspects. For example, Norman Hammond has looked at urban design and architectural theory as one part of settlement survey at Lubaantun (Hammond 1972) and Nohmul (Hammond, Pyburn, Rose et al. 1988). Although these works have not concentrated on urban design, they have considered them and proposed further avenues of study.

Iconographic Studies

Recently, there have been attempts to analyze architecture in terms of architectural "messages" to be read in the individual structures and patterns. Although

it is well accepted that symbolic meanings are pervasive in the built environment (a system of relationships among forms and space constructed or organized by humans) there are disagreements about how to interpret these architectural symbols (Knox 1982; Hegmon 1989). Three different approaches to this line of enquiry are architectonics, architectural anthropology, and art history.

Architectonics, stemming from a branch of linguistics called semiotics, is the study of the built environment aided by linguistic models. This theory holds that architecture is a communication system made up of signs that can be "read" like any other language system (Preziosi 1979). Linguistic models are used in a search for the architectural code that would clarify the messages.

While intriguing, this research is hampered by two factors. One, the recognition that centers are spatio-temporal in organization. That is, the built environment is constantly being added to and changed over time. Secondly, Panofsky's principle of disjunction has demonstrated how civilizations give new meanings to old forms over time rendering their initial meaning to obscurity (Kubler 1970). No serious attempt applying architectonics to an entire Maya center has been made.

Architectural anthropology, also known as symbolism, has been applied greatly to architecture in general and Maya centers in particular. Architectural anthropologists attempt to develop generally-accepted interpretations of the symbolic meaning of structures and spaces in ancient Maya society. Many different interpretations have been proposed for the monumental structures and spaces found in urban centers; that they are symbolic of power relationships, they are comforting imitations of natural forms, they are symbolic of cosmology, they are visual reminders of union and ties, and they assuage fear (Lynch 1960; Coggins 1982; Knox 1982; Trigger 1990; Webb 1990; Folan 1991; Scully 1991). The interpreted symbology of monumental architecture is usually held to be a manifestation of power but structures

can also be erected for other reasons: social harmony, reliability, or as a statement of arrival, for instance (Knox 1982; McGuire and Schiffer 1983).

Architectural anthropology, like architectonics, is also confronted by controversies of definition and abstraction. Is the symbolism in architecture a lasting or transitory message? If the message is static, as it must be for architectonics, than it is just a matter of "breaking the code" but, if architecture is a transitory medium being constantly modified, then the interpretations of architectural symbols are just as transitory (Preziosi 1979; Knox 1982; Scarborough 1991). The level of symbolic interpretation is also very important. A structure could be interpreted as a general expression of elite power on one level and as having more specifically a mythic interpretation. Another problem is whether or not architectural meaning is contextual or universal. If it is contextual is there a difference between the intended meaning of the builders and the perceived meaning of the viewers (Kuper 1972; Bacon 1974; Leach 1983; Thompson 1983; Jones 1993)? Lastly, there is a conflict between those who think that the built environment is but a reflection of the Maya's natural world or whether they were trying to create their own, constructed world (Scully 1991). With these ideas in mind, it is difficult to see how the present search for architectural symbolism can be anything but the scholarly interpretations of one individual, interesting but having no connection to the ancient Maya.

Another approach to the iconographic interpretation of architecture is epitomized by the recent work of Carolyn Tate (1992). This work combines epigraphic and iconographic analysis, which stems from the field of art history and the study of carved monuments left by the ancient Maya. Tate's work on the data from Yaxchilan demonstrates how one could interpret the placing of monuments and structures as representations of successive periods of rule. The site core could, literally, be read as a map of the king list, in this case for Yaxchilan. Merle Greene

Robertson has done some similar work on the iconography of Palenque (Greene Robertson 1984).

Orientation

Another method of architectural analysis has been that of orientation of individual structures, groups of structures, and entire sites. Much of this work is of recent date and stems from disciplines outside of anthropology. Architects, mathematicians and especially, astronomers, have examined various aspects of the urban centers in order to attempt to shed new light on the ancient Maya's cosmology. Foremost among these studies are those looking at astronomical alignments, directional alignments, and symbolic alignments.

Astronomical

We know that the ancient Maya, like most agricultural peoples, paid a great deal of attention to the sky. The sun and moon are prevalent throughout Maya epigraphy and iconography and of obvious importance to a people dependent on the crop cycles. We also know that the Maya were interested in the stars and planets. The Dresden Codex, for example, contains elaborate charts of the cycle of Venus and recent research may indicate that this cycle may have governed ritual warfare. Similarities in plan and orientation of structures and sites in Mesoamerica have led some to further investigate the role that the astronomical knowledge of the Maya played in their architectural planning and building (Hartung 1981). This new field is called archaeoastronomy.

In Mesoamerica, archaeoastronomers became particularly interested in the examination of site axis orientation. As early as 1945, it was noted that a large number of Mesoamerican sites seemed to have a similar axial orientation, east of north (Macgowan 1945). The orientations of sites were carefully calculated and it was

found that, not only are many of them grouped very closely, but also that large groups of sites may have periodically changed their planning axis in concert (Aveni 1975; Aveni and Gibbs 1976; Malmstrom 1981).

The problem now under consideration is just what this unity of orientation means. Suggestions have been made that the orientation is to the Pleiades, to an important horizon marker at Teotihuacan, or that it is tied to the Maya calendar. Unfortunately, without ancient Maya documentary evidence, none of these hypotheses can be proven or falsified. There are many archaeologists in the field who, though not doubting the importance of astronomy to the ancient Maya, find many archaeoastronomical "findings" the equivalent of a Rorschach test (Köhler 1991). Serious researchers in this field are also professionally hampered by the large number of amateur publications touting 'mystic' formulas that are clearly outlandish and never will be falsified.

Mathematicians have also become interested in the orientations of Maya works. As one of only two societies in the world to develop the concept of zero, the Maya have long captivated mathematicians. It is felt that, by carefully gathering orientation data, much more will become known about Maya knowledge of advanced geometrical theories (Aveni and Hartung 1982; Vinette 1986).

The last major focus of orientation research is that of structural groups. In 1924, Franz Blom proposed that an assemblage of architecture at Uaxactún may have functioned as an astronomical observatory of some kind. This idea was later expanded upon, given a name (Group-E structures after the type site at Uaxactún), and found to exist in similar form in many lowland Maya sites (Ruppert 1940). Group-E architectural assemblages are found to have very consistent geometry and form, but make poor observatories. They may, instead, have been an architectural form of cosmological or geomantic statement (Aimers 1994). Other assemblages, such as

radial pyramid groupings and the relationship between stelae and other monuments, have also been examined with similar results (Cohadas 1980; Hartung 1984).

Archaeoastronomy, as a young field, needs to develop standards and procedures of data collection and analysis before significant widely-accepted theories will result. To this end a variety of how-to manuals have been developed to aid the neophyte (Baity 1975; Hartung 1975; Aveni 1980). Archaeoastronomy, however, is still plagued by shortcomings in scientific method such as the uncritical postulation of astronomical links (Köhler 1991).

Directional

Because of our awareness of Maya interest in astronomy most analyses of orientation touch on this in way or the other. The question of the ancient Maya's concept of directionality is heavily intertwined with references to astronomy as the Maya repeatedly refer to the sun and moon in any text or iconographic evidence for their world concept. Although often assumed, there is no real "proof" that the ancient Maya had a concept of cardinal points similar to our own. Recent research, in fact, tends to cast doubt on this (Watanabe 1983; Swiat 1990). As our own western concept of cardinal points in a rectangular world are of fairly recent origin, orientation research involving direction may be founded on ethnocentrism (Brotherston and Ades 1975; Brotherston 1976; Köhler 1991). The clearest evidence of ancient Maya use of directions and directional planning may come from the use of what have been translated as directional glyphs in a painted tomb at Rio Azul (Adams 1990). Regardless of the content of the Maya's actual concept, it is safe to assume that their architecture and planning used this concept much as we do today for spatial division (Ashmore 1991).

Investigations at various lowland sites have found that many structures are nearly perfectly aligned to cardinal directions. This has led to a discussion of the

possibility of the Maya possessing the magnetic compass or its equivalent (Fuson 1969; Carlson 1977). There is, to date, no archaeological evidence other than the alignments to support this hypothesis any more than hypotheses of solar alignment. In the absence of a compass the Maya may have used architectural planning concepts not unlike the Chinese practice of *feng-shui*, or geomancy. Geomancy is a divinatory art for locating the proper site and correct orientation of structures so that they are in harmony with perceived cosmic forces. A well-developed Maya geomantic art would explain the similarity in orientation throughout the lowlands as well as the consistency of individual center plans through time (Wheatley 1971; Carlson 1977; Jim Aimers personal communication 1994).

Symbolic

Like the directional analyses, methods of analyzing architecture as symbolic are often laced with astronomical references. What makes this emphases on symbol different is that it attempts to show that Maya structures and planning principles are, in effect, Maya cosmology writ large. The buildings and plazas were designed to influence the ancient public and did so by symbolic manipulations of religion, ideology and society. An analysis of a Maya center from the viewpoint of iconography, this theory holds, will give anthropologists an overall view of Maya cosmology. The entire plan would be a cosmogram of sorts (Guillemin 1969; Broda 1982; Ashmore 1989; Tate 1992). Once again, archaeological evidence for this is slim and leads to multiple interpretations with sharply different views of Maya cosmology.

Conventional Typologies

The investigation of architectural components, structures and structural groups, and the broad classification of architectural types by form or function is another method of analysis used in the Maya lowlands. Many of these studies have

provided little more than descriptive lists of structures found. These can be roughly divided into the functional and non-functional typologies.

Functional Typologies

Since the first explorer's visited ancient Maya centers there has been speculation as to the function of the ornate stone edifices they encountered. The wealth of exposed architecture and the lack of controlled excavations led to descriptions of that which was already showing above ground. Initially this led to detailed descriptions of architectural components, like corbeled arches (Thompson 1911) and roof combs (Smith 1940), much of which were gathered into larger articles exploring Maya engineering knowledge (Roys 1934). This tradition of exploring architectural components and building styles continues today (Loten 1970; Heyden and Gendrop 1980; Sabloff 1989).

A second aspect in the search for building typologies is that of the functional analysis of individual building types or styles. This research has led to studies of perceived structure types, structural groups and architectural spaces based on assumed functions. This includes domestic architecture (Cliff 1988; Webster and Gonlin 1988), "palaces" (Harrison 1969, 1976), plaza groupings (Becker 1972), sacbeob or causeways (Folan 1991), and the previously mentioned astronomical observatories (Ruppert 1940; Laporte 1993; Aimers 1994).

Lastly, some researchers have developed comprehensive functional building typologies. While there have been some attempts at fresh starts, most of these schemes are built on the historical typologies dating to the first Europeans in the New World. These classifications are usually variations on the palace-temple-distinctive form theme (Totten 1926; Pollock 1965; Robertson 1963; Andrews 1975). The best example of which is the typology of 'Basic Building Groupings' developed by Andrews

(1975). He examined twenty site plans and found repetitive forms which he divided into Temple groups, Palace groups, Quadrangle groups, and Acropolis groups.

Non-functional Typologies

In more recent years there has been a tendency to reject these early typologies in favor of those that involve more rigorous data collection and testing (Loten 1970; Von Falkenhausen 1985; Tazzer 1990). These schemes are usually computer-based and involve the examination of architectural components, chronological seriation, relation to nearby structures, height, volume and more. Patterns may emerge from this data that can be tested to develop clearer ideas of the form and function of Maya architecture.

All of the aforementioned areas of study are important foundations for the study of urban design in Maya centers. Each of them contributes valuable data and a different perspective. Combining them within the urban design format can only enhance their importance. Chapter five demonstrates how each of these different areas of interest can add to our understanding of the Lowland center of El Pilar.

CHAPTER 5

AN ARCHITECTURAL ANALYSIS

As demonstrated in Chapter three it is relatively easy to break the center of El Pilar down into distinct components. Each of these components can then be analyzed specifically for orientation, alignment, symbolic meaning or, another method of microanalysis. Combining this microanalysis of each subject and center component within the larger format of urban design may tell us more about Maya architecture and Maya cities by forcing us to view the "big picture". As an example of how microanalysis techniques can be applied and combined, this chapter will begin by looking at Plaza Copal before turning to a holistic urban design analysis.

Plaza Copal: An Example

The entire structure of Plaza Copal at El Pilar illustrates how many of the previously mentioned analytical methods, discussed in Chapter 4, can be used simultaneously. It is important to point out that this plaza, along with the rest of El Pilar, was first explored in the context of a settlement pattern survey in the Belize River Valley area. The ten-kilometer BRASS survey transect that terminated at the site core (in Plaza Duende) found a very high structure density in the area, as high as 292 structures per square kilometer, indicating a large population in the ridgelands surrounding and including the site (Ford 1985).

Plaza Copal is the largest public plaza in El Pilar, 115 m long by 55 m wide, and is oriented north-south (Figure 17). Interestingly, test excavations along the bases of structures EP7, 8, 9, and 10 found all of the structures to be aligned within 5-8° east of present magnetic north. The importance of this plaza is readily apparent in the fact that the two largest structures in the site core, EP7 and 10, define the eastern and

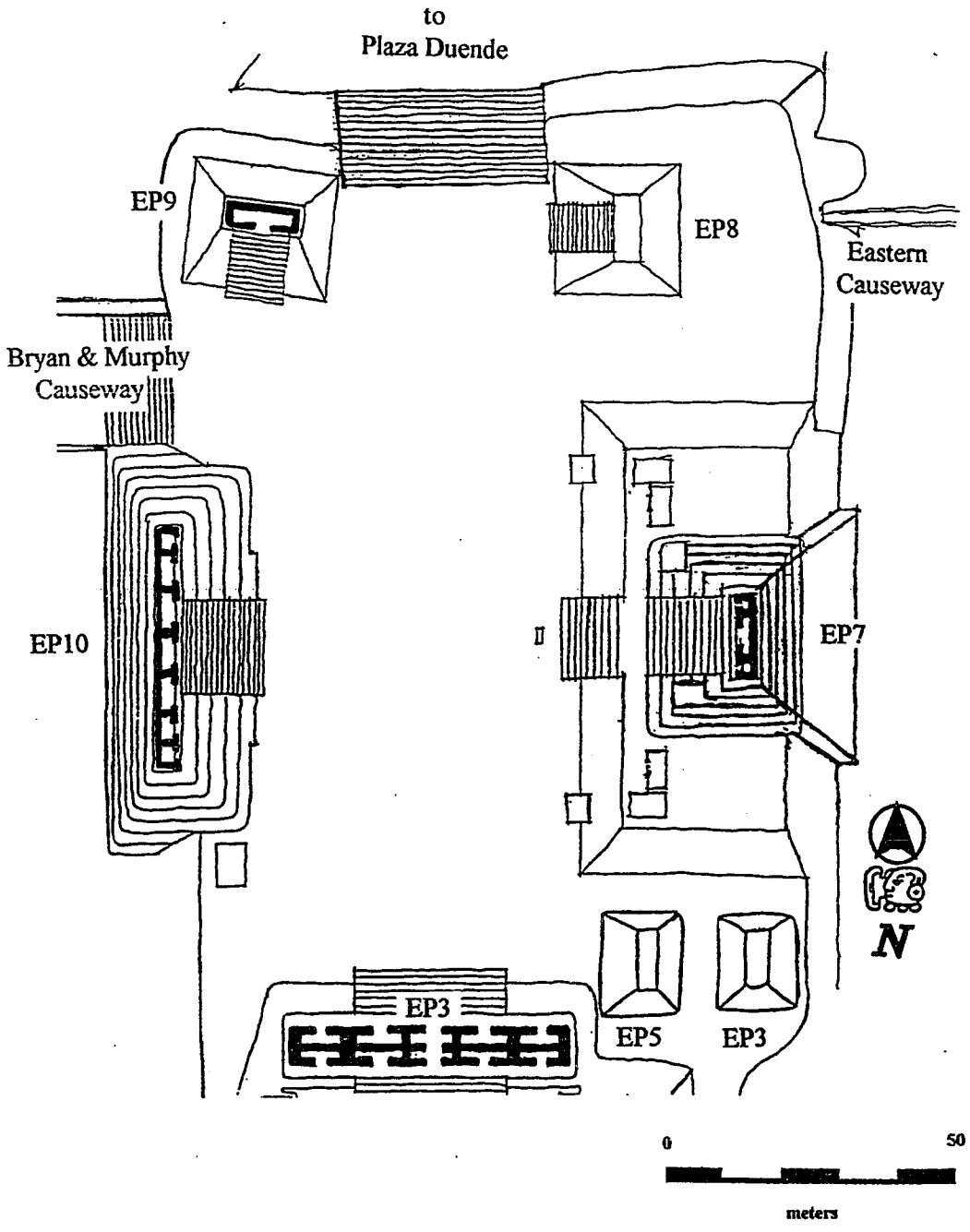


Figure 17
Plaza Copal, El Pilar (by Yust and Wernecke, 1994)

western sides of the plaza, a major public stairway enters the plaza from the north, and two large causeways enter the plaza from opposite sides.

Structures EP7 and EP10 face each other across the middle of the public space. EP10 is a large bilaterally symmetrical pyramid with a large, open apron stairway (14 m wide) on its eastern side. The pyramid has seven apparent battered platforms and culminates in a seven room-wide building running the length of the top. Facing it, on the eastern side of the plaza, is EP7. The large battered building platform of EP7 supports three structures: small foundation platforms on the north and south wings, and a six-platform central pyramid supporting a small range building on top. The number of platforms and rooms may be significant as the number seven, in Maya iconography, is associated with the surface of the earth and six with the opposition of earth and sky (Cohadas 1991).

Taken together, the two structures form a variant of the Uaxactún Group-E configuration (Figure 18; Ruppert 1940; Wernecke 1993). The differences in alignment and many variations on the Group-E theme found in the Maya lowlands now suggest that they served an important function other than that of astronomical observatory (Köhler 1991; Aimers 1994). Reinforcing the importance of this architectural pairing, the 1994 BRASS/El Pilar project team located another structure, EP50, due east of EP7 and built in the same style as EP7 yet significantly smaller (only 4-5 meters high). Ball courts are also often found in conjunction with Group-E complexes, and EP7 is flanked on the south by a small ceremonial court (EP5 and 6).

Examining Plaza Copal in terms of function, it is clear that it was public rather than private space. The two causeways entering the plaza are nearly thirty meters wide and offer unobstructed access to the central space. One causeway stretches east along the southern edge of Plaza Escoba to a large plazuela group on a nearby ridge, while the other causeway reaches west toward the monumental architecture of Pilar Poniente. Almost half of the northern end of the plaza is made up of a monumental

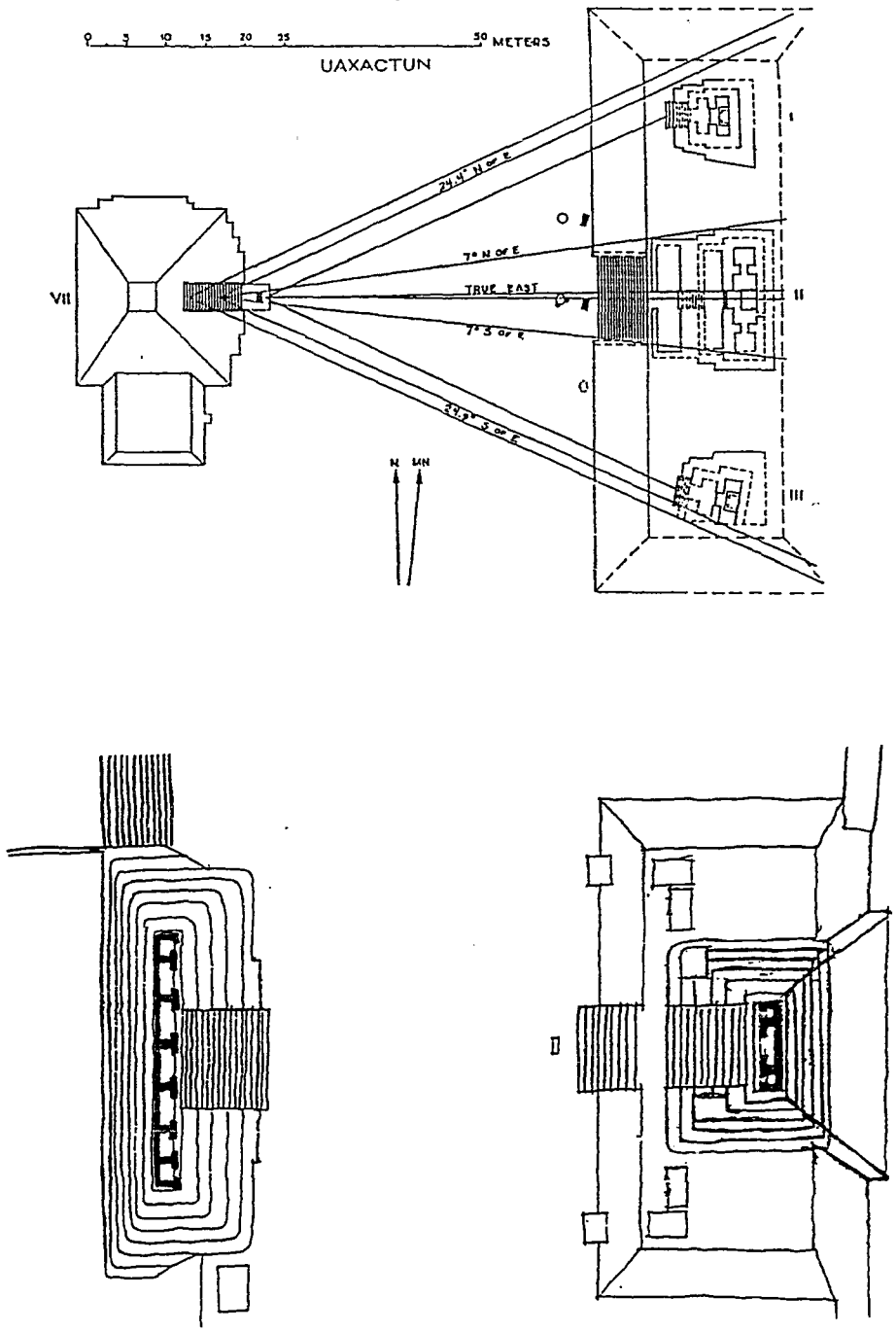


Figure 18
Group-E at Uaxactun (top, from Ruppert 1940) and the EP10-EP7 group at El Pilar (bottom)

staircase. Plaza Copal has five major structures surrounding the perimeter: four temple/pyramids (EP7, 8, 9, 10) and a small ceremonial ballcourt (EP5 and 6). Though more properly considered a part of Plaza Axcanan, the five-room palace structure EP3 towers over and defines the plaza's southern side. The narrow entranceway to Plaza Axcanan through EP3 sets it apart from Plaza Copal as more private space.

Symbolically, it has long been accepted that pyramids represent an imitation of natural forms. The architect Vincent Scully said,

> Hence the temples at Tikal are at once persons, mountains,
> and clouds. They rise in stages from earth to heaven,
> linking the Maya to the sun of life, as well as to the dark
> afterworld below. (Scully 1991: 16)

Ethnographic research on the contemporary highland Maya has recorded their belief that their ancestors, whose continued presence is important to their welfare, are dwelling inside mountains (Vogt 1990). In addition, epigraphic studies have found that the Maya called pyramids *huitz* or mountains. Perhaps the ancient Maya built these towering pyramids in order to entice their ancestors into living close to home, even burying important personages in them to ensure their benevolent presence (Tate 1992).

Plaza Copal is a good example here because its multiple structures readily illustrate many of the analytical methods discussed in Chapter 4. In using Plaza Copal as an example, however, it is not meant to imply that it is unique at El Pilar. Alignments in Plazas Axcanan, Duende and Escoba mirror those of Copal. The northern plazas appear to have a slightly different alignment, 3-8° west of magnetic north, but are consistent with each other.

Functionally, the plazas, other than Copal, are a mixture of public and private space. Plazas Duende, Escoba and Faisan appear to be public space due to their open access and large open spaces. Axcanan, Gumbo Limbo, Imix and the H'men Na are more private, with restricted access and smaller spaces. There are also pyramids outside of Plaza Copal, though not as large as EP10 and EP7. Plaza Axcanan has two (EP1 and 4), there is one in Duende (EP11), one in Escoba (EP44), one in Plaza Imix (EP19), and one on the acropolis (EP20).

George Andrews typology included four major building groups; the Temple group, Quadrangle, Palace group, and Acropolis group (Andrews 1975). Each of these forms exists within a range of variation, but Andrews found them at each site and more than once at each of the twenty sites he examined. A Temple group is usually characterized by two or three temples and an auxiliary building. A Palace group was defined as a raised platform with a nearly continuous line of buildings around its periphery and usually possessing a series of inner courtyards. The Quadrangle group is a simpler version of the palace grouping - buildings forming an enclosure around an open space. Lastly, the Acropolis group is made up of a number of Palace and Quadrangle groups situated at various levels on a raised platform.

Examining El Pilar with these definitions in mind it is relatively easy to spot good examples. Plaza Axcanan, Copal and Gumbo Limbo resemble Temple groupings. Plazas Faisan and Imix are classic examples of the Quadrangle group. The H'men Na matches Andrews description of a Palace group, and, with the addition of Plazas Gumbo Limbo and Imix, also forms an Acropolis group.

This brief description of the elements making up one of the twenty-two plazas in the eastern section of El Pilar leads us to a discussion of larger architectural planning principles and their use in ancient Maya centers. This discussion, and comparisons with other Maya centers and architecture of other cultures, will show that Maya centers are not as unique when compared to other world cultures. The Maya

were sophisticated engineers and architects and independently arrived at architectural principles and solutions similar to those of other world civilizations.

Urban Design

A look at any collection of Maya site plans makes it apparent that they exhibit a shared constructed logic (Robertson 1963). This logic consists of a similar use of forms that are used to define and link spaces. This use of forms, following consistent architectural design principles, is called urban planning or urban design (Dix 1992). The difference between planning and design is scale of specificity.

Urban design can be defined as the application of architectural design methods to urban situations, particularly community space (Toon 1988). As such, urban design is involved in the arrangement, organization, allocation, and management of the public areas, generally the site cores. This is manifest in cultural notions of the proper use of orientation, form, and space in an urban center. Monumental architecture, although often studied in isolation, does not exist outside of a greater context of a human altered environment. The functional aspects of a design may change, their symbolic interpretation may vary over time, but the use of architectural elements and forms will last as long as the structural patterns exist. The structures are mutually supportive through the use of architectural ordering principles.

Urban planning is usually used in a narrower, more concrete sense, suggesting the existence of a blueprint for planned growth of a center (Hardoy 1964). Urban planning implies mental formulation and graphic representation while urban design implies a degree of achieved order or harmony. This thesis will regard urban planning and urban design in these terms.

Some attempts have been made to demonstrate that the Maya used urban planning, in the strictest sense of the term discussed above, notably by Norman Hammond for Lubaantun (Hammond 1972). He concluded that the Maya architects,

made non-expedient decisions in the placement and construction of new monuments and that this proved the existence of a pre-ordained plan. This conclusion ignores other possibilities. Political, religious or geomantic reasons, or pressures could just have easily determined their building decisions.

Edmund Bacon outlines three methods of urban designed development; by accretion, using space, axes or mass to link old and new; by tension, using lines of force to impose a new order on a city; and by extension, projecting elements of the existing urban structure as a basis for expansion (Bacon 1974). Maya centers appear to have developed by accretion using visual ordering principles to link the new and the old. These principles, the basis for a holistic analysis of El Pilar, are axis or datum, symmetry, enclosure, hierarchy, and repetition (Ching 1979).

The two primary concepts very clearly employed in Maya urban design are axis and enclosure. The axis is simply an imaginary line between two points about which forms and spaces can be arranged. An axis need not always be a straight line. If the form that all architectural elements relate to is planar or volumetric than it is referred to as a datum. As it is primarily a lineal condition, axial planning induces movement and views along its path. Again, because of its lineality, axial or datum planning often lends itself to expressions of symmetry. Enclosure is perhaps the strongest form of spatial definition and can be used to define the flow and use of space. A field of space is defined by four enclosing planes, the space itself organizing the structures around its perimeter. The degree of enclosure can isolate a space or join it to others in a dynamic fashion. The Maya employed this concept to its fullest.

Symmetry cannot exist without an axis, or axis without symmetry, and the Maya used axial planning to create lines about which to build symmetrical structures. There are two types of symmetry; bilateral and radial. Bilateral is the balanced arrangement of equivalent elements. Radial is where equivalent elements balanced about two or more axes that intersect at a central point. Bilateral, or mirror, symmetry

appears to have been the norm. Radial symmetry is rarer and the best examples in the Central Maya Lowlands are the radial pyramids in the twin-pyramid complexes of Tikal.

The principle of hierarchy is concerned with how the differences between forms and shapes are revealed. Hierarchy uses exceptional size, a unique shape, or a strategic location to show the relative importance of structures. By being made an exception to the norm, the form or shape comes to dominate its surroundings.

The regular reoccurrence of lines, shapes, forms or colors is repetition. Redundant elements, similar in size, shape or details, can organize and set up patterns of visual rhythm. Repetition can be comforting, inviting, or imposing in public spaces.

These five architectural planning principles form the basis for the following analysis of the urban design of El Pilar and are used to compare it to other Maya cities as well as the fora of ancient Rome. This is not an exclusive list of architectural principles - these are the most important ones readily identified in Maya centers and are among the most powerful architectural planning tools. With the data available from future field seasons a more exhaustive analysis will be possible.

Architectural Principles at El Pilar

The ordering principle of axiality is one of the earliest architectural concepts found in human-built environments. In fact, in many cultures the earliest known symbol for "city" was a circle or square quartered by axes (Bird 1977). El Pilar, as an example of Maya urban design, is replete with excellent demonstrations of axial ordering (Figure 19). Plaza's Axcanan, Copal, and Duende are united by a major axis running north-south and connected to other spaces via smaller east-west axes. The lines of view and the directionality promoted by this ordering at El Pilar is impressive and inviting to the public. The view from Plaza Duende south, in particular, had to have been imposing. Walking south the Maya would have climbed the large stairway

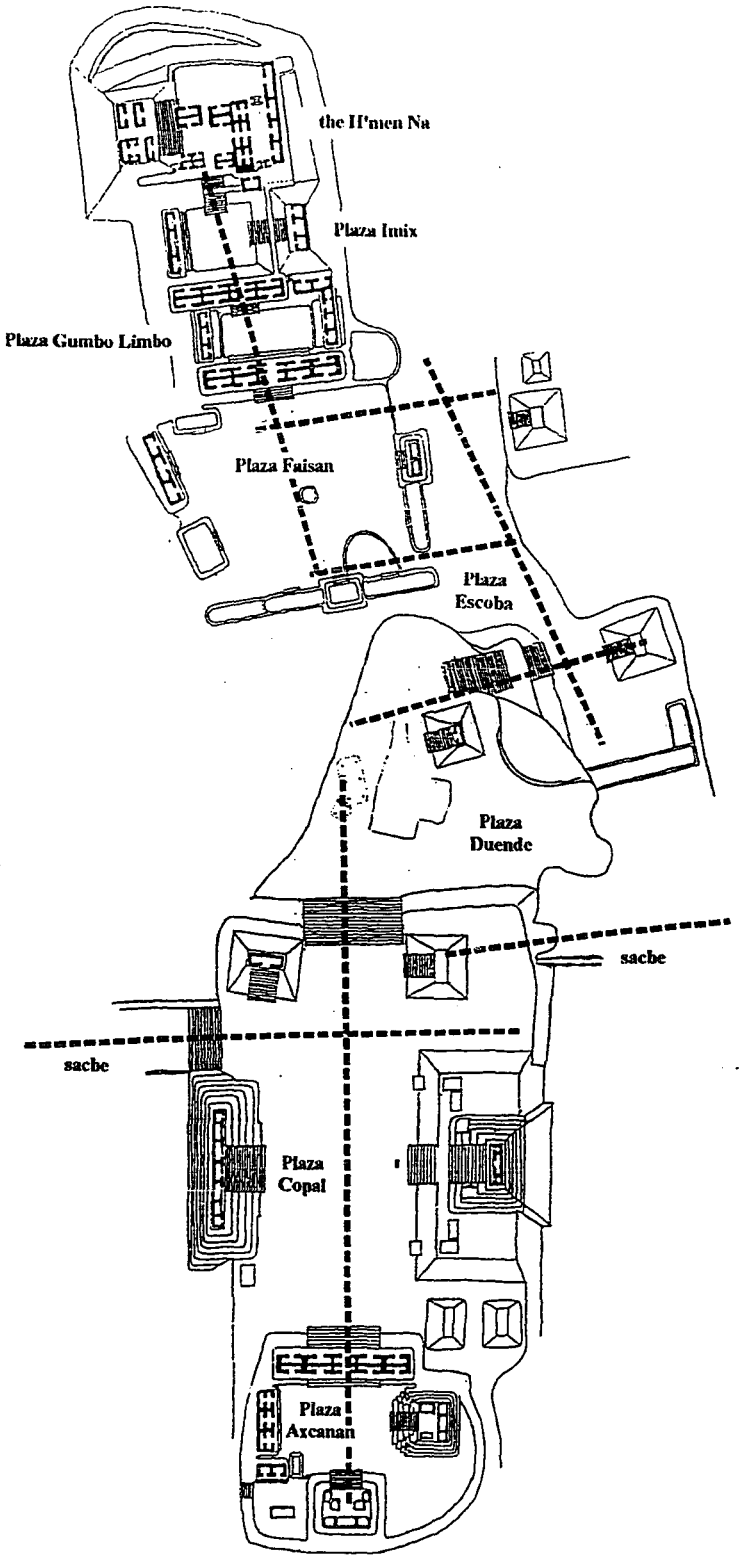


Figure 19
Planning axes at El Pilar

into Plaza Copal and would be confronted with a large, paved space surrounded by huge brightly-painted temples and faced by the elevated range structure forming the gateway to Plaza Axcanan. This plan of dynamic space directed toward some terminal object has been termed the "dominated square" (Kostoff 1992). The monumental stairways at El Pilar control not only the direction of travel but the speed of approach as well. As a person ascends the stairways to Plaza Copal, for example, the plaza and its structures would be gradually revealed.

After a brief separating jog in the central axis through Plaza Escoba the major north-south axis continues up to the H'men Na. Plaza Escoba, with its carefully controlled minor axes culminating in pyramids, is important because it visually and physically separates what are apparently two classes of space. The northern plazas (Faisan, Gumbo Limbo, Imix, and those of the H'men Na) are very different from those in the south. Traveling north from Plaza Faisan, the spaces grow increasingly more enclosed. Plaza Faisan is fairly open and has many exits while Gumbo Limbo is completely enclosed with only the axial stairways in and out. Plaza Imix also has two axial stairways providing access but appears even more enclosed because of the height of the structures surrounding it. The H'men Na is completely enclosed and has but one way in and out.

Most of the structures at El Pilar possess bilateral symmetry and a few may exhibit the rarely-found radial symmetry. Many of the plazas in the site core exhibit paired structures on either side of the major axis. Plaza Copal is balanced by the pairing of EP8 and 9 at its southern entrance and the large masses of EP10 and 7 in the center. Other plazas, Gumbo Limbo for example, are balanced by the paring of smaller platform structures or range buildings.

The principle of hierarchy is evident chiefly in the differences in elevation between Plaza's Duende, Copal and Axcanan as well as the use of raised culminating monumental structures, such as EP3 and EP44. The northern plazas, however, are

even more powerful examples of hierarchy. The walk to the H'men Na from Plaza Faisan is one of increasing enclosure, restriction and elevation. The summit of the H'men Na, a palace-like maze of rooms, commands a view of all of El Pilar and the surrounding area. Several structures (EP10, 7, and 20) had to command attention due to their imposing size. It is important to note that color can also be an important hierarchical tool (Reekie 1972). Although we have scant archaeological evidence of its use at El Pilar (stucco pieces with polychrome coloring), we know from other sites that the Maya were enthusiastic users of color on their architecture. Many of the pyramids at El Pilar were probably originally painted a bright red hue accentuating their importance.

It is clear that the more enclosed and restricted an area is the more private and exclusive it will be and it has been suggested that many Maya centers were enclosed gradually throughout the Classic period (Von Falkenhausen 1985). Many of the plazas at El Pilar form textbook examples of enclosure (for examples see Rykwert 1976). A look at the dimensions of these plazas makes it clear that they are all rectangular (see Appendix A). Rectangular plazas are the most frequently used for public spaces because they allow the directional axis discussed above (Kostoff 1992). These enclosed rectangles follow two patterns; the closed where space is static and self-contained and; the dominated, where space is dynamic and directed toward a terminal object or view.

Repetition is evident at the first glance at the site plan. The series of plazas and bilateral symmetry along the major axes create a directional rhythm even on paper (Figure 19). Many of the plazas are defined by range buildings, defined as a common room organization pattern generated by rooms strung out, or "ranged" end to end (Loten 1970). Repetition can be used to visually direct vertically as well as horizontally. The larger structures, particularly the pyramids, are constructed with

layered platforms and stairs with repetitious landings directing the eye upward toward small temple buildings.

The structures of El Pilar were not constructed by the same architects over a period of a few years. The elements of this center were built piece by piece over a minimum of twelve centuries. The fact that the structures all seem to work together in a harmonious whole impresses one with the Maya architects skill.

Comparative Data

Regional Maya Centers

How does El Pilar compare with other Maya centers, is this sophisticated use of architectural order peculiar to El Pilar? The answer is that El Pilar is not unique, in fact, it is analogous to many lowland Maya sites. A brief examination of the site plans of three lowland centers (Yaxhá, Yaxchilan and Copan) clearly makes this point (Figure 20). Each of these major Maya centers exhibits the architectural ordering principles of axis, enclosure, symmetry, hierarchy, and repetition as well as a marked distinction between public and private space. Evidently the cultural norms governing Maya architecture were very strong in the Central Maya Lowlands. A more complete urban design analysis of other Lowland centers would greatly benefit comparisons of architectural techniques in Maya centers. Turning to the site maps of the nearby centers of Baking Pot and Pacbitun demonstrates that El Pilar's two-part structure with causeway connection is not that unusual (Figure 21). The sites of El Mirador, El Pozito, Nohmul, Nakbe, and many others also display this two-part trait (Neivans 1976; Dahlin 1984; Hammond, Pyburn, Rose et al. 1988; Hansen 1991).

A Cross-Cultural Comparison

To demonstrate the similarity of the ancient Maya use of these architectural principles with other civilizations, a brief comparison to the Roman fora will be made.

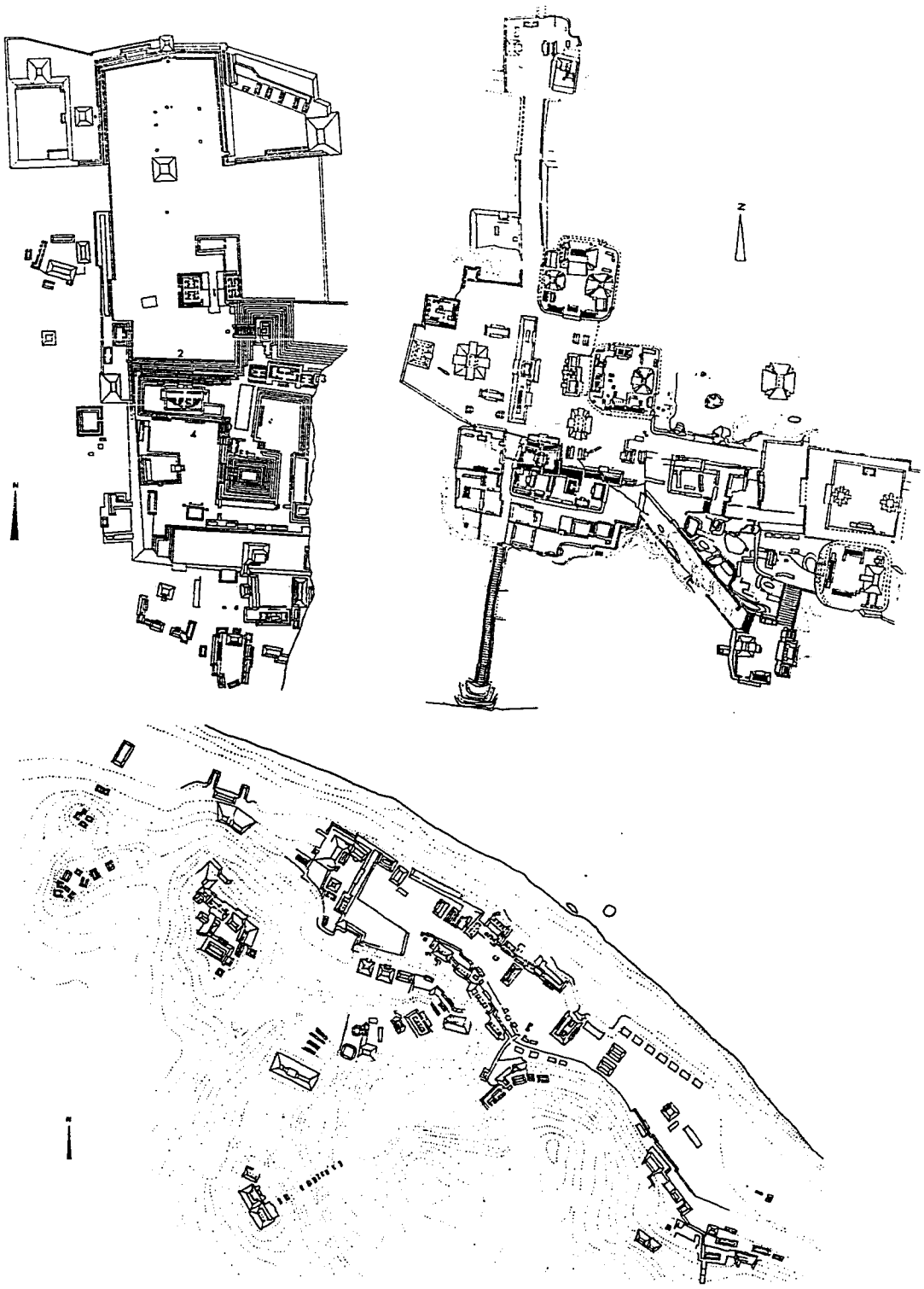


Figure 20
The Maya centers of Copan (top left), Yaxhá (top right), and Yaxchilan (bottom)
(all from Heyden and Gendrop 1980)

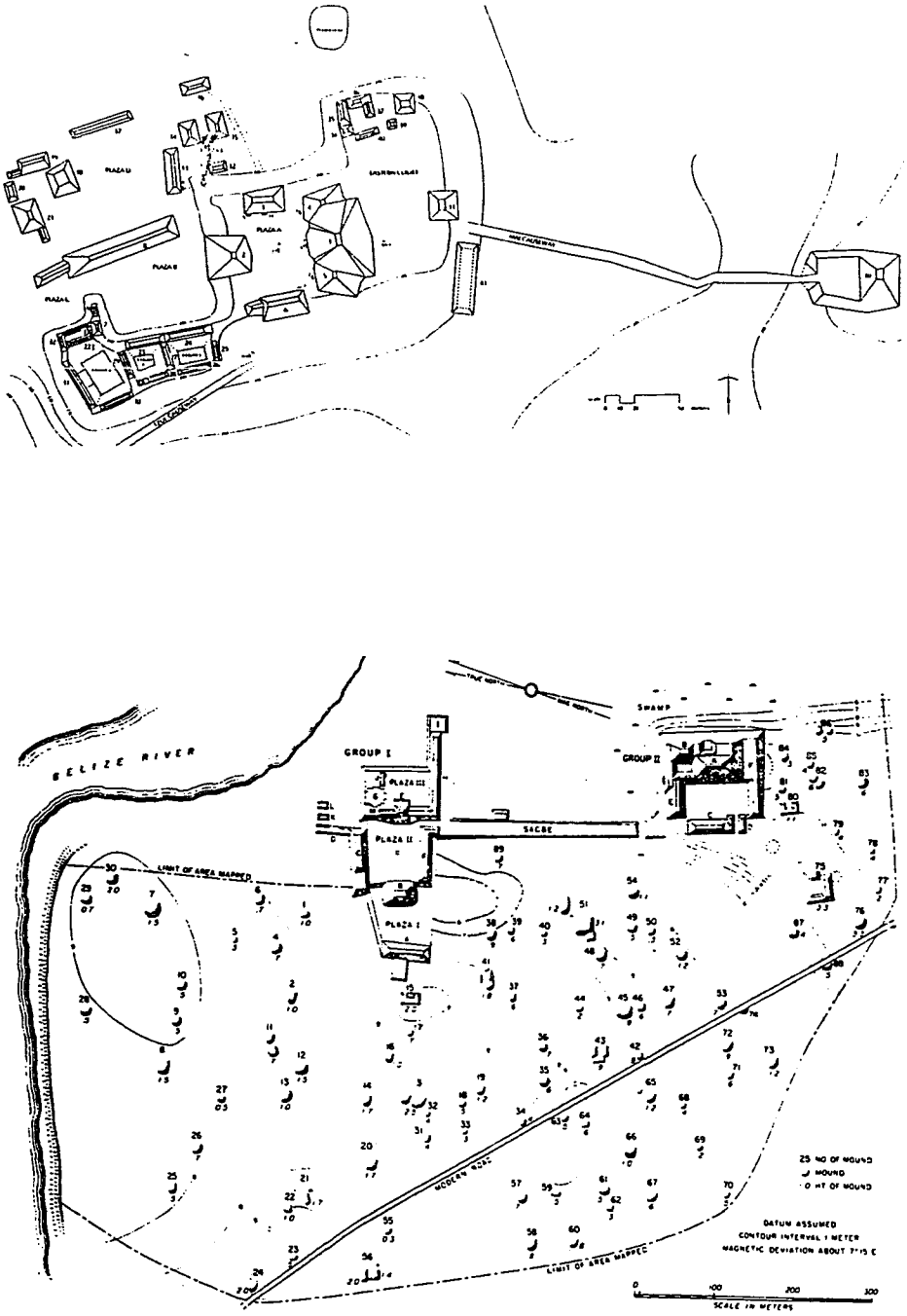


Figure 21
The centers of Pacbitun (top, from Healy 1992) and Baking Pot (bottom, from Bullard and Bullard 1965)

It is very important to assert at this point that this comparison in no way implies any influence or contact between New World and Old. Rather, the comparison amply illustrates the proposition that the ancient Maya architects arrived at similar solutions to the problems of public space to those of ancient Rome. Rome's urban design techniques have been studied for a thousand years, the same amount of time that Maya cities have been abandoned.

The Roman forum was an architectural element forming the core of almost every Roman community in the widespread empire. The models and archetypes were, of course, the central group of fora in Rome itself (Figure 22). A glance at the map of the Roman fora impresses one with the planning similarities to ancient El Pilar. The fundamental and ideal principle guiding the design of the forum was monumental axiality (Zucker 1959; Owens 1991). Along the axis, a series of linked, enclosed public spaces were created. Like the Maya, there is much evidence for increasing enclosure with the passage of time (Owens 1991; Perring 1991). The series of spaces laid out along the northern axis, the Imperial fora, are markedly more enclosed than their southern counterparts, the Republican fora.

Hierarchy and repetition were also extremely important. The use of repetitive colonnades and paired spaces unites the individual plazas (Crouch 1976). The principle of hierarchy could be best depicted by the opposition in the Republican fora of the Roman's foremost temple, that of Jupiter Optimus Maximus, on the eastern Capitoline hill with the great mass of the coliseum in the west.

The forum was the center of Roman life. It combined market, meeting place and temple and formed the impressive center of most Roman communities (Webb 1990). Because the temples were private, large public spaces had to be created for public services, processions and gatherings. The relationship of games to public spaces was also an intimate one. What more appropriate spot could there be for symbolic games than the forum (Kostoff 1992)? In this El Pilar's Plaza Copal ballcourt

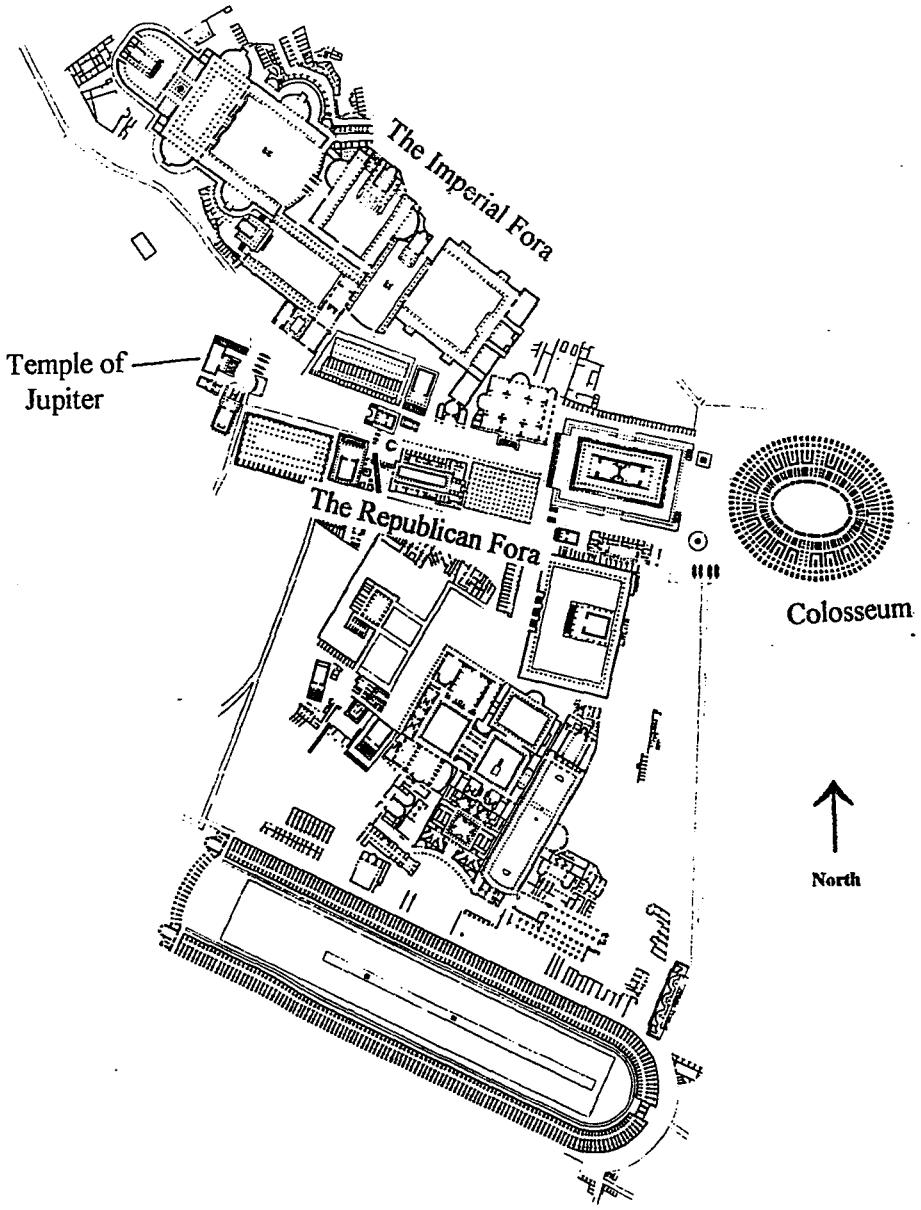


Figure 22
The fora of Rome (from Bacon 1974)

mirrors the symbolic position of the Coliseum in all but size. The famous Roman architect Vitruvius wrote a manual for the design of fora and suggested the ideal proportions of 3:2 for the enclosed space, roughly the same proportions as found along the axis in El Pilar's Plaza Copal. It is evident that the Maya architects of El Pilar understood the ordering principles as well as their Roman counterparts, although the latter exceeded them in specific engineering knowledge (for instance, the Maya possessed all the materials available for both hydraulic cements as well as the true arch but there is no evidence of their use in Mesoamerica).

CONCLUSION

> It is possible to make buildings by stringing together patterns, in a rather loose way. A building made like this, is an assembly of patterns. It is not dense. It is not profound. But it is also possible to put patterns together in such a way that many patterns overlap in the same physical space: the building is very dense; it has many meanings captured in a small space; and through this density, it becomes profound. (Alexander, Ishikawa, Silverstein et al. 1977)

All Maya centers, El Pilar included, are unique in specific form. This uniqueness, however, has been overstated in the past in comparison to urban centers elsewhere in Mesoamerica and the world. In denying theoretical similarities between Maya centers and other centers of the world, Mesoamerican archaeology has left a broad gap in our knowledge of the ancient Maya.

This void can be partially filled by research into concepts like those of urban design suggested in this thesis. This type of investigation looks at the centers as holistic systems, not just sums of their individual parts. Most importantly, work such as this can be best done in the context of an interdisciplinary approach to both the fieldwork and the resulting data. As illustrated in this thesis, there are many methods of analyzing the structure of Maya centers such as archaeoastronomy, orientation, symbolism and, function. All contribute to our knowledge of the whole but it must be recognized that these methods cannot stand alone as interpretations of ancient Maya thought or practice. Rather, they should be used together, in the framework of urban design analysis, to give a broader, more holistic, view.

This thesis has proposed a framework for the incorporation of past methods of center analysis. The use of general architectural principles and urban design theory focus research on the 'big picture' neglected by the study of specific architectural traits or styles. Utilizing the method proposed can facilitate the comparison of urban center settlement pattern data both among Maya centers and cross-culturally. A better understanding of Maya architecture, engineering and planning may help us to understand much more about ancient Maya society. It is important to emphasize that this thesis is but a partial step in this direction using preliminary data from a newly-explored Maya center.

The BRASS/El Pilar project has just begun this process. Further fieldwork is designed to gather data such as building chronologies which, taken together, will help explain the process by which the Maya architects of El Pilar expanded and remodeled the urban core. The countryside is also being studied to develop a sense of how El Pilar fit into its surroundings. Architects, engineers, archaeologists and cultural anthropologists are all working together to understand the ancient architectural knowledge and, in the process, examine our own modern relationship to architecture, form and space.

It has been recognized that human beings have a fragile sense of place, particularly when they feel overwhelmed by the landscape. Our sense of place is enhanced by 'putting our mark' on it, especially through architecture. We mirror natural forms, like the pyramid mirrors the mountain, but order them in a way we can understand and feel more secure within. This process, as a reflection of our fundamental psyche, is a unique and lasting window on our society.

This thesis is the start of a probe through this window of the ancient Maya. The myriad studies of individual aspects of Maya material culture and cosmology examined here are shown as steps toward a broader view of Maya urban centers within a framework of architectural urban design.

Appendix A:

The structures and plazas of El Pilar

El Pilar Master Structure List

#	Structure type*	Location	Facing	Elevations #/Top*	#/Bottom	Heigth
1	pyramid	SE crnr of plaza A	PL A	192/252.3	181/245.42	6.88
2	US	SW crnr of plaza A	PL A	127/248.48	137/245.35	3.45
3	range building	N side of plaza A	PL A	150/250.3	155/245.3	5
4	pyramid	NE crnr of plaza A	PL A	167/253.8	160/245.3	8.5
5	ball court	W structure, SE crnr of plaza C	BC	98/244.3	92/241.5	2.8
6	ball court	E structure, SE crnr of plaza C	BC	103/243.6	94/241.	2.6
7	pyramid	E side of plaza C	PL C	266/257.99	258/241.5	16.49
8	pyramid	NE crnr of plaza C	PL C	283/251.7	273/241.5	10.2
9	pyramid	NW crnr of plaza C	PL C	269/250.8	268/241.6	9.2
10	pyramid	W side of plaza C	PL C	248/253.4	240/241.4	12
11	pyramid	NE crnr of plaza D	PL D	287/240.2	284/236.4	3.8
12	pyramid	S side of plaza F	PL F	320/230.6	324/228.	2.6
13	platform	W side of plaza F	PL F	339/226.1	343/224.5	1.6
14	range building	W side of plaza F	PL F	297/226.8	298/224.6	2.2
15	plat. pyramid	W side of plaza G	PL G	375/230.8	373/229.6	1.2
16	plat. pyramid	E side of plaza G	PL G	384/232.3	389/230.	2.3
17	US	NE crnr of plaza F	PL F	403/228.2	405/227.	1.2
18	US	E side of plaza F	PL F	305/229.3	300/226.7	2.6
19	pyramid	E side of plaza I	PL I	22/242.53	49/229.7	12.83
20	pyramid	W side of H'menNa	W-PL Q	164/247.4	N5/228.6	18.8
21	range building	S side of plaza J	PL J	N13/242.4	27/240.4	2
22	range building	Btwn plazas J & M	PL M	715/241.8	T16/238.6	3.2
23	range building	Btwn plazas J & K	PL J	148/240.9	18/239.8	1.1
24	range building	E side of plaza K	PL K	146/239.7	32/238.1	1.6
25	pyramid	E side of plaza L	PL L	N7-54/232.5	719/227.1	5.4
26	US	Btwn plazas G & I	PL I	57/234.4	51/229.	5.4
27	range building	SE crnr of plaza G	PL G	393/232.4	394/229.8	2.6
28	range building	SW crnr of plaza G	PL G	351/231.8	394/229.8	2
29	US	W side of plaza I	PL I	47/232.4	51/229.	3.4
30	range building	W side of plaza A	PL A	140/247.6	139c/245.7	1.9
31	stone pile	S of EP10, SW crnr of plaza C	PL C	280/242.9	279/241.4	1.5
32	US	SW crnr of plaza F	PL F	327/229.1	326/227.5	1.6
33	US	SE crnr of plaza F	PL F	314/229.7	312/228.1	1.6
34	US	NE crnr of plaza M	PL M	2/239.2	3/238.6	0.6
35	US	W of plaza D	(W)	114/232.8	127/229.5	3.3
36	range building	NW crnr of plaza F	PL F	295/226.	296/224.8	1.2
37	range building	E side of plaza N, btwn N & Q	PL N	424/230.3	427/228	2.3
38	US	E side of plaza P	PL P	422/229.7	426/228.6	1.1
39	range building	E side of plaza O, btwn N & O	PL N	599/226.	601/223.22	2.78
40	US	NW crnr of plaza N	PL N	606/227.68	607/225.14	2.54
41	range building	W side of plaza O	PL O	581/224.53	582/224.1	0.43
42	range building	N side of plaza O	PL O	592/226.99	591/225.01	1.98
43	US	south side of plaza E	PL E	624/233.31	622/232.36	0.95
44	pyramid	E side of plaza E	PL E	650/232.57	501/228.13	4.44
45	pyramid	W side of plaza R	PL R	665/235.03	666/230.88	4.15
46	pyramid	W side of plaza R, N of EP45	PL R	692/233.29	691/231.44	1.85
47	US	S side of plaza E, btwn EP43 & 4	PL E	642/228.63	644/227.88	0.75
48	balustrade	N side of plaza M	PL M	717/238.84	718/238.66	0.18
49	pyramid	E side of plaza F	PL F	310^/228.5	311/227.6	0.9
50	pyramid +	E of EP7, small triadic structure	(W)	727/235.05		

#	Structure type	Location	Facing	Elevations #/Top	#/Bottom	Heigth
51	US	SW crnr of plaza F	PL F	336/226.6	335/225.4	1.2
52	US	W of EP1, S of EP2	(N)			

* all structures measured include humus & collapse
* all structure heigths measured from the facing side indicated
* structures designated "US" are of as-yet unspecified type

El Pilar Master Plaza List

LTR	Name	Location	Dimensions
A	Axcanan	S plaza at EP	35 X 20m
B	Ballcourt	SE of plaza C, ballcourts	23 X 40m
C	Copal	Btwn plazas A and D	55 X 115m
D	Duende	N of plaza C	50 X 70m
E	Escoba	E of plaza D and F	40 X 75m
F	Faisan	S of plaza G	70 X 57m
G	Gumbo Limbo	btwn plazas F & I	30 X 15m
H	Hatz	plaza btwn K & I	28 X 5m
I	Imix	S of the acropolis (H'menNa)	30 X 18m
J	Jobo	SW plaza on the H'menNa	18 X 7m
K	Kibix	E plaza on the H'menNa	4 X 24m
L	Lec	Northernmost EP plaza	32 X 29m
M	Manax	N plaza on the H'menNa	14 X 55m
N	Naba-cuc	W of EP, btwn Q & O	35 X 13m
O	Ok-pich	Westernmost plaza in EP	22 X 22m
P	Pom	N of plazas N & O	25 X 35m
Q	Quelite	W of plaza Q	40 X 30m
R	Rosa	E of structures EP45 & 46	50 X 75m
S	Subin	plaza on E edge of H'menNa	17 X 40m

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