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## **Architectural Restoration Criteria in the Maya Area**

*Translation of the Spanish by Alex Lomónaco*



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## **Introduction**

The architectural restoration of the Maya area is not a frequently discussed issue, and consequently not too much known for the general public. Nevertheless, it has an obvious significance, as restoration is responsible for the ruins transformation of numerous archaeological monuments into outstanding tourist attractions as well as development centers for the nearby communities and companies involved in tourism.

Presently, countries in Mesoamerica are requesting that archaeological projects, in addition to studying the prehispanic cultures past, include at least partial restoration works as a part of their programs. Unfortunately, these works are not being accomplished by experts in this field, and much too often archaeologists, all by

themselves, must take full responsibility. Moreover, there are no official guidelines or criteria so far on which to base our actions.

This work, completed thanks to the assistance and support provided by FAMSI, will attempt to fill in the gap by discussing a number of primary conservation criteria and by defining, as much as we can, major theoretical and conceptual foundations to make them available to all those who for different circumstances may find themselves engaged in these activities.

Consequently, we hope to be of help in establishing a theoretical framework to justify the methodology of reconstruction involving archaeology as a base of conservation. In other words, it is not our intention to make archaeologists become restorers, but rather to spread the awareness of the urge to coordinate all archaeological actions with those of monumental conservation, in the understanding that they are complementary and by no means competitive activities, and that one is no less important than the other.

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## **Some Background**

To achieve our objective there's no need to account for one hundred years of restoration history in Mesoamerica; such a thing would be too long and unnecessary. On the contrary, I feel it would be important and useful to place ourselves within the overall perspective of what has been done in the past; in broad outlines, we shall also refer to a number of aspects of the methodology involved, to finally elaborate a bit on the results fo such interventions.

We also want to warn that even though a number of awful errors will be mentioned regarding the treatment some monuments were given, our intention is far from criticizing anyone, as methods have arrived tied to a number circumstances from the different times, and in a way, with the valuation process our countries, as political entities, have given to their cultural heritage.

During the first three quarters of the XXth century, and due to the increasing admiration raised by prehispanic cultures, several foreign institutions undertook archaeological investigations, some of which involved restoration works. The methodology set in motion to investigate, would generally include trenches, two, four and six meters wide, which occasionally cut complete buildings and acropolis; moreover, some architectural entities underwent systematic dismantling.

Uaxactún (1925-37) represents a very particular example of what we just said, as large trenches were excavated that completely cut architectural complexes in their four directions, from the very top of them down to the bedrock (Smith 1950, Fig. 7, 8, 9, etc.), thereafter the site was left abandoned. The excavations and trenches were not back filled, the forest grew once more, and the ruin of the ruin was ruined, again.

Like many other places within the Maya area, Tikal (1956-69) was not an exception; in this case, however, we should point out that very significant changes gradually began to take place, almost everywhere. They had to do with the value governments gave to touristic activities; therefore, excavations were back filled, major structures restored, and archaeological sites were duly prepared to receive visitors. Between 1970-1985, at least in Tikal, other archaeological projects were undertaken, which somehow modified previously employed methods.

The large trenches and the dismantling of buildings constituted a destructive method, we are aware of that, but the obverse of the coin should be considered as well: that timeframe has provided us with excellent documents and knowledge, of which we have all learned and which we still use as the basis of new and sophisticated investigations. The most destructive methods involved the use of dynamite by Leopoldo Batres in Teotihuacán, México (Cabrera Castro 1986:185), or the craters that are still visible at Xunantunich and Lubaantún, Belize, a result, according to the remembrances of local neighbors, of Thomas Gann's use of dynamite during the 20's.

Overall, and throughout one hundred years of adventures and research in prehispanic monuments, methodology has gradually changed, though we all agree these changes are insufficient, as far as monumental conservation is concerned. Likewise, architectural restoration was frequently undertaken as an independent activity, divorced from archaeology, even in projects that involved a restoration responsibility.

The architectural restoration of monuments, present in Mesoamerica since the early XXth century, did not emerge as a conscious conservation tool but rather –with few exceptions– as a method to take advantage of touristic attraction. Thus, many archaeological sites were restored by applying methods that ranged from the more simple, honest, and conservative ones, as is the case of Quiriguá (1910-1934) in Guatemala when anastylosis was first used (González 1977:7), and Palenque, whose initial restorations were undertaken out of the love for a great artwork in the process of deteriorating. Other restorations provided monuments with an all-brand-new splendor that reached beyond the limit of evidence and entered into the realm of imagination, scenography, and hypothesis.

Restoration has existed in the world since immemorial times, a result of the widespread yearn to preserve places with great cultural significance, connected with social and religious traditions. But it was only in the XIXth century when discussions began on why or how to accomplish this, which led to a controversy between two opposite criteria: one proposed not to intervene in the destruction process, or to intervene as slightly as possible and only for stabilization purposes, while the other one which pursued the full reconstruction of the ruin for the restitution of its former splendor.

The art critic John Ruskin (1819-1900) from England, who influenced the preferences of Victorian intellectuals, and Eugene Emmanuel Viollet-le-Duc (1814-1879), a French architect, were the champions of apparently extreme and unreconcilable positions. Viollet-le-Duc had restored numerous monuments in France, the Cathedral of Notre Dame of Paris among them (Encarta 2000), and felt that based on documental analysis and existing evidences, monuments were to be totally rebuilt. The critic Ruskin, on the contrary, perhaps wrongly interpreted by many, considered the restitution of missing parts inappropriate, and coarse restorations with no respect for the original work and merely based on hypothesis, even more unacceptable. This is what he said:

*"Restoration may eventually become a necessity, all right. Then, face such necessity and accept it, tear down the building, toss its stones to the farthest possible place, make rubble or mortar out of them... but do it with honesty, do not replace the building with a lie..."*

(Ruskin 1963:199-200, quoted by Molina 1975:17).

The trend to rebuild and to restore the work of art back to its original form, and the obsession to prevent such a thing may be observed even nowadays. Some shared Viollet-le-Duc's point of view, while Ruskin and his supporters would rather leave monuments as they were, or intervene as slightly as possible and only to allow for their survival.

In my view, and as we shall later see, both are partly right, but it is indispensable to take into account other essential factors and to understand them in their appropriate dimension. For now, and as a background information, it will suffice to say that the XIXth century thinking has not notably evolved as far as philosophical notions or techniques are concerned; and as mentioned earlier, we still lack an overall consensus in accord with the reality of the prehispanic cultural heritage.

In an opposite viewpoint, many archaeological projects failed to consider the need for conservation, the excavations were left with no back fill and the buildings abandoned. Such was the case with Lamanai, Al Tun Há and Lubaantun in Belize, though these are not the unique examples. This trend, in addition to the weakness of government institutions, derived from the understanding that conservation was an obligation of those countries that owned cultural goods, and not of the particular researcher involved.

In a way, this is true as far as conservation is concerned, but it is obvious that whoever digs a hole and causes damages, no matter the extent of such damage, should as well be responsible for repairing the damage caused as an integral part of his/her activities, inasmuch as conserving is an ongoing task, while restoring or repairing the damages associated with an investigation must be an issue inherent to whoever causes the damage. This is similar to a car crash: the person who hits is the person who pays; whoever destroys must pay for the damages.

My career in the field of archaeology, restoration and conservation of monuments, began at Mixco Viejo, Guatemala (1962), and later my work continued in Kaminaljuyú

and Tikal (1956-69). Between 1970 and 1980, I was head of the Tikal National Park, and this experience gave me a clear awareness of the responsibility we embrace at the time of excavating and leaving monuments publicly exposed using inadequate methods. This also gave me the opportunity to test a few ways of complementary work between archaeology and conservation which could be of help at the time of undertaking that kind of responsibility.

Although the Project Copán Phase II (1980-85) had been initially planned so that archaeology would go first and the restorer would be incorporated later, as always, my presence there as restoration director (1981-85) helped to make evident the need to coordinate actions with a multidisciplinary sense. As a gift from God, I met there with William Fash and his wife Barbara, and together we were able to successfully coordinate a few experimental actions that provided shape and foundations to our future actions.

Such experience and the enthusiasm shown by both the Fash's, led to the creation of the Copán Mosaic Project, followed by the most successful of all programs known as the "Copán Acrópolis Archaeological Project" (PAAC 1985-1996). Our objective was to analyze mosaic sculpture, trying to place it, whenever possible, in the original architectural, archaeological and temporal contexts. Unmodest as it may seem, I must say this proved a model of coordination worth imitating, while conservation works were never considered a separate thing.

Since 1992 and to this date, I have shared my time as a consultant in several projects and international institutions in Guatemala, Honduras, and also in El Salvador, Belize, and México. Consequently, this work is largely the result of 38 years of personal experience, and I am prepared to assume the responsibility of the successful actions I shall now describe, and needless to say, to also take responsibility for any errors that may have been made.

As for the remaining Maya area, things have not varied greatly. Most projects undertaken in the past, including contemporary endeavors, are still divorced from restorers, or either, archaeologists personally assume such responsibility. Architect Augusto Molina Montes, in his book *La Restauración Arquitectónica de Edificios Arqueológicos*, has stated:

*"In the past decades, an exaggerated and in most cases improper primacy has been given to 'reconstruction', as objective and goal of an important number of official projects of Mexican archaeology... ...in spite of the many reconstruction works completed in México, interest has been scarce regarding the theoretical and conceptual aspects of the archaeological, monumental restoration,..."*

(Molina 1975:5)

For all of these things I am very grateful to FAMSI for the support received, one that allowed me to write this report while adding a number of personal experiences lived

during my last extended tour along forty restored sites within the Maya world, where I was able to witness a part of the many things that have been done and are being done nowadays. This tour has helped me to weave a frame of reference for some later conclusions.

## **Definitions and General Conservation Criteria**

It seems bold to refer to the theoretical principles of conservation and to the conceptual theoretical principles regarding restoration of prehispanic monuments within the Maya area, because actually, even now at the dawning of the XXIth century, we lack any coordinated and firm doctrine for archaeological monuments. I feel, however, that we now have a firm foundation on which to discuss some essential aspects of the existing regulations and some major criteria set forth by experts.

The truth is that the norms for restoration and the fundamental concepts thereof are of an overall nature, and they depend upon conditions that vary greatly from those we customarily encounter in the archaeological sites of our Maya world. It is undoubtedly true that the theoretical principles remain the same as to the reason why cultural values should be preserved; however, we must define the scope of archaeological restoration without escaping from such foundation, but instead, adjusting it to our reality in the field of Maya archaeology.

Some notions from the XXth century have tried to establish a balance between the antagonistic positions of the XIXth century, in an attempt to establish criteria that would allow us to work in harmony. Thus, to this date, the existing documents are abundant; some of them are international, others are regional or national, but they are all based on international documents like the Letter of Athens, Venice, Australia or Burra; the European Convention of Protection, the Norms of Quito in the Pan American case, and many others.

The abundance of documents and the proliferation of workshops, seminars, conferences, etc., have made several contemporary scholars feel rather skeptical about the use of concepts contained in less modern letters, like Venice's, or the criteria set forth by Ruskin and Viollet-le-Duc for considering them old fashioned. I personally believe that the fundamental concepts displayed in such documents are still in force and may be used with absolute propriety, as long as they are applied with the necessary adjustments to the reality of the Maya world, taking into consideration that most times such concepts were originated in the Classic architecture of the Old World.

In the first place and as an ethical foundation, we should not disregard Ruskin's words, when he said "*...do it with honesty, do not replace it with a lie...*" In other words, the most important thing in any restoration work, no matter the monument, must be honesty, authenticity, and truth. Because as we shall see, our responsibility is to make cultural values last, so that they may still be there for the generations to come, as true witnesses of a culture from the past.

For the time being, it is necessary to express ourselves clearly on the different actions concerning restoration of Maya architecture: therefore, we shall begin to set forth a number of definitions which also involve fundamental theoretical concepts focused on the healthy development of restoration of prehispanic monuments in the Maya area.

(**Note:** All references to the Letter of Venice have been taken from Díaz Berrio, 1968.)

## **Monument**

*Norms of Quito, Numeral 3 and 4. General Considerations:*

*3. Disregarding the intrinsic value of an asset or the circumstances concurring to realize its historical or artistic importance and significance, this will not constitute a monument unless a specific declaration by the State is made in such sense. The declaration of National Monument implies the identification and official record thereof. As of that moment, the asset in question shall be subjected to the régime of exception according to the law.*

*4. Every cultural asset is implicitly destined to fulfill a social function. It is the State's responsibility to make it prevail and to determine in the different cases, to what degree such social function is compatible with private property and the interest of private individuals.*

Consequently, a *monument* is a category based on the cultural meaning or special value of a particular object or place. Such category is established by the State, in accordance with such attributes, and it is not a synonymous of large size, as it is frequently considered. Some people say: "this site is not quite so monumental as that one," meaning that the first is smaller or of a lesser importance than the latter, but this is not correct. This is what the dictionary says:

*MONUMENT. (Lat. Tu-moneo, to remember) m. Public work of architecture or engraving accomplished to perpetuate the memory of a person or memorable deed.*

*Remarkable building (work)*

*Work that becomes memorable for its exceptional merit.*

(Encarta Dictionary 2000)

In short, it means "remembrance", in such a way that anything at all, disregarding its size, may be a memento, whenever it involves a historic meaning. Therefore, it will be unable to fulfill such purpose within a society that is unaware of its past; it is a testimony, it is unique and unrepeatable. A monument, as a part of history, fulfills its *social function* whenever the nearby communities and the nation as a whole are aware

of the characteristics that made it memorable. It is indispensable to know its past to grant it the right value and interpretation.

### **Social Function**

The social function that renders a remembrance memorable is the original function; nowadays, however, it will also have a contemporary function, or destiny. This is the starting point to define the scope of restoration, one which will help us discern between monuments that will continue with their original use like religious temples and public palaces within societies still active, and those that for different circumstances have interrupted their original function, and are therefore destined to contemplation. I mean, to be visited by tourists, with no intervention of religious or political activities within the component buildings.

In other words: if society and the original use are still in force, the scope of a restoration in the framework of Viollet-le-Duc's proposals may be acceptable; that is, its full restoration would be valid and necessary, as was the case with the Notre Dame Cathedral. But in the case of ancient Maya cities, if the social group that created the monument is no longer present and the monument has become a ruin, our intervention must be in accord with such reality. The original function cannot be reintegrated.

Nevertheless, if the ancient society is also ignored, the monument will be deprived of any major meaning, because we shall be unable to understand its history, original function, and transformation. If restoration is accomplished for touristic purposes only, without a research, as was and still is the case in many sites within the area, we would be weakening its cultural value, and the modern social function would remain incomplete. Archaeology is essential for the execution of projects that attempt to preserve and exhibit a monument; likewise, archaeology without conservation destroys, even though great knowledge may be achieved in the process.

In any case, be it to reintegrate the original social use and rebuild according to Viollet-le-Duc's terms, or to modify the monument according to what is needed, or merely for contemplation as a remembrance of a past we must bring to the present for the generations to come, the major foundation will still remain the same: to do it with honesty and never replace it with a lie, according to the sayings of Ruskin, the critic.

### **Conservation**

The term "conservation" is frequently replaced with the term "restoration", but as we shall see, these two actions are quite different from one another. The dictionary, the Letter of Venice and the Burra Charter define it as follows:

*CONSERVE: (From Latin Conservare; de cum, with, and servare, keep.)  
To maintain something, to attend to its permanency. // In regard to habits,*

*virtues and similar things, to continue the practice thereof. // To keep, to carefully keep something...*

(Salvat Encyclopedia, Dictionary)

*The Burra Charter: Article 1.4.: Conservation stands for all those processes and cares aimed at retaining the cultural meaning of a place. This includes maintenance, and according to the circumstances, it may include preservation, restoration, rebuilding, adaptation, and in most cases it will be a combination of more than one of them.*

*Letter of Venice: Article 2. The restoration and conservation of monuments is a discipline which requires the collaboration of every science and every technique that may contribute to the study and safeguard of the monumental patrimony.*

*Article 4. Monument conservation in the first place demands that permanent care is provided to them.*

In short: to preserve is to take all the necessary steps to secure the permanency of the monument. The following should also be included: specific legislation at a national and international level; effective policies at the same level, and actions such as vigilance, maintenance, monitoring, environmental control, landscape control, the site's capacity to support itself, deterioration, etc. etc.; all this demands permanent attention. This cannot be a casual undertaking, but on the contrary, it must be formal and designed to work interruptedly. This is why the responsibility of conservation cannot fall on any archaeologist or foreign institution, but on the State.

## **Restoration**

*Letter of Venice: Article 9. Restoration is an operation which must be considered as an exceptional one. Its goal lies in keeping the esthetic and historic values of the monument and is founded on the respect granted to the ancient substance and the authentic documents. It stops there where hypothesis begin, and beyond, all complementary works deemed as indispensable for esthetic or technical reasons, will depend on the architectural composition and will bear the mark of our age. Restoration will always be preceded and accompanied by the archaeological and historical study of the monument.*

*Article 15. Measures will be taken to facilitate the understanding of the monument exposed, without ever denaturalizing its meaning. However, all reconstruction work will be excluded a priori: only anastylosis, or the recomposing of the existing but dismembered parts, may be considered.*

(From Díaz Berrio, 1968)

Restoration, differently than conservation, is an exceptional, not permanent process; its objective is to preserve esthetic and historical values. In a literal sense, to restore is to recover, to recuperate, to repair, to put back in its primitive state, But as far as archaeological assets are concerned, we cannot take this meaning literally and apply it indiscriminately. It is necessary to consider the reality of the ruined monuments. This is what César Brandi states:

*"...In general terms, restoration is understood as an intervention that pursues to put back in efficiency a product of human activity..."*

(Quoted by González, 1977:3)

Architecture, disregarding its magnificence or simplicity, is created with a specific purpose. A post-office building, for instance, is useful and efficient for such a purpose, but when it deteriorates, for some reason, so does its efficiency; it is changed or disappears. This is also true for a warehouse, a temple, or a residence, but as we said in regard to Maya monuments, there's no way to recuperate the society that created them and its institutions and consequently, we are forced to analyze the restoration issues from this reality.

It would seem that Brandi's definition does not fit in with our present and future finality, and therefore, it must be adapted to the new social objective, which in our case is rendering permanent the remembrance so that it continues to a testimony of the past. The problem is to define to what extent can we or must we restore a monument destined to be visited by tourists. I shall quote Hiroshi Daifuku's, when he says:

*"Whenever an object is not in good shape, the problem consists in assessing the extent of the treatment to be applied. The minimum would be to do only what is necessary for its survival, but if the object risks to remain unrecognizable, we should ask ourselves whether such restoration is to be undertaken at all."*

(Daifuku 1969:27)

If the reintegration of the original social function is not possible, whenever we talk about giving back its efficiency to a ruined monument or a ruined city, we would have but one possibility: to restore its structural efficiency. That is, to render efficient the existing parts that because of the ruin have lost their capacity. To extremist, it would suffice to do the absolute minimum to stop deterioration by stabilizing its formal elements. In this respect we agree with Daifuku: if the object is unrecognizable... what would be the point in restoring it?

The Letter of Venice, a *priori*, forbids any reconstruction except when anastylosis is feasible. However, it seems to contradict itself by authorizing complements in missing areas when these are considered indispensable for technical or esthetical reasons. With these concepts, our criteria would be unimportant: we have here the base to complement as much as we want, or either to limit ourselves to the very indispensable actions to stabilize, avoiding any complementation.

Obviously, of course, if we have established honesty and truthfulness as a fundamental, ethical principle, we should discern what is convenient according to the present social function and the existing evidence. Complements are added "*with the purpose of facilitating the understanding of the monument exposed, without ever denaturalizing its meaning*". In simple words, we restore so that visitors may understand what they see, without substituting it with a lie, or changing its ruined nature and remembrance with something new and hypothetical.

Considering the hypothesis, maybe this is the right time to repeat Arch. Molina Montes' words, when he adds that Viollet-le-Duc went ahead of the Letter of Venice when he stated:

*"To decide a disposition a priori, without being compenetrated of all the data that should rule it, is to fall in hypothesis, and there is nothing so dangerous as hypothesis in restoration works." (Viollet-le-Duc, op cit; 33)*

(Quoted by Molina 1975:16)

Consequently, based on what has been said and in general terms, we may define the restoration of archaeological monuments as follows:

**MAYA ARCHITECTURAL RESTORATION:** It consists of an exceptional operation which seeks to preserve the esthetic and historic values of monuments by means of interventions that restore their structural efficiency and make it understandable to the visitor, without ever denaturalizing its meaning. It stops where hypothesis begins and is fundamented on respect towards the ancient substance, authentic documents and architectural composition.

Finally, we must say that the responsibility for restoration must be shared both by the archaeologists and the state, in a way that damages caused by the archaeologist are to be assumed by him, while damages caused by ten or fifteen years of abandonment ought to be repaired under the state's responsibility, as the starting point of a conservation process that implies permanent care.

### ***The Ruin***

A ruin is the result of abandonment and time; it is a state provoked by certain lateral pressures that show up whenever the damage of the superficial and horizontal layers of mortar appears, and cracks, allowing penetration by foreign agents. The excess water modifies the volumes of interior refills, and clays in particular increase their volume pushing laterally; tree roots push laterally as well, as they thicken. This is manifested by a slight deviation of lines, collapses, heavy sinkings, cracks, landslides, and total destruction.

## **Restoration Methods**

Generically, actions carried out on a monument are called "interventions", no matter if the work accomplished is of a preventive, formal, or permanent conservation nature. In overall terms, the steps to be taken may have to do with: liberation, documentation, analysis and diagnosis, so that on such bases we may determine what kind of treatment would be more convenient, and its application at a medium and long term. To fulfill our specific objective, we shall now describe the most frequent and significant interventions regarding archaeological monument restoration.

### ***Liberation, Analysis and Diagnosis***

Liberation is an integral part of archaeological investigation and a means to understand cultural significance. Combined with a multidisciplinary team, it is also a fundament of conservation. It begins with the planning of the project, being its major goal to systematically remove the collapse rubble. With this work, archaeology and restoration will jointly provide the evidence and documentation that are indispensable for the understanding of the monument and for evaluating its state of preservation. And on that basis, to elaborate the corresponding diagnosis that will lay the foundations for the most appropriate restoration treatment.

The architectural entities thus studied, once they are free of rubble, will be ready for the application of restoration treatments, while simultaneously, we shall have a story to tell on the origins and ancient function of the monument. In short, this will help to identify and connect the studied object with its past and present owners, thus providing a cultural meaning that they, together with the visitors, may understand and enjoy.

### ***Stabilization, or Consolidation***

The action of making a monument stable by strengthening it, is called consolidation. However, this term may be misinterpreted with those interventions intended to make deteriorated materials harder through the use of synthetic substances. To avoid confusion, we shall use the word stabilization here, a word that may be defined as to restore the structural capacity or efficient support to the weakened elements.

Everyone knows that the remains of ancient monuments in state of ruin and especially those that have become mounds, as is the case with many archaeological monuments, achieve balance and stability with the surrounding environment. This is evident mostly in those that have remained buried under their own rubble, or under the protection of the tropical forest for centuries. The problem is that deterioration may begin immediately after exposing them to a different environment: their liberation or the mere deforestation or felling of the surrounding trees, may set the process in motion.

In addition to this, the structural faults that caused its ruin are also reactivated with the liberation process. Hence the importance of working as a team, granting priority to the safety of the cultural asset and collaterally to that of the intervening individuals. In case of severe collapse, for instance, a simple trench bracing with whatever material we may have at hand, like wood, iron, stone, planks or the like, is essential to avoid losses. But if this would prove technically impossible, it is very simple to leave the rubble as a stabilizer and try to clean it later with the assistance of an expert.

A correct and timely bracing will allow the archaeological investigation to proceed with no interruptions, making it possible to wait for the right moment to accomplish formal works, both for completing the investigation and for preserving the material remains by stabilizing them according to the possibilities at hand and the most appropriate methods. To that purpose, we may put into practice the following methods:

### *Reassemblage*

The loss of facings such as stuccoes or clay mortars as plasterings or flattenings, plus the years of abandonment and ruin, help in the deterioration process of the materials' agglutinants. The original mortars, particularly in refills and cores in most sites of the Maya world, are sandy clays or limestones; they transform and deteriorate through contamination with organic materials such as roots, insects, birds, and small mammals. Such damage is not severe and it does not necessarily imply structural instability, but because of their nature of contaminated materials, they constitute a focus of infection and possible future instability.

*LAYOUT: Architecture. Shape or mode in which materials are placed in a construction; particularly, the ashlar stones or bricks of a wall.*

(Dictionary, Salvat Encyclopedia)

The task of reassembling consists in eliminating the contaminated material with the help of a thin and long iron hook used to clean the joints as far deep as possible, replacing it with a much more stable modern agglutinant, clean, and strictly compatible with the original materials. To that end, the standard mason trowel will not do; an adequate tool will be necessary (special spoons) that allow to introduce the new material inside the empty joints, without staining or damaging the ashlar stones we intend to protecting.

Reassembling is not always necessary, as usually there are exceptions where the Maya builders used top quality clay mortars, and the layouts, particularly the final retaining walls, or bearing walls, are so strong and stable that they don't require any reassembling work. This condition must be carefully evaluated during the liberation works, so as to establish whether the treatment applies or not.

## *Repairs*

Repairs are minor reparations in stuccoes and flattenings, and involve the fixation of portions undergoing a detaching process, the refilling of cracks, small complementations of an esthetic character, etc. This kind of work involves particular techniques, both for the application of first aids and for the preparation of materials and their further application. It is advisable to have an expert at hand to take care of all problems related to the movable goods or artifacts collected during the survey, for the responsibility to preserve is not restricted to the building, or to the site, but rather, it includes all artifacts and objects found in it.

## *Reinforcements or Liners*

The terms "liner, filler" (embono) derives from the Italian and mean "to improve something"; the term is used here to refer to one manner of stabilization consisting in the application of a coarse refill, made of stones and agglutinants identical or similar to the original ones, that are integrated to the old refills and cores in destroyed areas; the objective is to recuperate structural capacity. It must not be confused with the original refills.

The liners, or fillers, are particularly useful to reinforce and protect the superficial parts exposed to rainwater; its objective, besides strengthening and stabilizing, is to drain rain water as quickly as possible, to avoid filtrations that could be potentially dangerous to conservation. Moreover, they help us provide some kind of finishing to the superficial portions that for one reason or the other are to remain broken, or with missing parts. However, in practice, we should avoid abusing of this material by making large complements, because overabundance may be unaesthetic.

## *Collapsed Walls*

A bearing wall that has collapsed in colonial buildings occasionally allows to be pulled or pushed so that it recovers its plumb; this is a rather well-known practice in that type of architecture because usually the wall will be a compact and firm unit, for having a clay mortar of superior quality. This allows that it may once again be restored to its perpendicular position, while its bricks or stones will not become separated. Whenever we find a similar case in prehispanic architecture, the feasibility of returning the walls to the original position is high, although weak agglutinants, abundant cracks and strong curves described in a transverse section, will be frequently encountered ([Figure 1](#) and [Photo 51](#), shown below), making this case a difficult or impossible task to accomplish.

Anyway, this issue would be better addressed to by a restorer with an experience in *Maya structures*, as on the contrary, the attempt could yield fatal results. We must keep in mind we are referring to two very different types of constructions, not only for their shape but also for their structure and the construction materials involved.

## ***Reintegration, or Anastylis***

Reintegration or anastylis is the process through which we have the possibility to reintegrate or restore original parts that are falling or have fallen. The liberation works usually encounter sections with such characteristics. In traditional archaeology the ashlar stones are removed as a part of the rubble, considering that nothing can be done; however, the possibility of salvage and reintegration of such dislocated or fallen portions may be considerable, through the timely application of anastylis. Its effective application has to do with the following basic steps:

### *Topography*

Prior to initiating the archaeological investigation, it is indispensable to count on one topographic system of a one single point of origin; this will allow to monitor each and everyone of the structural elements and even the artifacts found during the liberation of the monument. At the same time, this system will be the coordination link between archaeology and restoration. This system will allow to create a data bank that will tie all cultural traits by means of three coordinates, and facilitate further actions of handling, interpretation, and reintegration.

To facilitate this task, it is convenient to establish a reticule formed by squares measuring two per two meters, named after their topographic position. This means that each localized element will have its distance from the point of origin, both in latitude, longitude, and height above sea level. This is useful not only for recording archaeological data but also to facilitate the task of architectural surveys, with absolute accuracy.

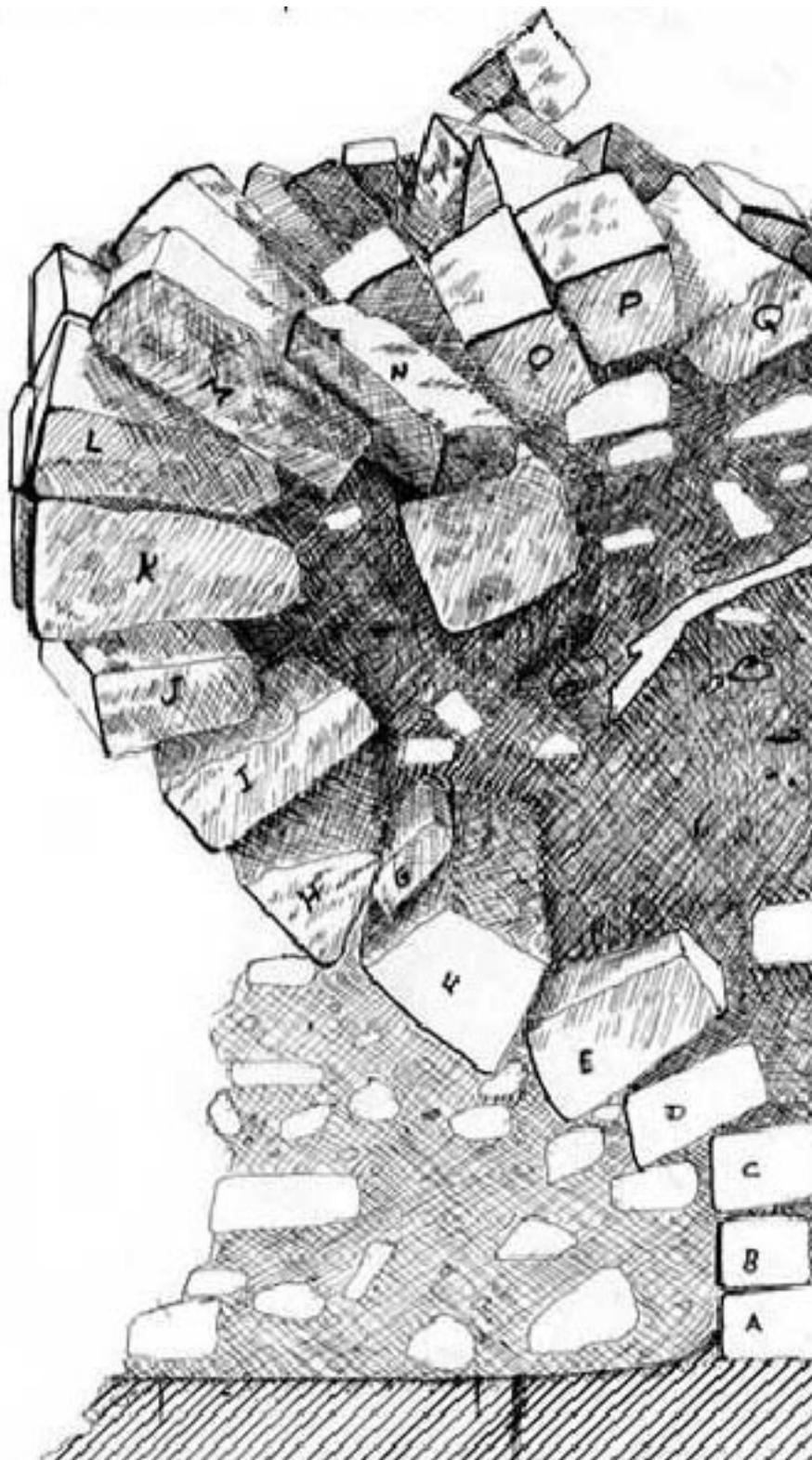


Figure 1. Cross section: Element No. 9, Structure 10L-22, Copán.



Photo 51. Copán, Structure 10L-21, north section, restoration process through anastylosis, March, 1991.

## *Documentation*

Once the reticule has been established, a detailed record of data will be carried out, describing the present state of the monument with words, abundant photographs, and clear and accurate drawings; all this must be tied to the topographic system. As to the fallen elements or elements in the process of falling down that are deemed restorable, it will be necessary in addition to place them in a plan drawing illustrating its distribution within the rubble, as this will largely determine the possibility to reintegrate the ashlar stones of walls or the mosaic sculpture. It is also advisable to record the damages or deterioration processes in accurate plan drawings and elevations of all façades, both external and internal, from the entire entity.

## *Fallen Walls*

Whenever in the rubble we identify ashlar stone courses and/or stones of mosaic sculpture, no doubt we are in front of a fallen wall; it is necessary to maintain them precisely where they were found. That is, each stone must remain in the precise place where it fell, and they will be further marked, avoiding to do so on the main face; this is better done on the rear side, so when they are reintegrated, the mark will not be erased but will remain hidden to the eye of the observer. The sculpted blocks should further be immediately catalogued; it is always convenient to coordinate the work from the moment of its finding with the iconography expert, and to count at least with the help of one mason and to assistants.

If we were in front of a heavily inclined wall in the process of falling down, describing a curve on its transversal section ([Figure 1](#) and [Photo 51](#)), and if diagnosis of the expert in Maya architecture determined a technical impossibility for it to be pushed or pulled, then it should be treated with anastylosis, by adequately documenting and marking the stone courses at the same place where they were found. This will give us the chance to monitor the relative position of each dislocated element, to further pick them up and recompose them in the correct place of origin or in an adjacent location. This is the process known as anastylosis or reintegration..

## *Marking Stones*

The alignments or horizontal stone courses will be marked with letters, while the ashlar stones may be marked with numbers, as shown in the hypothetical drawing ([Figure 2](#)). It should be noted that this drawing is an example of the numerating order; in practice, the face of ashlar stones is not to be marked with painting, as they would look bad. In any case, if marking the face of the important stones is deemed indispensable, it is to be done with plaster or some other marker that may be easily removed.

It is preferable, however, to use an indelible marker and mark the back of each stone, to avoid unintentional mistakes by the masons or ourselves at the time of doing the

reintegration, and if the mark is strong and the agglutinants are reversible, we shall have the chance to make corrections without losing the original marks.

### *Conclusions about Reintegration*

It is advisable to be assisted by an expert fit to advice or to conduct works such as these, to fulfill an accurate work and a fine presentation. We call this work reintegration or anastylosis. It consists of integrating once more the existing, original elements, badly collapsed or fallen. This has nothing to do with picking up the disarranged blocks of rubble to use them at random in partial reconstructions or complementations. It is indispensable that the stones picked up show a true relationship between each other, and that we may prove its order and structural provenience.

In most parts where buildings from the Maya area in Guatemala, Belize and the Southern Yucatán Peninsula are found, construction stones are extremely feable limes, so whenever they collapse and portions of the construction fall down, they are usually destroyed to such a degree that it is not possible to carry out any reintegration work; however, we have seen this rule broken in the past. At El Pilar, for instance, a site from the El Cayo district in Belize, we were able to find several sculpted stones that were a part of the frieze of a collapsed structure.

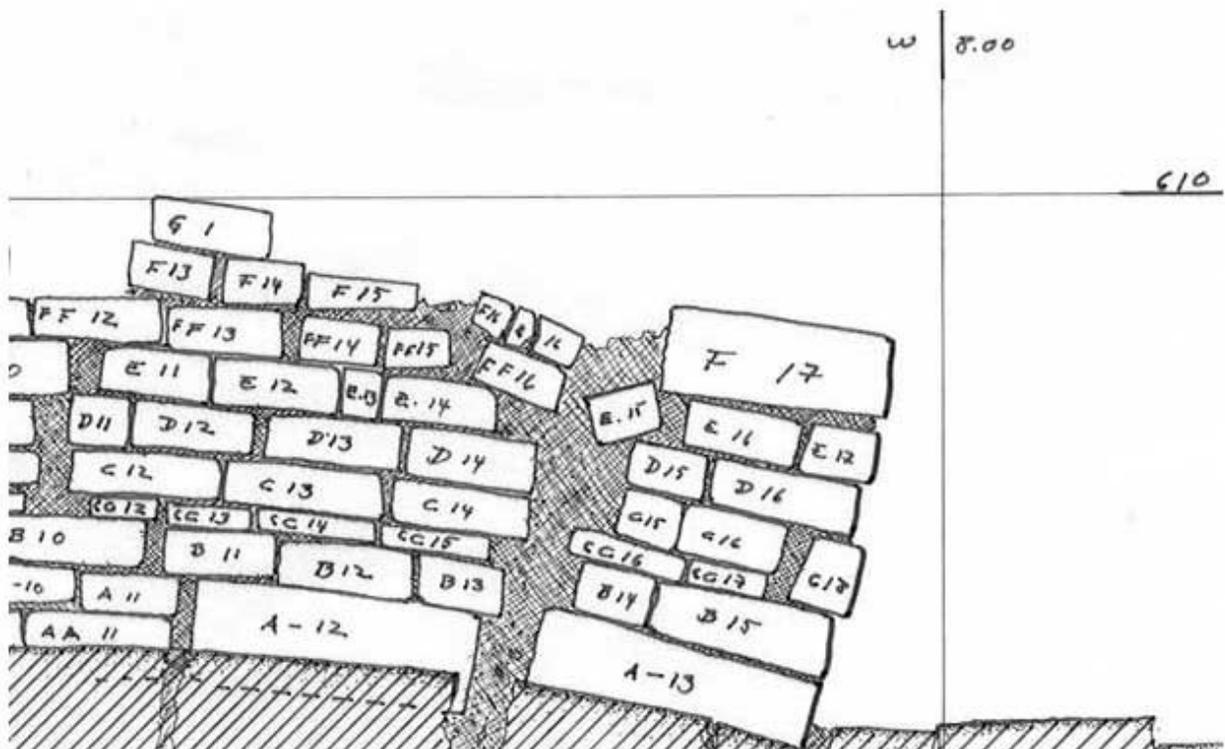


Figure 2. Example of adequate way to mark stones in preparation for anastylosis. Marks on the main face of stones are to be avoided.

In my view, what has probably happened is that the methodology of excavation applied in sites with very soft stones, has not been delicate enough to spot this kind of element which has usually broken into several pieces. In fact, if we are specially careful when removing stones from the rubble, we may also find fractions of the sculpture.

### *A Few Examples*

#### Copán

Copán was the most fruitful place as far as anastylosis is concerned. The ruin in this city was so severe that not a single roof was found in place, and numerous bearing walls were collapsed in over a 50%. I do not mean to say that only here we find the ideal conditions for the reintegration of ashlar stones or mosaic sculpture, but instead, that prior to Copán we never run multidisciplinary projects comprising the need to combine archaeology and restoration with a multidisciplinary team that included archaeology, epigraphy, architecture, iconography, topography, etc.

#### Structure 9N-82

During my work as restoration director to PAAC II, in 1981, Elliot Abrams and David Webster (Pennsylvania State University), as an exceptional case, recorded several lots of cut stone found in the rubble of Structure 9N-82. They placed each sculpted stone on a map that covered the entire area excavated by them with squares measuring 2 × 2 meters, at the front and inside the building. The portions of wall that had not fallen were short in height and collapsed in manners impossible to correct, because even while tufa is a stable and tough stone, the original agglutinant was a sandy clay with abundant roots, cracks, and organic soil.

We reintegrated the remains found *in situ*. Among them we found the foundations of two sculpture motifs of which some stones were missing ([Photo 1](#)). There I met William Fash and his wife Barbara, with whom I shared my wish to carry out a joint work that included archaeology and conservation. They proved particularly interested in the reintegration of the sculpture recovered by Abrams. Then, with the help of experts in epigraphy, iconography, and my assistance regarding Maya architecture and restoration, total success was achieved.

After careful study and several lab trials, the stones were transported to the site for a structural test. Fortunately, the main stones fitted in just like when we slide a drawer into its original place, evidencing as well that before the collapse took place, the building had been burnt with a very intense fire which indelibly marked the stones. The pink stains produced by burning also fitted with great precision, providing additional proof of its correct placement ([Photo 2](#) and [Photo 3](#), shown below).



**Photo 1. Copán, Structure 9N-82, preliminary reintegration of stone blocks, east side, 1981.**



**Photo 2. Copán, Structure 9N-82, reintegrated sculpture, 1983.**



**Photo 3. Copán, Structure 9N-82, main façade restored and protected with a palm roof, 1986.**

As a consequence of this success, William Fash invited me to jointly work with him in the rear part of the Palace of the Scribe, as we called it. The results were amazing: the rubble analysis allowed us to understand nearly 100% of the collapsed architecture, and to undertake, at least in a drawing, an ideal reconstruction of its façades. I say at least in a drawing, because even when the sculptural records of the lower portions of the main façade were reintegrated to the building, it was not possible to do so with the individuals of the upper portion because some intermediary elements were missing.

Such an accomplishment was followed by the need of exhibiting the sculpture, but not only the one from the Palace of the Scribe but from Copán as a whole, and we dared to suggest the building of a sculpture museum with a totally different museographical concept. The team's idea was to exhibit the original sculpture, not in showcases but instead, in exact replicas of the buildings to which they corresponded. Eventually, such museum became a reality, and nowadays accurate architectural replicas are present, where we exhibit the original sculpture. An example of this may be observed in [Photo 53](#), below, where the replica at a natural scale of the east building of the ballcourt is presented, representing the original sculptures in the position we were able to elucidate through our joint investigation.



**Photo 53. Copán, replica of Structure 10L-10; the ballcourt is inside the Sculpture Museum, 1997.**

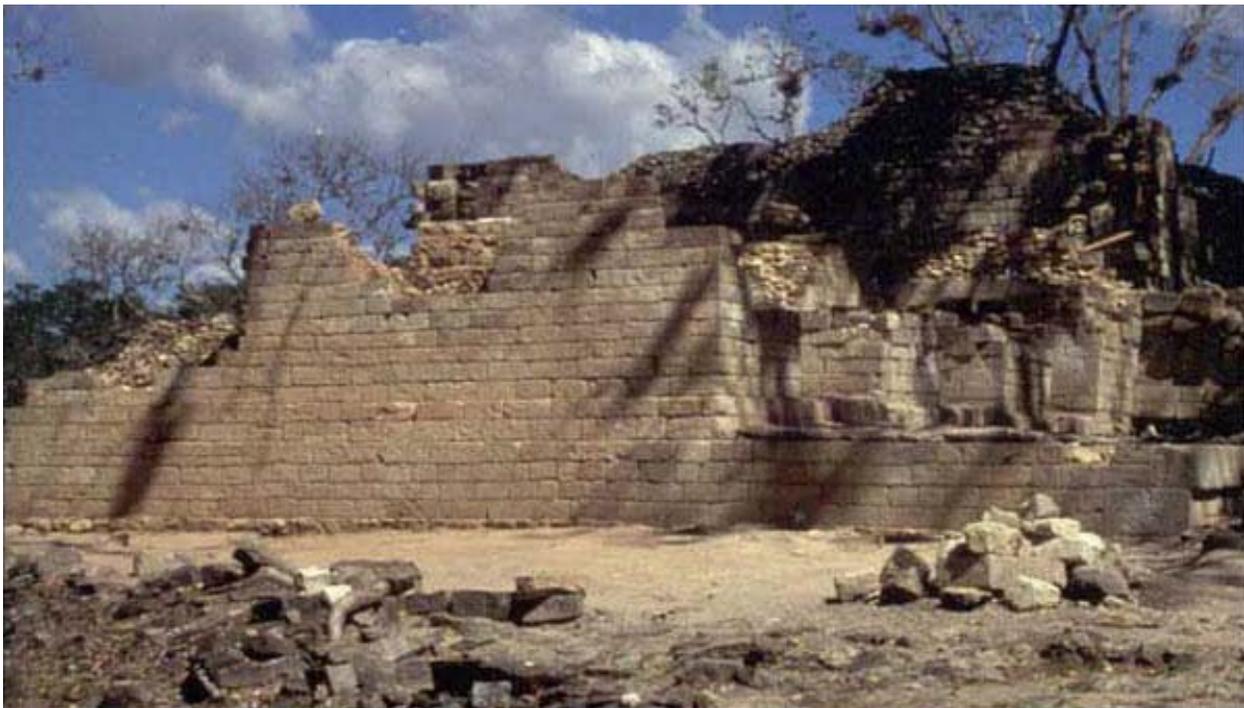
During further work (Copán Mosaics Project and Copán Acrópolis Project, 1985-1996), we underwent several unique experiences, of which at least two are worth referring: they represent extraordinary examples of how the team managed to achieve results that would have been unattainable in other projects.

#### Structure 10L-22A

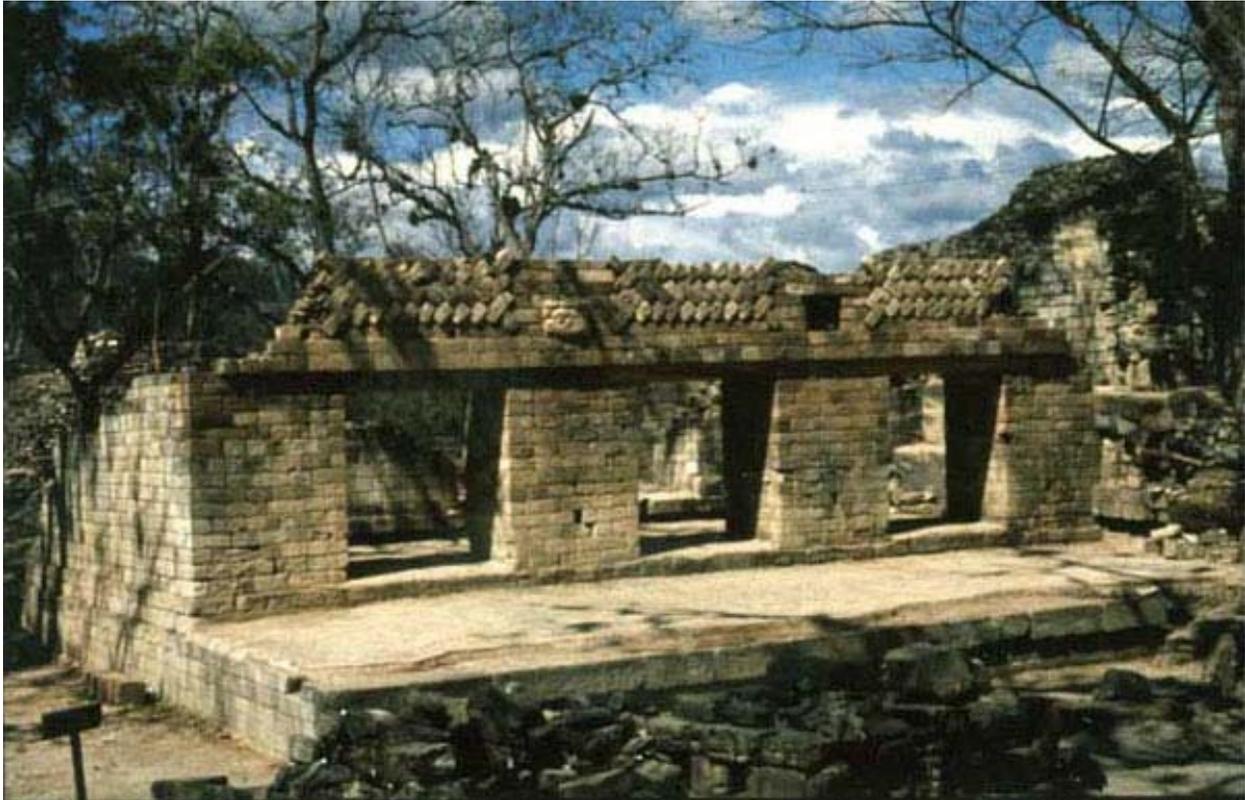
A portion of the bearing wall of the west façade in Structure 10L-22A was almost completely collapsed ([Photo 4](#)). After careful excavation, we found within the rubble on a section that showed the organization of several courses of ashlar stones, including a row of perfectly organized corner stones. With the documentation method already described, each stone was marked and then, with the help of photography and joint work, we were able to reintegrate the ashlar stones providing the building with a greater significance ([Photo 5](#), below).



**Photo 4. Copán, west wall, fallen, Structure 10L-22A, 1988.**



**Photo 5. Copán, restored west wall, Structure 10L-22A, 1989.**



**Photo 6. Copán, Structure 10L-22A, main façade restored, 1990.**

In the same way, one portion of the main façade, south side, containing mosaic sculpture, had also fallen in a relatively organized fashion, and we were able to reintegrate it with the certainty of doing the right thing ([Photo 6](#), shown above, and [Photo 7](#), below). Besides, in the eastern edge where the structure abutted with its neighboring one, Temple 22, we still had a portion of the upper zone decoration which helped to understand the fallen elements with clarity.

#### Structure 10L-29

Our greatest success took place when the team of archaeologists under the supervision of Wyllys Andrews as co-director of PAAC (Tulane University), worked in the liberation of Structure 10L-29, located north of the Acrópolis. The collapsed western façade, which apparently was a huge labyrinth of fallen stones ([Photo 8](#)) was actually a frieze of mosaic sculpture, which appeared before us in a surprising order and with a remarkable feasibility for reintegration.



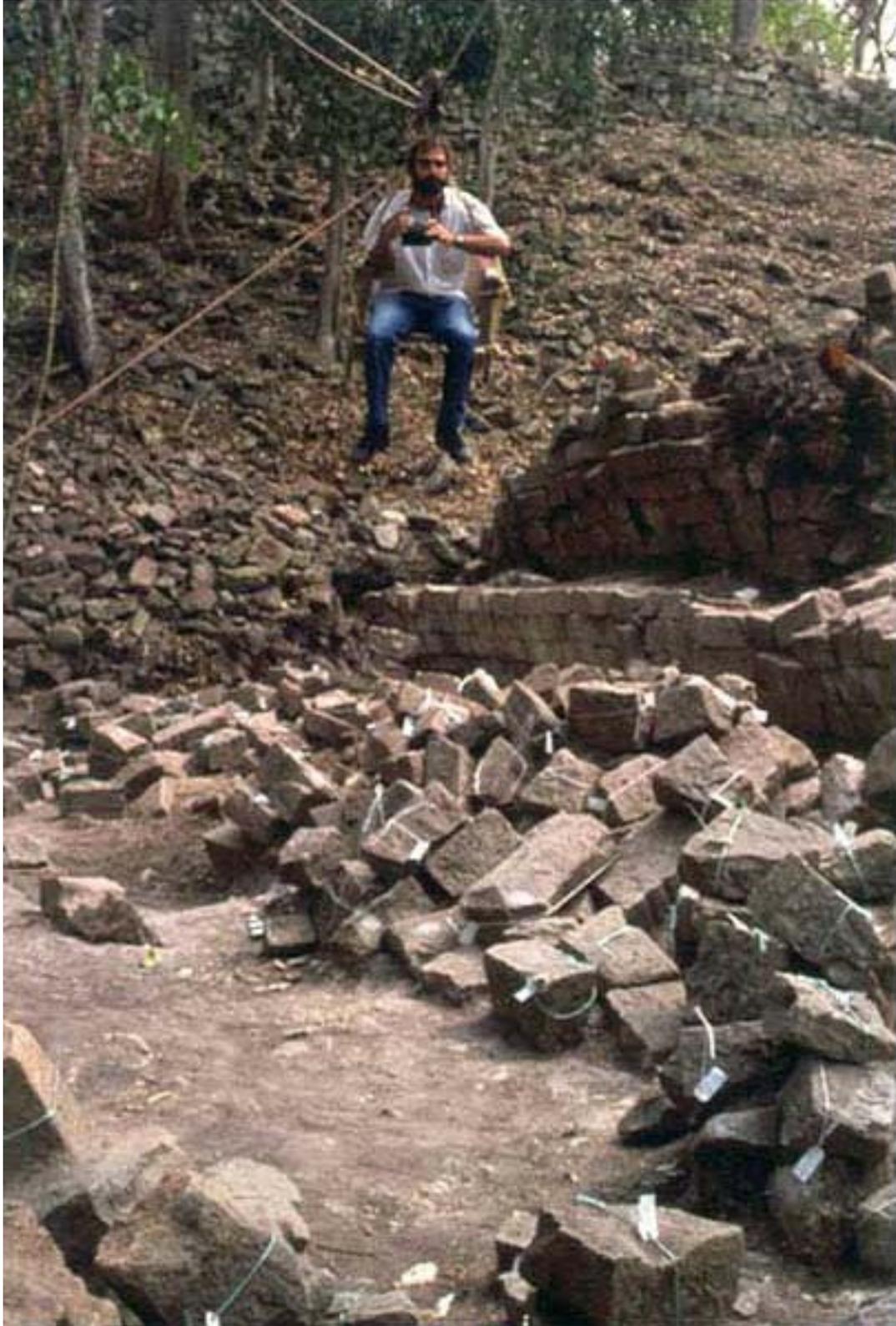
**Photo 7. Copán, Structure 10L-22A, detail of sculpture, upper portion, 1991.**

When the bearing wall collapsed, it fell down in fractions that rested one on top of the other, in the shape of layers. The method consisted in documenting the superficial layer in the first place, to be later picked up and recomposed in an adjacent space. In [Photo 9](#), we see William Fash, sitting on a chair that runs hanging from a wire, while he was taking pictures with a conventional camera. Pictures were also taken with a Polaroid camera to obtain images at once.

The process was repeated with the subsequent layers of stone; the method functioned perfectly well, and its immediate results may be seen in [Photo 10](#), shown above, where the portion of the frieze recovered and recomposed in an adjacent part of the collapsed building may be observed. Today, the southern façade may be observed at the Sculpture Museum ([Photo 54](#), below).



**Photo 8. Copán, Structure 10L-29, 1991. West wall rubble.**



**Photo 9. Copán, Structure 10L-29, 1991. W. Fash taking pictures of the rubble.**



**Photo 10. Copán, Structure 10L-29, mosaic sculpture reintegrated in adjacent area, 1991.**



Photo 54. Copán, Structure 10L-29, south façade, inside the Sculpture Museum.

## Palenque

During the excavation works at Structure XIX of the Group of the Cross, with Alfonso Morales as the archaeologist in charge, the team of excavators found thousand of fractions of molded and polychromed stuccoes within the rubble. In normal projects, whenever fractions of molded stucco are found within the rubble, the fractioned material is collected and kept in bags or wooden boxes; later, this material is probably examined and finally kept in a storeroom. In this case, and as an extremely rare exception, Morales decided that the collected material was to be rescued and reintegrated.

The team of experts of the Las Cruces Project (1999) accepted the challenge, and following a hard and patient laboratory work, their efforts were crowned with the obtention of the portrait of Pakal K'inich, who seems to have been the successor to Ahkal Mo' Nabh III (Morales, personal communication, January 2001) in a representation over three and a half meters high with amazingly lively colors. The stucco was part of the decoration of one of the central pillars of Structure XIX, whose base still presented a small portion of well preserved stucco.

*In situ* conservation has been one of the objectives of contemporary restorers. The purpose is that findings, particularly sculpture, are left right where they are found. Unfortunately, experience has shown that tourism, the lack of trained and permanent personnel, insufficient surveillance and nature itself, favor the destruction of delicate materials whenever they are left exposed to the public. On this basis, our idea was to rescue the entire panel and reintegrate the fractions of one another, while simultaneously protect it in the sole place where its permanency could be secured, that is, at the site museum.

The destiny of the building, as well as that of the entire site, is to be exhibited to visitors; therefore, in an absolute right manner and with all common sense, Structure XIX was restored by stabilizing its walls and pilasters, but as far as the stucco panel was concerned, the decision was to substitute it with a replica that looked exactly the same than the original ([Photo 11](#)) and place it in the corresponding pilaster. To some conservators, perhaps, placing the original piece in a different place than its place of finding, or original context, is not an easily accepted idea in general terms, although no one may deny that the objective of preserving it will be assured, away from curious hands; most important, however, is to have protected it from meteorological effects. Anyway, the characteristics of construction of this entity urged us to recommend the placement of a protection roof and a footpath for visitors ([Photo 57](#), below).

As to the architectural remains of Structure XIX, it is interesting to mention that though large sections of displaced or fallen walls could not be reintegrated, anastylosis was applied in stabilizing the main stairway. The movement of the ashlar stones was pronounced but pretty clear, so we were able to do some reintegration in the stairs without hiding its deformations and completing an indispensable minimum to make it clearly understandable.

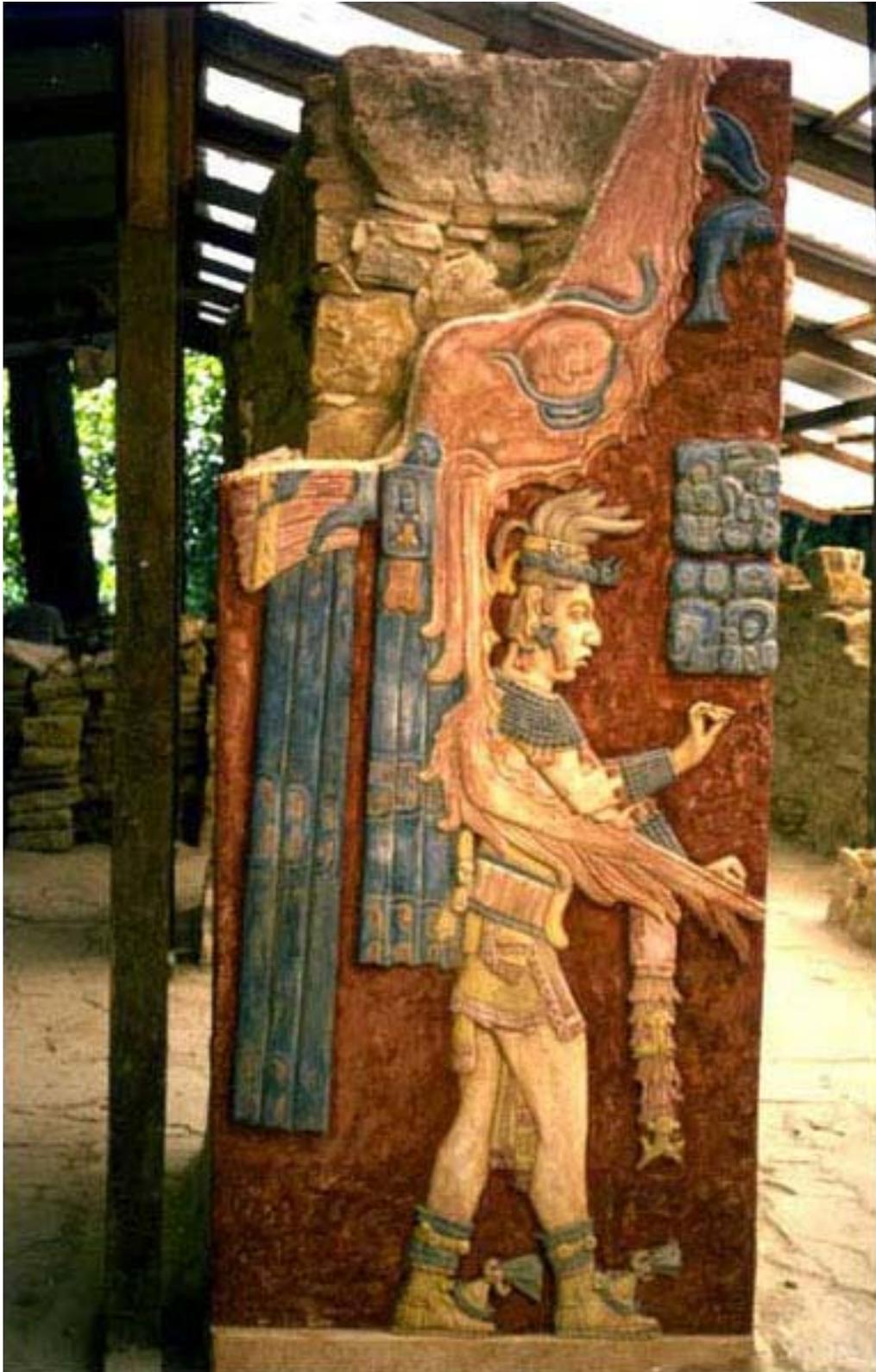


Photo 11. Palenque, Structure XIX, replica of modelled stucco on original pillaster, June 4, 2000.



**Photo 57. Palenque, Structure XIX after restoration was completed. There is a footpath for tourists and a protective roof. There are no side walls and therefore ventilation is constant, while the shade of trees helps to stabilize the interior temperature, July, 2000.**

### Chichén Itzá

During my last trip to the Maya world, while I was visiting Chichén Itzá in Yucatán, I found something very special in the works conducted by Peter J. Schmidt. First, and surprisingly, we found sculpture recomposed through anastylosis, though it was not reintegrated to the building but placed nearby ([Photo 12](#)). The result, not what we would have anticipated for the site, conveyed a sense of great respect for authenticity, allowing that the visitor's imagination carried out the work of architectural recreation. Regrettably, it still is at arms length of tourists and snoopers.

Presently, in a group south of the city, reintegration is being implemented in some of the friezes with bas-reliefs, through anastylosis. This has efficiently contributed to the restoration of the architecture and its upper façades, by following the same method, and the result is a very complete vision of the restored monument, but eliminating the magic of imagination.



Photo 12. Chichén Itzá, NE colonnade. Repairs using anastylosis in adjacent space, July 31, 2000.

### ***Integration, or Complements***

We call integration the work intended to complete missing portions. Doing the absolute minimum to stabilize a ruined monument is not enough if it still remains unrecognizable, so, according to what has been previously said, it is indispensable to evaluate to what extent the integration of the missing portions would be convenient. The purpose is clear: it is about making the construction understandable, remembering that the Letter of Venice establishes that such complements will depend on the architectural composition and will bear the mark of our age by being called "complements".

Whenever something that is missing is replaced, even partially, we are rebuilding, no matter the name this action is given. The Letter of Australia is much more honest regarding this point, and uses the word "reconstruction", but, as is the case with the Letter of Venice, its execution is conditioned to the reproduction of the original fabric, provided this may be identified through a close inspection:

*"ARTICLE 8. Conservation requires the maintenance of an appropriate visual setting: e.g. form, scale, color, texture and materials. No new construction, demolition, or modification which would adversely affect the*

*setting should be allowed. Environmental intrusions which adversely affects appreciation or enjoyment of the place should be excluded."*

*"ARTICLE 19. Reconstruction is limited to the reproduction of fabric, the form of which is known by physical and/or documentary evidence. It should be identifiable on close inspection as being new work"...*

(Marquis-Kyli and Walker, 1992:71)

In virtue of this, any complement that needs to be placed for technical or esthetical reasons, is justified since it will make the monument understandable, but it will be limited to reproducing the fabric known through documents or evidence, and shall never represent the substitution of the original with a lie. Besides, it must be distinguishable under close inspection, but should not be a patch or a contrasting repair.

In other words, we must try to harmonically integrate the complements, as stated in Art. 12 of the Letter of Venice; but through close inspection we should be able to acknowledge that they are complements put in place with total respect towards the basic components of shape, color, texture, and materials. Likewise, we must *facilitate the comprehension of the monument exposed, by never denaturalizing its meaning*. In other words, like the monument has deteriorated or become partially destroyed along the centuries, it has as well acquired a history of its own. Therefore, no one is entitled to change that history; no complement may reach the point of eliminating the traces of time, or substituting the missing parts with imagination or hypothesis.

In this sense, we shall refer to the very interesting case of Balam Ku in the structure denominated Of the Four Kings (see [Photo 49](#) and [Photo 50](#)), because evidently, the intention to secure protection and conservation to the wonderful stucco frieze may be qualified as witty and effective. It serves its purpose by providing stuccoes with a quite stable climate and by protecting them from the wind, heat, cold, humidity, rain, etc. The photographs referred to, however, clearly show that much of that visible structure did not exist prior to 1993, as the stucco frieze was exposed for all to see, with a plated roof as a protecting means. I do not have an in-depth knowledge of the details of this work and I don't feel like judging or criticizing, though the presence of some degree of imagination is evident. I insist, however, that it represents an adequate and excellent solution as far as a conservationist objective is concerned, because it stabilizes the microenvironment of the object to be preserved.



Photo 49. Balamkú, House of the Three Kings. March, 1993 (photograph courtesy of Graziela Sartori).



Photo 50. Balamkú, House of the Three Kings, following the protective reconstruction, February 18, 2000.

## *The Mark of our Age*

Leaving a seal or mark of our age is a controversial issue. Numerous restoration works have not taken this into account, and in others, materials and non-esthetical, incompatible aspects such as mortars of Portland concrete, have been used in reassemblages, together with concrete and iron, to replace the fallen elements or to reinforce reconstructions. Other times, textures are changed using different materials. Also, little stones are put in place to mark the integrated parts, and there are also examples of unlimited reconstruction but inseting faces 5 to 20 cm from the original surface. This is done to distinguish the integrated parts. We shall now refer to the following particular examples:

### Concrete and Iron

We should simply take a look at [Photo 13](#), [Photo 14](#), and [Photo 15](#). The first corresponds to Uxmal, with its rusted iron and concrete fault. The second corresponds to the main entrance to Tikal's Temple IV, with the concrete lintel that was placed during the National Tikal Project, one that now, less than 20 years later, has also failed. The third picture, taken personally by this author in Cahal Pech, Belize, 1992, shows the use of abundant iron bars in reconstruction works. Presently, the concrete and the iron are being removed from Uxmal to be replaced by wooden lintels similar to the original ones. I consider this an indispensable and appropriate initiative.



**Photo 13. Uxmal, Quadrangle of Nuns. Deteriorated concrete lintel, July 28, 2000.**



**Photo 14. Tikal, Temple IV. Lintel with deteriorated concrete. May 22, 1991.**



**Photo 15. Cahal Pech, Structure 19 during reconstruction, using numerous iron bars, June 12, 1992.**

### **Inset Faces**

The system of inset faces consists in reconstructing as much as possible using the same original materials found during the excavations, but changing the position of the wall's surface, by making a slight inset within the original, as may be observed in the pictures from Toniná, Palenque, and Ek Balam: ([Photo 16](#), [Photo 17](#), [Photo 18](#), [Photo 19](#) and [Photo 20](#)). Occasionally, the surface of ashlar stones is also changed. If they were rectangular in shape and thin, they are made irregular and coarse; if they were coarse, the new ones are thin and rectangular.



**Photo 16. Toniná, small restored pyramid with insets as a mark of our time, March 4, 2000.**



Photo 17. Toniná, an additional example of insets as a mark of our time, March 4, 2000.

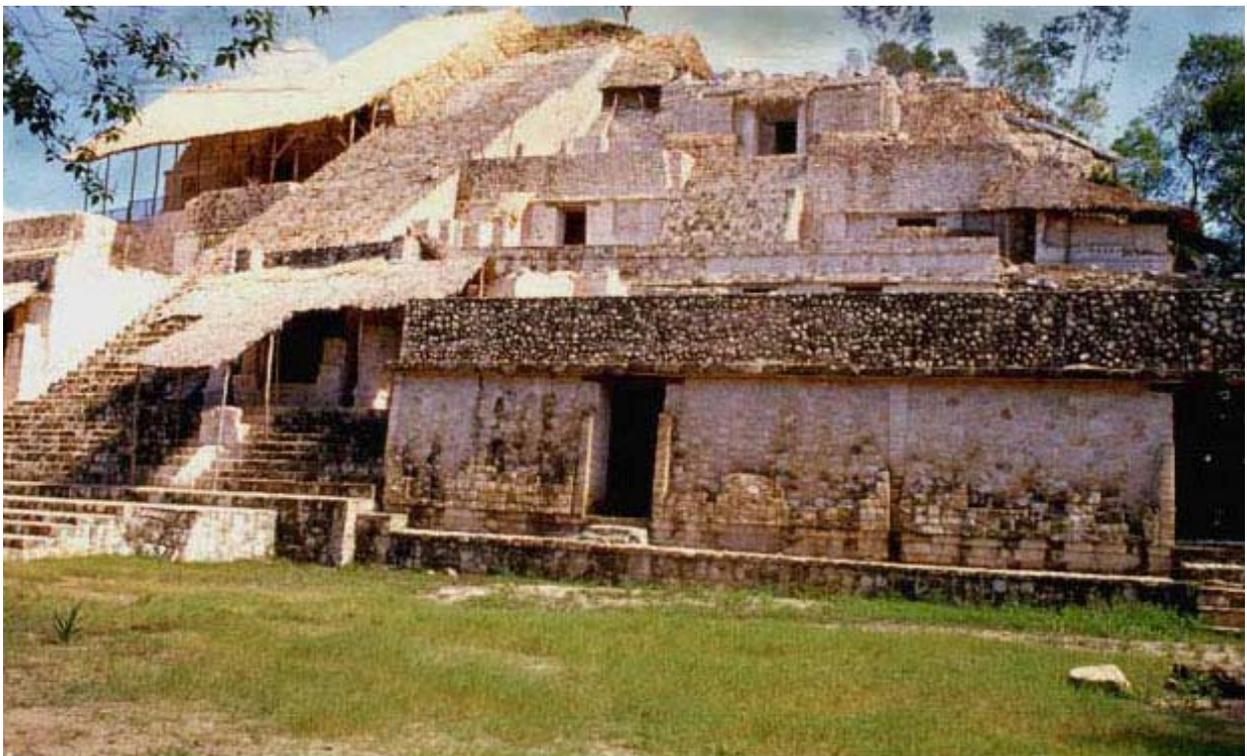


Photo 18. Ek Balam, Temple 1, South façade. August 1, 2000.



**Photo 19. Palenque, Group of the Cross. Corner with insets, February 2, 2000.**



**Photo 20. Ek Balam, Temple 1, detail of recessed reconstruction. August 8, 2000.**

## Restitution of Volumes

The main idea is to return or rebuild the lost volumes. This has been accomplished by reconstructing the missing parts with a changed texture and materials, to suggest the original shape, evident or by analogy. Occasionally, even the incline of the originals is modified, etc. A few examples may be observed in Calakmul, Campeche, México ([Photo 21](#) and [Photo 22](#)), and particularly in Yaxhá, Petén, Guatemala.



**Photo 21. Calakmul, Structure 1, restitution of volumes as a part of the restoration process, July 25, 2000.**



**Photo 22. Calakmul, Structure 1, restitution of volumes and change of texture, detail, July 25, 2000.**



**Photo 23. Yaxhá, Structure 216, restitution of volumes, change of materials. May 27, 2000.**



**Photo 24. Yaxhá, northern area. Experimental restitution of volumes with mud and stones, May 27, 2000.**



**Photo 25. Yaxhá, detail of experimental restitution of volumes with mud and stones, May 27, 2000.**

The case of Yaxhá deserves our special attention: there, reconstruction was undertaken by using the earth of the ruin turned into mud with the addition of rustic stones. This material is placed to line damaged cores or refills by means of a small form, or board mould ([Photo 23](#), [Photo 24](#), and [Photo 25](#)), as if it were a melting. According to the statements by Oscar Quintana, Project Director (personal communication, December 2000), it is some sort of experimental sacrificial layer, which in spite of changing the color, the texture and the materials, and rebuilding the missing portions with a degree of imagination, may later be eliminated or changed at will.

### Small Stones and Thin Flagstones

The small stones embedded in the ashlar stone joints of the restored walls, have been used in different ways. At some sites of the Mexican plateau, the mark has been common in the entire integrated part, and therefore, it makes it easy to distinguish the new work. In [Photo 26](#), from Cholula, Puebla, México, it is possible to observe something of what we have said.



**Photo 26. Cholula, restoration with the use of small stones in the joints to show the reintegrated portions, July 16, 2000.**

Elsewhere, in places like Balamkú and Kohunlich, thin flagstones have been used, a work consisting in putting in place small cracked and relatively polished stones, which as a thin serpent, draw the limit between what was found *in situ* and the integrated parts ([Photo 27](#) and [Photo 28](#)). In ashlar stones with rectangular cuts and a carefully laid lining, the examples observed in Ek Balam are of interest. There, two different techniques were used to define the integrated parts: insets in the grand façade of the main palace with a full reconstruction, to which we have already referred to ([Photo 18](#)), and something very special: a line defined by means of partially empty joints that draw, without a doubt, the limit within the original and the integration ([Photo 29](#)). This final technique has also been used at Kohunlich.

### A Technique of My Own

As to myself, I have always believed that respect towards architectural composition is a must; consequently, restorations at Copán were made by using the stones of the monument itself, to avoid changing any of the characteristics of lining, shape, color or texture, but using galvanized metal clamps at a distance that would not exceed 20 cm between one another. These clamps, on closer examination, clearly delimit the integrated parts. Later, at the site of El Pilar, Belize, with the same idea we have used aluminum nails that are absolutely unrustable, and feature an unequivocal mark of our age.

At Palenque, México, where I have been acting as an advisor for the restoration of Structure XIX (1999-2000), the idea of modifying the nails system or unrustable clamps and thin flagstones emerged, for considering that metals, notwithstanding they are a clear modern evidence, tend to contrast remarkably on close examination. For that reason, with a special machine, we cut rectangular fractions of a very dark-gray stone, with a cross section of approximately 1 cm x 2.5 cm and a length of 6-8 cm. In the same way than at Copán or El Pilar, these rectangular stones separate the integrated parts by forming a dotted line with a separation of 10 cm to 15 cm ([Photo 30](#) and [Photo 31](#)).



**Photo 27. Tzibanché, mask, thin flagstones in a continued line showing complementation, February 19, 2000.**



**Photo 28. Kohulich, thin flagstones in a continued line showing complementation, August 4, 2000.**



**Photo 29. Ek Balam, Temple 1, detail of partially empty joints to divide the integrated parts from the original ones, August 1, 2000.**



**Photo 30. Palenque, Structure XIX, a portion of the restored main stairs, signalled with rectangular stones, March 20, 2000.**



Photo 31. Palenque, Structure XIX, detail of integrated steps marked with rectangular stones in a dotted line, March 20, 2000.

### ***Materials***

Prior to referring to restoration materials, I think we should explain now one word we have been using frequently: the word structure. Generically and according to the dictionary, this term is defined as follows:

*STRUCTURE: Distribution, arrangement and linking of the parts of a whole.*

(Dictionary, Encarta Encyclopedia 2000)

In a purely literal sense, any product of nature or humans could be named with this word, but in the archaeological world the term "structure" has long been applied as a generic word with which we may denominate any construction, provided that parts thereof do integrate a whole. We must outline that this is a term with a strictly general use, in a way that it has no relation with the social function it may have played in antiquity.

The terms "palace", "temple", "residence", "patio", or "plaza", etc., are terms denoting a social function, and therefore we are unable to use them as long as the archaeological investigation is not completed, which would explain in turn the use the structure in question may have originally had.

An additional, important aspect, is to explain that the structure or fabric of Maya buildings work in a very different way than modern buildings and designs, as they are fulfilling different physical principles. In Maya buildings, balance is the major issue, one that is achieved not through a rigid internal frame but rather with the organization of materials in such a manner that the whole may acquire "*balance*". In mathematical terms, we could say that construction materials are placed in such a way that its "moments" are annulled and equal zero (R. Larios 1997:11).

In virtue of all this, we understand that the stability of Maya structures does not depend on the strength or weakness of mortars, because even though exceptions exist, the most usual is to find clay muds or weak clay mortars, or merely lime, used as agglutinants. The superficial linings such as flattenings, stuccoes and floors, were almost always manufactured with top quality clay, as they had a clear understanding of the fact that water filtrations were to be avoided at all costs.

The mortars used, disregarding the component material and applied with abundant wedges of hard and thin stones, is only of help for achieving that perfect balance in the organization of stones, as refills, constructive support masses, or in the layout of the final walls.

Modern building techniques, together with our present notion of the structure and the available materials, has influenced many restorers of prehispanic buildings, making them use strong materials such as concrete mortars or iron bars (like in Kahal Pech, [Photo 15](#)), in an attempt to achieve stability through the strength of modern materials. However, the Maya structural foundation has little to do with the toughness of the agglutinant.

As an extreme example, let me show you [Photo 52](#), above, an experimental arrangement of scale-cut stones, on which no agglutinant or mortar has been used. Stones were organized merely with small wedges until the desired balance was achieved, and there are five courses one on top of the other breaking the vertical position, imitating a portion of the Maya vault (Copán, October 1986).



Photo 52. Copán, experiment: scale construction of dry laid vault, October, 1986.

### *Mortars*

Having clarified this matter, no doubt it will now be clearly understood why we recommend to avoid, whenever possible, the use of Portland concrete in agglutinant mixes, turning preferably to lime mixes of the best possible quality. We know that it is not easy nowadays to obtain quicklime, or caustic lime, as in production places they'd rather sell hydrated lime or calcic hydroxide. Nevertheless, it is much better to try to obtain quicklime, to have the chance to hydrate it on the very spot. In this way, quicklime is placed in a washtub or large wooden box while abundant clean water is poured on top of it allowing to personally control the chemical reaction. This allows to eliminate the stones that do not react correctly, and so we have the chance to keep the best lime.

In the hearth, fire transforms the stones or calcium carbonate in calcium oxide, or quicklime, and this in turn, when wet, reacts and is transformed in a calcium hydroxide, slaked or hydrated lime. (This is something different than hydraulic lime, obtained from stones of calcium carbonates and a percentage of clay, and which hardens when contacting water).

Lime's capacity will depend on three factors: the kind of stone, the temperature and homogeneity of calcination in the hearth, and the degree of hydration. It is advisable to leave it submerged in water for the longest possible period of time. In special cases such as repairs and stucco fixations, lime is to remain in water for at least one to three months, but whenever possible, for one year or more. This kind of treatment will yield a top quality calcium hydroxide. For what I know, it is possible in México to obtain chemical lime with a remarkable degree of purity, and restorers of movable goods recommend it as a special material.

If the preceding possibility cannot not be put into practice, hydrated lime in commercial bags may be an acceptable agglutinant in the preparation of mortars for reintegration, or for the integration of ashlar stones during work. Needless to say, if our work includes footpaths for the passing of thousands of tourists, perhaps concrete would be an appropriate material; but for restoration purposes, we should use a material compatible with the original one. Three parts of sand or sascab, in limy areas, and one part of lime, will yield an acceptable mix. If lime's quality is very poor, we could exceptionally use concrete in a proportion that should not exceed 5%.

### *Ashlar Masonry, or Stone Blocks*

In architectural restoration we are required to use compatible and not contrasting materials, to avoid changing the color, shape, or texture of the monument, so whenever we have the original stones at hand, there's no reason not to use them in the same way as they were originally arranged. Nevertheless, the mark of our age is required. Thus, we shall be maintaining an integrated look while simultaneously those who are interested or have some degree of knowledge may, through a closer inspection, differentiate the integrated parts or complements, as also the evidence that led to the undertaking of such actions.

We have previously said that there are no specifications for the restoration of Maya or prehispanic monuments. Nonetheless, I have found an interesting document titled "Especificaciones Generales de Restauración" (*General Specifications for Restoration*). It is not focused on archaeology, and was published by the Secretaría de Asentamientos Humanos y Obras Públicas de la República de México, México, D.F., 1981 (*Human Settlements and Public Works Secretariat, Republic of México*). Mostly, it refers to colonial and historical monuments.

We have also explained that in a way, the foundations for restoration and the conceptual aspects of colonial monuments are more or less the same than those for

prehispanic features, and that they basically differ in the social function that the monument serves nowadays. Under that light, and interestingly, this is what the document literally states:

#### *4.01 ROCKY MATERIALS:*

*4.01.1 Natural stones.— They must be similar to the original ones in geological provenience, color, dimensions and texture. The attempt should be made to locate the precise source; if this is not possible, the most possible similar materials shall be used. Whenever the original stone happens to be remarkably frail, replacement with a tougher material is recommended, though its appearance should be similar to the desired one.*

(Especificaciones Generales de Restauración, pg. 17)

As seen, also in colonial restoration, the criterion is not to change the color and texture of the integrated portions. In this case, and as previously stated, the use of rubble stones recovered during the investigations is the best possible material to reproduce the original fabric, provided it exhibits the mark of our age which should be visible under close inspection.

The opposite situation would be the absence of stone originated in the ruin, because this has been completely destroyed for its softness and the fall suffered at the time of collapsing. Tikal, Xunantunich, El Pilar and other sites in the area are typical cases where the original stone was so soft that at the time of its fall during collapse, it was turned into powder or fractions so small that they will prove insufficient to restore. In this case, my advice is to proceed as previously stated. An alternative source of materials should be located to fulfill the necessary specifications.

Of course, if we work carefully, we may find some original stones in an acceptable state of preservation. It would be a pity to dispose of them. In my view, we should use them, if possible, and we should even try to understand where do they come from, to attempt a reintegration.

### **Degradation and Protection**

The issue of deterioration would require an expert and a separate book. Nonetheless, allow me to share a part of what I have learned and experienced regarding the deterioration process and how climate impacts on monuments. According to experts, the degradation of construction stones is an irreversible natural phenomenon with the main intervention of water, due to rainfalls or capillarity, the humidity of the environment, winds, temperature, and a number of factors related to mineral and organic decomposition. These are all totally natural phenomena that science is unable to eliminate.

But some actions may be undertaken to delay deterioration, though we should be aware that as humans, we lack the capacity to eliminate the effect of natural phenomena, particularly when the objects to be preserved are exposed to them. I repeat, I am not a chemist with an expertise in such effects, but my thirty eight-year long experience has taught me a few interesting things about the behavior of deterioration in limestone. The following examples will help to understand how we can be of help.

### ***Kaminaljuyú***

After common sense, we have used temporary or permanent roofs as a means to protect cultural assets. My experience with them has been very special. I began to work on mound DIII-1 from Kaminaljuyú, a Maya site located within Guatemala City. The year was 1963, and under the direction of don Gustavo Espinoza, Inspector General of Monuments, both Miguel Orrego and myself had the opportunity to clean with our own hands an incomparable treasure: a number of talpetate modelings in crude and polychrome clay, ornamentally integrated to architecture of an identical material ([Photo 32](#), [Photo 33](#), and [Photo 34](#)). The state of preservation of the modelings was in fact excellent, and the original colors were partially visible.



**Photo 32. Kaminaljuyú, Structure DIII-1, clay and talpetate modelled mask, 1963.**



Photo 33. Kaminaljuyú, Structure DIII-1, three characters modelled in clay and talpetate, 1963.



Photo 34. Kaminaljuyú, Structure DIII-1, individual on squash modelled in clay and talpetate, 1963.

Adobe is the name given to this kind of construction, although it is not real adobe but a large modeling of talpetate and clay: sand clay and pumice stones: it is perhaps the most difficult material to preserve, it is weak and is affected both by humidity and water scarcity. Thirty seven years ago, however, we built a "provisional" roof with rustic pine wood and zinc sheets, very ventilated, which still stands in place, fulfilling its protecting mission.

The problem I detected during my last visit, which took place in November 2000, was not related to the quality of the roof, which had performed effectively, even though it was in a deplorable condition. The masks modelled as a part of architecture have deteriorated for human causes and the complete absence of expert assistance. In [Photo 35](#), below, we can observe the attempts made to repair one of them, which, according to the vigilant, was damaged during the 1976 earthquake. It is also evident that whoever did this did not have a clue on how to do it right, and lacked any artistic ability. Compare with [Photo 32](#), 1963.



**Photo 35. Kaminaljuyú, Structure DIII-1, the same clay mask shown in Photo 32, when repair was attempted, November 14, 2000.**

The characters seen in [Photo 33](#) and [Photo 34](#), as also other modelled elements, of which I have no illustrations at hand, are completely gone due to human factors we shall not discuss at this time. However, it is evident that the mask fraction which is not so easily reachable by people ([Photo 36](#)) still shows a good state of preservation ([Photo 37](#), and [Photo 38](#)). In this case, the roof proved effective and has accomplished its protecting mission.

We may similarly describe the section known as "La Palangana", whose roof still stands forty years after it was built. The structures it protects have also been damaged, mostly as a consequence of human action and the occasional penetration of rainwater, rather than for the years gone by.



**Photo 36. Kaminaljuyú, Structure DIII-1, remains of a clay and talpetate modelled mask, not easily accessible to visitors, November 14, 2000.**



Photo 37. Kaminaljuyú, Structure DIII-1, portion of mask and overview of the building, November 14, 2000.



Photo 38. Kaminaljuyú, Structure DIII-1, general view of the masks area, November 14, 2000.

## ***Tikal***

In August, 1967, I had the privilege of drawing 50% of an extraordinary frieze ([Figure 3](#)), which was protected by a thin plate roof. In fact, while I was drawing, I was able to see that the parts protected by the roof, where water did not fall, were quickly degrading and turning into a white dust. But inexplicably, those portions wet by the rain, assumedly the worst possible enemy, looked in perfect condition although they were colored by microflora, while the dry parts protected by the sheet were the most affected by the phenomenon of degradation.

In view of such a strange phenomenon, the Pennsylvania State University, who was responsible at that time for the site, made the decision to reintegrate the wall previously dismantled to clean the frieze, and covered it once more, thus providing a permanent protection.

Almost simultaneously, and while cleaning Structure 5D-33-2nd, I was in charge of cleaning and documenting the west mask ([Figure 4](#)). The purpose of this excavation was to exhibit the ancient masks by placing a fiberglass roof that would provide enough light so that visitors could take pictures. A similar treatment was received by another mask previously located on the south façade of Estructure 5D-22. The degradation phenomenon previously observed was also present in the sculptures with the fiberglass roofing, with identical characteristics. In this case they remained exhibited to visitors.



**Photo 40. Tikal, Structure 5D-83, main façade, May 5, 1991.**

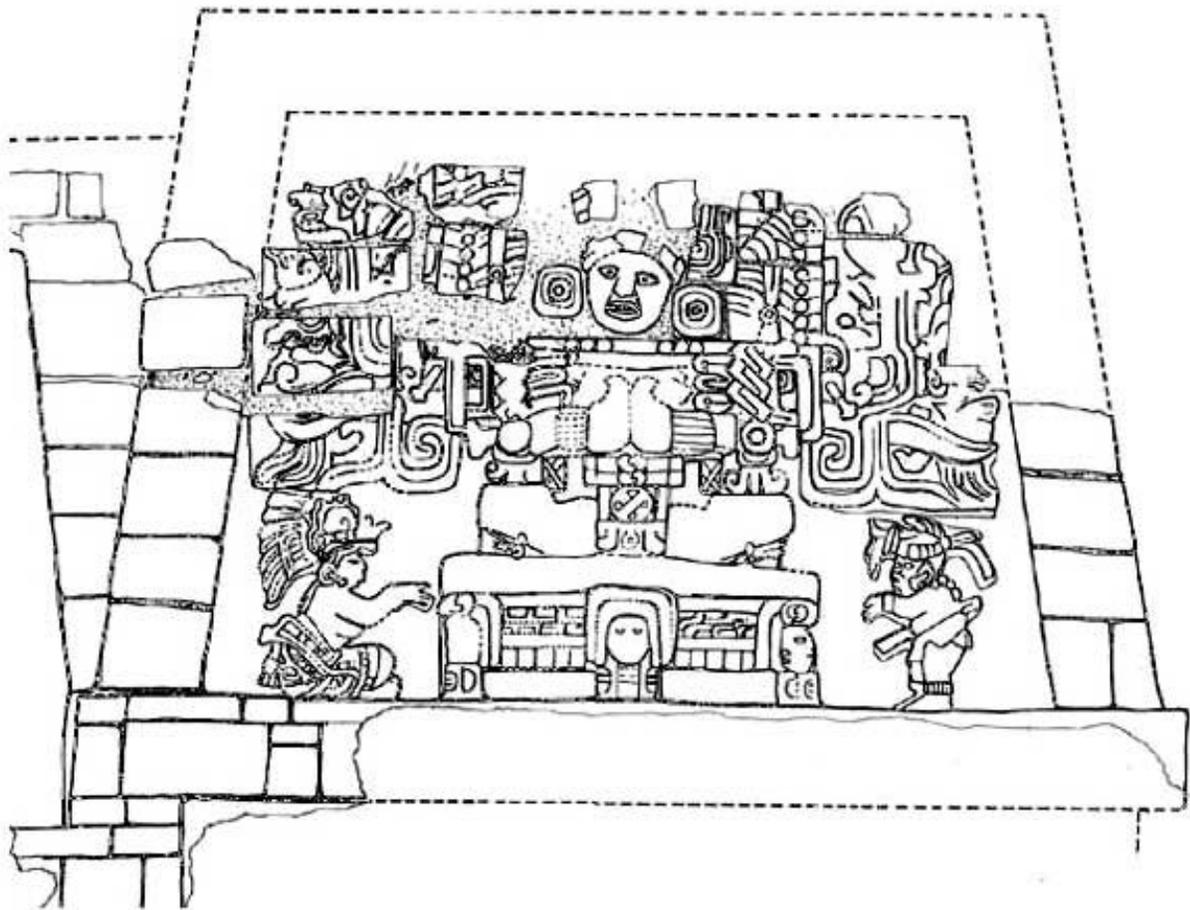


Figure 3. Drawing of frieze in Structure 5D-44, Tikal. This is a stuccoed sculpture which has been covered for conservation purposes.



Photo 41. Tikal, Structure 5C-53, portion of south façade, very damp. December 12, 2000.

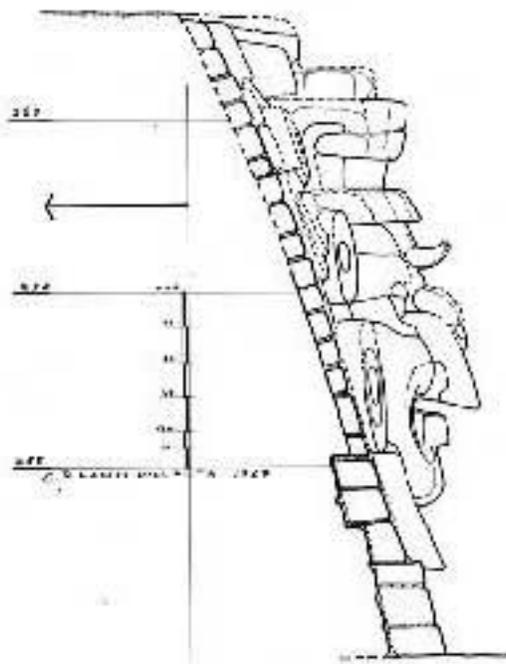


Figure 4. Structure 5D-33-2nd, Tikal. Drawing in profile of mask located at the west side of the stairs, 1967. Note the volume and the well defined lines immediately after its liberation. Drawing by Rudy Larios.

A different phenomenon that keeps catching my attention is that those structures located in shady places show a better state of preservation ([Photo 40](#) and [Photo 41](#), shown above) than those located under the sun ([Photo 42](#) and [Photo 43](#)). Common sense indicated that humidity and dryness played a determinant role; so, after several conversations with the authorities of the Instituto de Antropología e Historia de Guatemala, IDAEH, we proceeded to dampen the mask on Structure 5D-33-2nd, with the help of a fumigator pump ([Photo 44](#), shown below, 1972). Results were surprising, as the deterioration process was almost immediately interrupted, except in those parts that were closer to the sheets; therefore, a few years later, we switched from fiberglass to a palm-leaf roofing.

[Photo 47](#), shown below, 1978, shows the mask on Structure 5D-22 heavily destroyed under the roof, while the portions exposed to rain water and colored by microflora looked much better. This was not touched at all, for comparative reasons. The difference observed in 2000 was amazing: the mask on Structure 5D-33-2nd, with no humidity following the change of roof accomplished in 1980, is still there ([Photo 45](#), shown above), black with microflora but still there, while the other one ([Photo 48](#), below) is hardly recognizable.

On the east side of Structure 5D-33-2nd, another mask is found, identical to the one previously described. Its state of conservation is amazingly good, I could even say it looks the same than when I first saw it thirty four years ago ([Photo 46](#)). The main difference lies in the fact that it was left inside a tunnel; it was not exposed to climatic change, neither was it roofed with transparent sheets so that visitors could take pictures; on the contrary, it was left inside the tunnel with a high degree of humidity, but constant, and free of winds, effects of sunlight and with little or none touristic visitors.



Photo 42. Tikal, Structure 5D-43 with Temple 1 at a distance, and an advanced deterioration of the stone, February, 1980.



**Photo 43. Tikal, Temple 1, south side of the stairs, heavily deteriorated; note the white dust on the joints with the terraces, May 14, 2000.**



Photo 44. Tikal, Structure 5D-33-2nd, stone and stucco mask, west side, August, 1972



Photo 45. Tikal, Structure 5D-33-2nd, mask, west side. December 12, 2000.



**Photo 46. Tikal, Structure 5D-33-2nd, west side mask, inside the tunnel, in a very good state of conservation, December 13, 2000.**



**Photo 47. Tikal, Structure 5D-22, west mask. The light parts represent deterioration. The parts darkened by microflora are better preserved, February, 1978.**



**Photo 48. Tikal, Structure 5D-22, idem photo 47, though this one was taken on December 13, 2000; note that the mask has almost disappeared. The damp parts with a heavy dark color show a much better state of preservation than the roofed portion.**

## ***Xunantunich***

When we were working as consultants to the Getty Conservation Institute at the archaeological site of Xunantunich, the project archaeologists under the direction of Richard Leventhal located the remains of the frieze on the western side of El Castillo. Its state of preservation was outstanding. We were perfectly aware that leaving a frieze such as this one, made of limestone and stucco, outdoors, like the frieze on the eastern side, would unavoidably lead to its destruction, so we had to make the right decision.

In Xunantunich, like in many other restored sites, tourism is important, so we did not think it would be right to bury the frieze once more, as it was done with Tikal's, though undoubtedly it would have been the best option. After careful consideration, we came to the conclusion that the best thing to do was to make an exact natural size replica ([Photo 39](#), below) to be placed later in front of the original.



**Photo 39. Xunantunich, El Castillo, west side, replica of frieze. May 24, 2000.**

The system consisted of elaborating a faithful copy of the frieze by modeling it in clay in an area adjacent to the building, first on the basis of the original piece and then based on existing drawings and abundant additional details and sections prepared to that purpose. Later, we molded the figure with rubber and fiberglass, to finally elaborate the copy in a polyester resin, fiberglass, and limestone powder with the color of the stuccoes.

The original frieze was buried entirely after reinforcing the refills with liners, and we also replaced what had been taken away creating a sort of wall in front of the frieze, but we isolated the stuccoes with a layer of *sascab* (sandy lime) very finely strained. We left as well a number of holes at the base, so rainwater filtrations could drain and cause no damage.

### ***Copán***

The tuff stone, which is of volcanic origin, is hard, stable, and easy to carve. Nonetheless, the deterioration usually present in exfoliations ([Photo 67](#), below) is increasingly worrying. At this site, with different component materials, once more the buildings that remained in the shadow were in a much better state of preservation than those which received more sunlight throughout the year.



**Photo 67. Copán, the Hieroglyphic Stairway, detail of deteriorated steps at the base of the stairway.**

Our work went beyond the study of sculpture and restoration, and we focused also on conservation. We decided to preserve the trees as much as we could, with the purpose

of giving the buildings a more or less stable environment. In the sunny portions, a reforestation program was urged.



**Photo 55. Copán, Structure 9N-67, the protective roof is in very poor condition, November 22, 2000.**

Obviously, delicate materials require a special protection, and the museum represented a wonderful tool. Yet, very important monuments with stuccoes or original sculpture required roofing, like 9N-82 and 9N-67. Unfortunately, we must say that maintenance of these roofs has failed ([Photo 55](#), shown above). In the particular case of the Hieroglyphic Stairway ([Photo 68](#), below) in Copán's center, it was as well necessary to display a tilt to cover the entire stairway, the stela, and the altar in front of it ([Photo 69](#), below).



Photo 68. Copán, Hieroglyphic Stairway, 1990.



**Photo 69. Copán, Hieroglyphic Stairway with protective canopy put in place in 1985, picture taken in 1988.**

It might be of interest to narrate that when I first arrived to Copán (1975) we were caught in a big storm; the scene was discouraging, because rain water run on the sculpted stairs as a huge cascade, sweeping away thousands of chips of the decomposing stone. My great wish was to do something to stop this, and several years later I was given the opportunity to design a tilt, which was put in place in 1985, and which is still there, protecting the monument.

Certainly, a tilt is not a final solution, but in this case it has accomplished its mission. It is neither an esthetic element, and I believe that no roof, no matter how nicely designed it may be, will be harmoniously integrated with Copán's architecture. It will always be an intruder element which will change the landscape, but if it is useful to provide protection, then it is justified, even though it may not look good.

## What Can We Do?

### *Trying to Attain Climatic Stability*

We are fully aware that the struggle is against the forces of nature, and therefore we must acknowledge our incapacity to modify them or to eliminate them from the environment:

*It is widely known that the best way to preserve cultural goods consists in air conditioning museum halls, thus maintaining in all of them constant conditions of temperature and humidity, together with an acceptable degree of atmospheric purity.*

(Coremans, 1962, pg. 35)

As to the architecture we intend to preserve, it is not possible to place it inside buildings with the adequate conditions previously mentioned of climatic stability and purity. However, this, in addition to the examples seen in Tikal, Copán, and many other sites from Belize and northern Petén, provided us with the foundations to propose that it is not the lack or excess of humidity what will preserve buildings, but rather the stability of the climate and the microclimate. We must remember that the mask inside the tunnel in Structure 5D-33-2nd at Tikal ([Photo 46](#)), as also several molded stuccoes inside some tunnels in Copán, represent a clear evidence that high humidity within absolutely stable conditions is not harmful.

The book *El Deterioro y la Conservación de Materiales Porosos de Construcción en Monumentos*, a bibliographical revision translated into Spanish by Luis Torres, reads:

*"Chlorides are highly hygroscopic and the salts are first dissolved during the condensation of water present in the surrounding air. Once in a solution, they are very active regarding three aspects: they are very mobile and thus penetrate and break many crystalline structures; they peptize, that is, they suspend in water large conglomerates of molecules; and finally, they increase the non-stoichiometry of crystals. This properties of chlorides explain the dangerous lixiviation of the cementing medium observed in the stones that contain these salts. That's why such construction materials tend to become pulverized. Nitrates and salts from organic acids are equally dangerous."*

(T. Stambolov, 1984, pg. 13)

In simple words: when chlorides crystallize in the pores of stones or stuccoes, they increase their volume and therefore become destructive agents that turn stone into powder. The acidity of decomposing organic materials adds to this phenomenon, minerals are transformed, and stones destroyed. But whenever the monuments are located in shady areas, soluble salts are unable to crystallize as a consequence of the

humid environment, and therefore appear to be innocuous. On the contrary, in sunny areas, they crystalize when the sun rises and melt once again with the humidity of the night.

Microflora, which has given a coloration to most buildings and foundations, represents as well a destructive element, as defined by Mason Hale, Jr., in his study on this particular subject (1975). However, as he also acknowledges, nothing is worse than the damage caused by the dissolution of materials caused by the meteorization of the weather. This is what he wrote:

*"While microflora is causing extensive but relatively low-level deterioration, natural weathering of the limestone at Tikal is more conspicuous and more dangerous for the future conservation of the monuments."*

(M.E. Hale, 1975: pg. 318)

The little vegetation coloring the walls of buildings, when dried during periods with no rain, falls and drags with it particles of stone or stucco; throughout the years, however, we have observed that whenever this layer retains its humidity and does not fall, it may also be a factor of conservation, to some extent, or at least, it is much less damaging than the water soluble salts.

This may be verified inside the buildings which now, thirty four years later, still maintain the original stuccoes under the layer of algae that caused the coloration. At a mere sight, at least, we are unable to clearly determine how deteriorated they may be, except for the damages caused by visitors who want to write their names on them ([Photo 56](#)). This is not the case in sunny areas, where the effects caused by salts are catastrophic, unavoidable and growing ([Photo 42](#) and [Photo 43](#)).

Given such a delicate situation and in the awareness that the enemy is powerful, I feel that our mission, until better tools are found, is to try to avoid the environmental changes that the monuments have endured for over twelve centuries; they have stabilized somehow within the jungle that protects them and we are not to eliminate it as it was done in the past.

As to Copán's Hieroglyphic Stairway, and keeping in mind the reality described, my proposal consisted in making a valiant decision to place it inside a special building, leaving a duplicate to replace the original stones. Nonetheless, the *in situ* conservation trends in 1997 convinced the Instituto Hondureño de Antropología e Historia to carry out a previous scientific study and a two-year long monitoring.

The purpose of the study, with the intervention of experts from the Getty Conservation Institute and supported by UNESCO, the results of which I ignore so far, is to define the most convenient method to preserve the most important monument of Maya literature and sculpture *in situ*, for the enjoyment of visitors. It is our hope that the solution, whichever it may be, arrives in time.

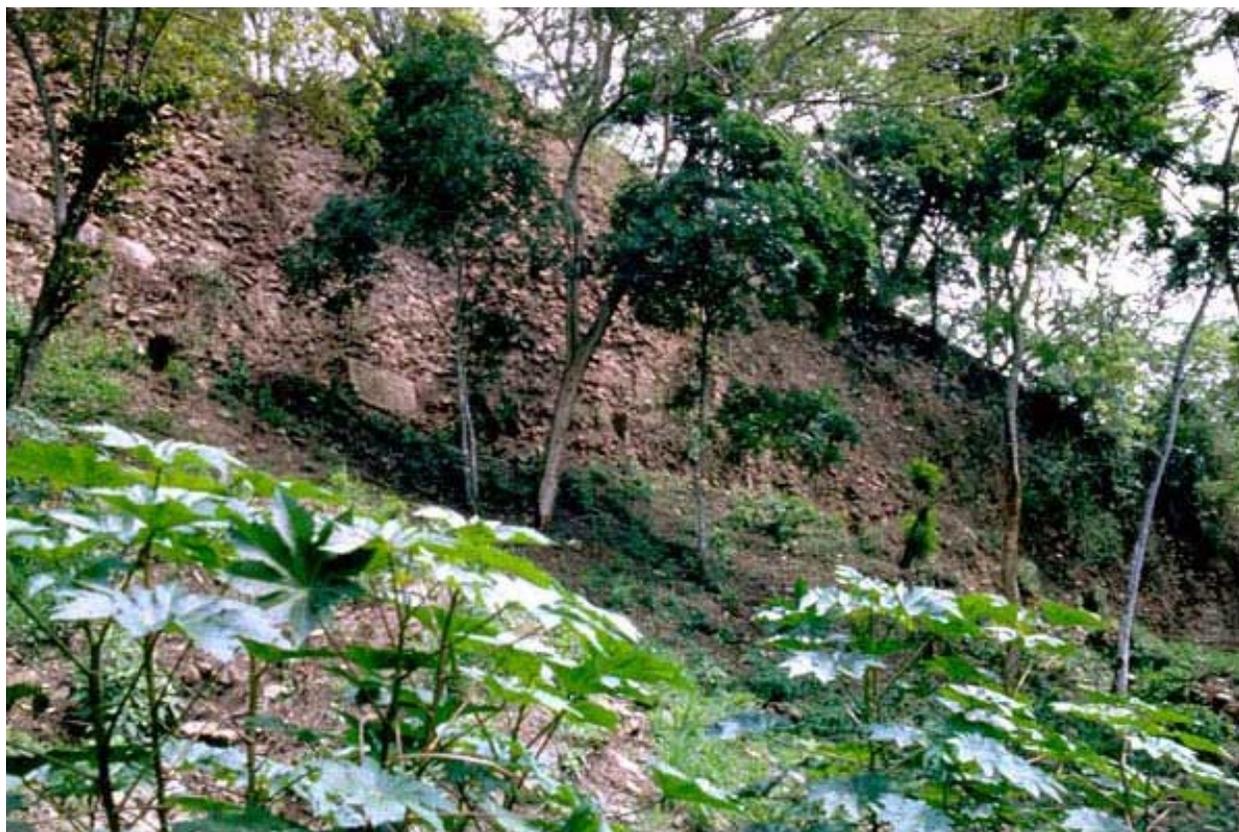
Finally, I must say that the most dangerous aspect of conservation is the poor attention given to the sites already restored. This is a widespread problem; there's no personnel trained in conservation, and even maintenance has been relegated to sweep the floors now and then, and to use the machete, which occasionally risks to become a destructive agent. In several archaeological sites, and I won't be giving any names, one can see how the machete of the cleaning crews have added to the destruction of the most important stones of the restored structures.



**Photo 56. Tikal, Structure 5D-33-2nd, interior of chamber with modern graffiti on the original stucco. Deterioration here was caused by man and not by humidity.**

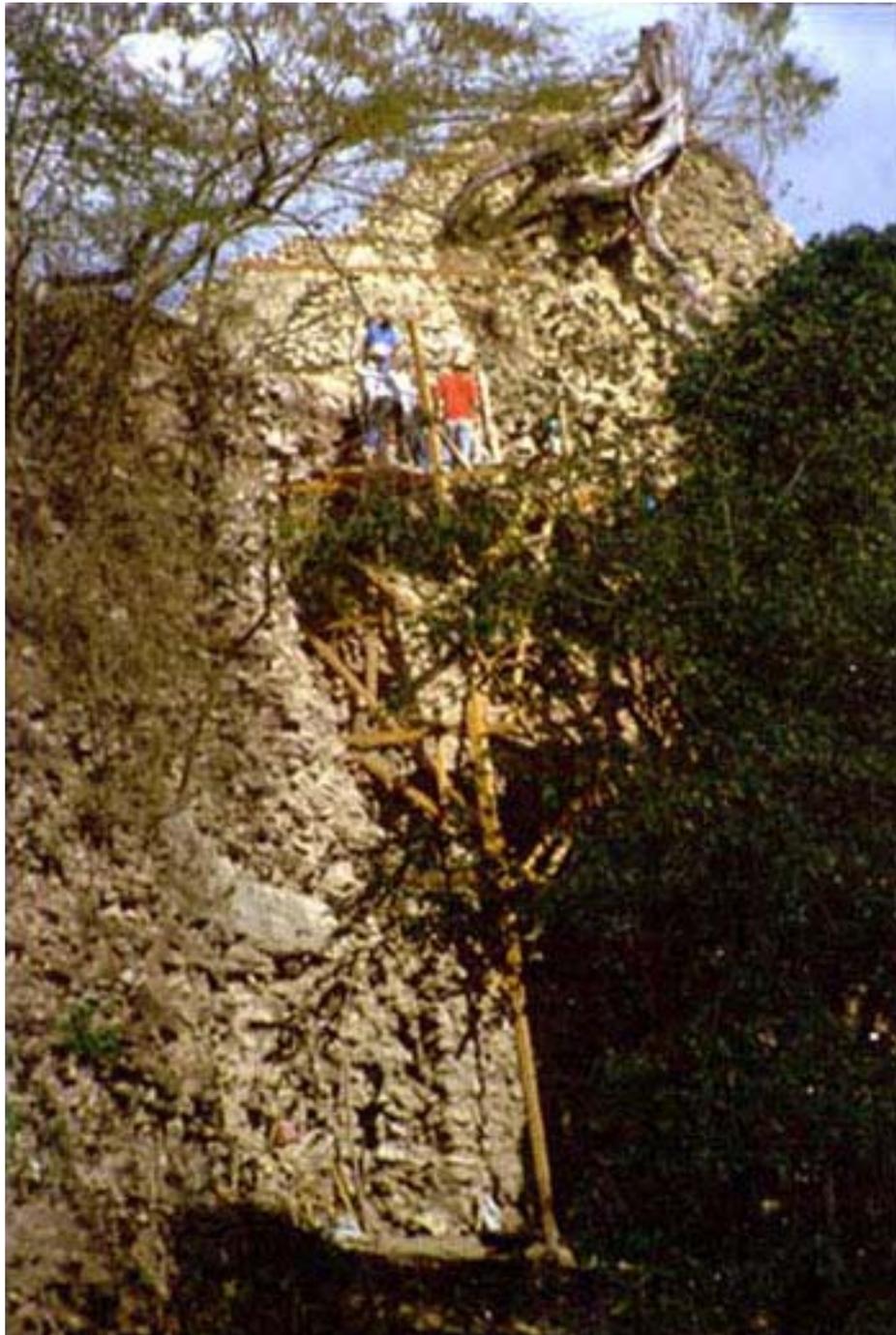
### ***Drainage of Rain Water, the Number One Enemy: The Case of Copán's Archaeological Cut***

We are fully aware of the danger water involves for the conservation of ancient buildings, not only as a dissolution and transformation agent of some component minerals of the construction stones, but also, and to a higher degree, as an agent of erosion and collapse. We have said elsewhere that when rain water penetrates into the fills and constructive masses, agglutinant materials, particularly clays, increase their volume and consequently cause a lateral pressure that pushes, deforms and may even cause portions of the structure to collapse.



**Photo 58. Copán, the archaeological cut caused by the erosion of the river. Before stabilization was completed, 1983.**

The Copán Acropolis Archaeological Cut ([Photo 58](#)) is a typical case. Water from the river has undermined the foundations of this huge construction, and in just a few centuries has caused a cut of over two hundred meters in length, and approximately thirty meters in height. The river, being the cause of destruction, had its river-bed diverted in 1945 by the Carnegie Institution's project, in an attempt to stop for good the process of destruction. In spite of this, the collapsing process continued ([Photo 59](#)) uninterrupted, threatening to completely destroy the acropolis.



**Photo 59. Copán, the archaeological cut, at work in 1991**

All those who knew about this problem became increasingly concerned, and several proposals were presented, aimed at stabilizing the cut. Some proposed to build gabion walls, others, masonry walls to brace the cut, etc. The proposal I elaborated during my

earlier years in Copán consisted of stabilizing the cut in the same way we would do with a small structure, that is, to restore it allowing that all structural features remained visible for an adequate interpretation.

The plan was submitted in 1985 to Lic. Ricardo Agurcia F., who was the manager, back then, of the Instituto Hondureño de Antropología e Historia; ever since, the cut's restoration became a dream with little possibilities of coming true, because as we anticipated, the agency lacked the necessary financial resources. After a few years of expectancy, however, work was completed, first with the support of the Ministry of Public Works, and then of the Fondo de Inversión Social (FIS) *Social Investment Fund* through the Copán Association, between 1988 and 1993.

In this case, it is important to explain that the project foundations rested on the fact that if we were able to restore formal architecture, we could also be able to restore or stabilize the cut. Basically, we would attempt to preserve all existing architectural features, by stabilizing them and defining the different building strata ([Photo 60](#)). In broken parts with no architecture, work would consist in returning a portion of the lost or weakened volume, with liners similar to retaining walls, to rebuild the cut ([Photo 61](#)). In addition, and in the clear understanding of the potential danger of water filtrations, our project included the stabilization of the eastern patio and the stairs found at the edge of the cut ([Photo 62](#), below).



**Photo 60. Copán, showing in detail how the cut was stabilized and cultural strata restored, 1991.**



Photo 61. Copán, the cut during the stabilization works. Detail of arrangement, 1992.



**Photo 62. Copán, east court, general view of stairs at cut's edge, before restoration. From Temple 22, looking south, 1987.**

The river-bed, cancelled in 1945, was still there and carried water during the rainy seasons. The first probes at the foot of the cut revealed that the entire acropolis was resting on the water table, so the first proposal consisted of an earthen and stone talus that would act as a bracing at the base of the cut. The talus finally covered approximately five meters in height from the base, and was extended with a slight incline to the bank of the Copán River ([Photo 63](#)).

The final result was good, and we succeeded in stabilizing an extension almost two hundred meters long, with a height that varied from twenty to twenty five meters, plus the stairs of the east border of the eastern patio, at the edge of the cut. Photos ([Photo 64](#) and [Figure 65](#), and [Photo 66](#)) show this process and a portion of the completed works. Needless to say, those works were but the first step in the conservation process; a permanent maintenance is required, to keep the surface of the restored portion in such condition that rain waters are quickly evacuated before they have the chance to filtrate. Otherwise, the destruction process will start all over again.



**Photo 63. Copán, archaeological cut, in the process of completing the bracing in its base, 1990.**



**Photo 64. Copán, archaeological cut, in the process of stabilization. Wooden scaffolds were used throughout the entire work, 1992.**



**Photo 65. Copán, archaeological cut, general view, during stabilization works, 1993.**

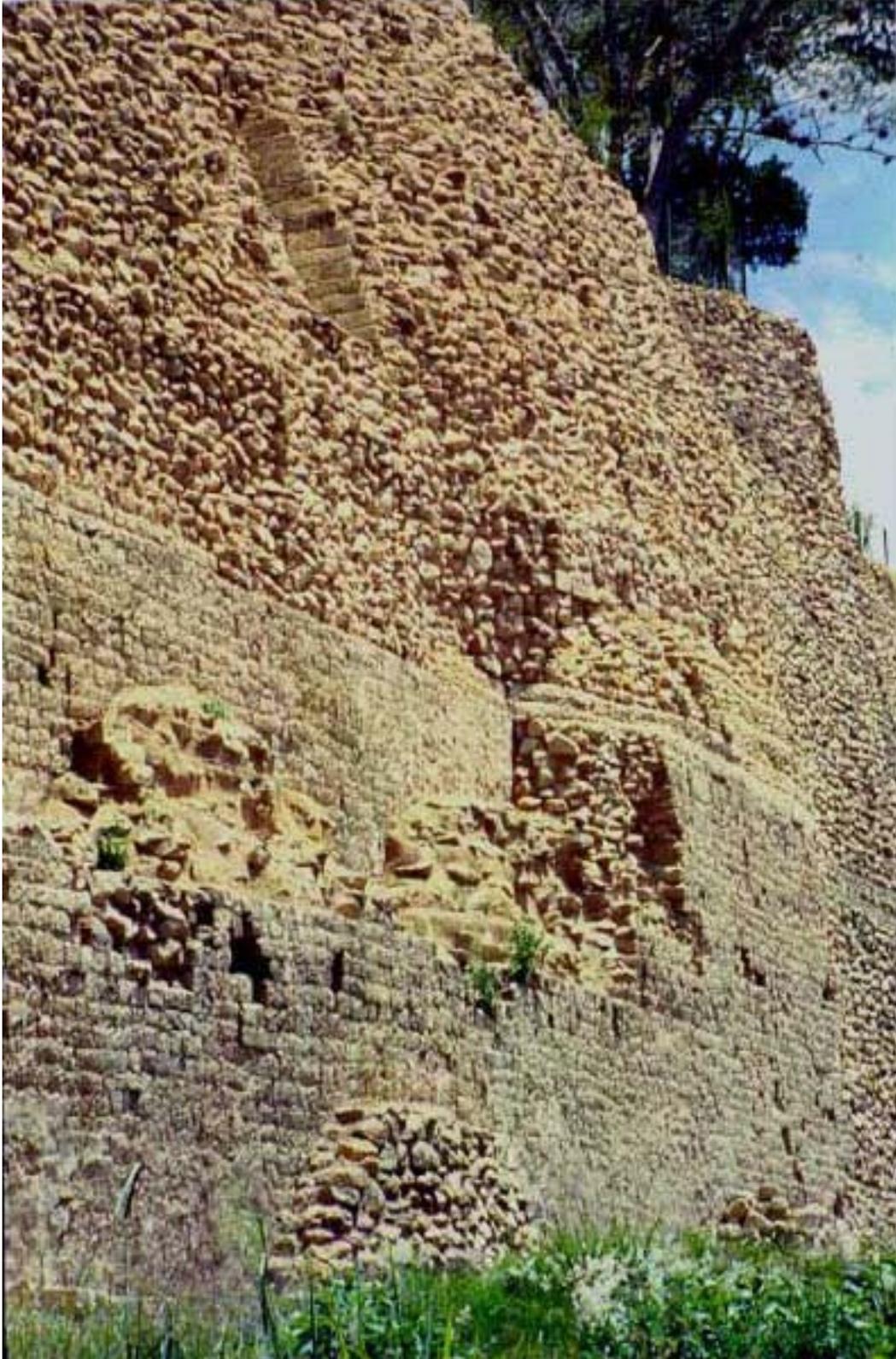


Photo 66. Copán, archaeological cut, when restoration was completed. Portions with architecture and liners, 1993.

## Conclusions

At the time of writing this small book, our purpose had nothing to do with transforming archaeologists into restorers, but rather, to provide them with some clear and brief standpoints on which they could be able to decide the most convenient methodology in the most frequent cases. With the same purpose and based on the above, we are defining a number of major conclusions, as follows:

1. Monuments, being unique, irrepeatable, historic and esthetical, must be preserved for their cultural value and as a remembrance of the past, to transcend into the future as witnesses before the generations to come (R. Larios, 1997:63).
2. No one is entitled to change history or to eliminate the traces of the past by substituting missing portions with lies. Therefore, restoration must respect the architectural composition and most of all, it must be in harmony with such composition and nature, by all means avoiding hypothesis.
3. The archaeological investigation, as also the restoring interventions, must perform as a single team, coordinately, and never in competition but as complementary disciplines.
4. It is understood that climate and microclimate stability are key factors. Deforestation represents, in any case, a danger to conservation, as it favors and stimulates extreme climatic changes between heat and cold, humidity and dryness, wind and rain, etc.
5. Shady areas not only provide for a rather stable climate, but also favor the visit of tourists in a pleasant environment.
6. Rain waters must be drained as quickly as possible, and like the Maya did, we shall not use water proof materials, as these could be damaging, but instead, the appropriate inclines so that water runs freely and is quickly removed, avoiding excessive filtration.
7. No restoration project may be undertaken unless the responsible conservation authorities become aware of the need to maintain the works completed through permanent cares.
8. The major goal in an archaeological-touristic project, is the preservation of monuments and their environments, not for the worth of foreign currency but for an asset that money cannot buy: its cultural significance, which involves the historic identity of the people who owns the asset, not as a particular or isolated fact but rather, as a part of the culture of human kind.
9. Finally, I thank God for giving me the chance to complete this work, and most certainly, I am particularly in debt with FAMSI for supporting the process. I'm also in debt with all the good friends that helped me: Alfonso Morales, Richard

Leventhal, William Fash, and particularly, Dr. Alejandro Martínez, National Coordinator of Archaeology in the Republic of México.



Figure 5. Schematic map of Mesoamerica.

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[Figure 2](#). Example of adequate way to mark stones in preparation for anastylosis. Marks on the main face of stones are to be avoided.

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[Figure 4](#). Structure 5D-33-2nd, Tikal. Drawing in profile of mask located at the west side of the stairs, 1967. Note the volume and the well defined lines immediately after its liberation. Drawing by Rudy Larios.

[\\_\\_\\_\\_\\_](#). Schematic map of Mesoamerica.

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[Photo 6](#). Copán, Structure 10L-22A, main façade restored, 1990.

[Photo 7](#). Copán, Structure 10L-22A, detail of sculpture, upper portion, 1991.

[Photo 8](#). Copán, Structure 10L-29, 1991. West wall rubble.

[Photo 9](#). Copán, Structure 10L-29, 1991. W. Fash taking pictures of the rubble.

[Photo 10](#). Copán, Structure 10L-29, mosaic sculpture reintegrated in adjacent area, 1991.

[Photo 11](#). Palenque, Structure XIX, replica of modelled stucco on original pillaster, June 4, 2000.

[Photo 12](#). Chichén Itzá, NE colonnade. Repairs using anastylosis in adjacent space, July 31, 2000.

[Photo 13](#). Uxmal, Quadrangle of Nuns. Deteriorated concrete lintel, July 28, 2000.

[Photo 14](#). Tikal, Temple IV. Lintel with deteriorated concrete. May 22, 1991.

[Photo 15](#). Cahal Pech, Structure 19 during reconstruction, using numerous iron bars, June 12, 1992.

[Photo 16](#). Toniná, small restored pyramid with insets as a mark of our time, March 4, 2000.

[Photo 17](#). Toniná, an additional example of insets as a mark of our time, March 4, 2000.

[Photo 18](#). Ek Balam, Temple 1, South façade. August 1, 2000.

[Photo 19](#). Palenque, Group of the Cross. Corner with insets, February 2, 2000.

[Photo 20](#). Ek Balam, Temple 1, detail of recessed reconstruction. August 8, 2000.

[Photo 21](#). Calakmul, Structure 1, restitution of volumes as a part of the restoration process, July 25, 2000.

[Photo 22](#). Calakmul, Structure 1, restitution of volumes and change of texture, detail, July 25, 2000.

[Photo 23](#). Yaxhá, Structure 216, restitution of volumes, change of materials. May 27, 2000.

[Photo 24](#). Yaxhá, northern area. Experimental restitution of volumes with mud and stones, May 27, 2000.

[Photo 25](#). Yaxhá, detail of experimental restitution of volumes with mud and stones, May 27, 2000.

[Photo 26](#). Cholula, restoration with the use of small stones in the joints to show the reintegrated portions, July 16, 2000.

[Photo 27](#). Tzibanché, mask, thin flagstones in a continued line showing complementation, February 19, 2000.

[Photo 28](#). Kohunlich, thin flagstones in a continued line showing complementation, August 4, 2000.

[Photo 29](#). Ek Balam, Temple 1, detail of partially empty joints to divide the integrated parts from the original ones, August 1, 2000.

[Photo 30](#). Palenque, Structure XIX, a portion of the restored main stairs, signalled with rectangular stones, March 20, 2000.

[Photo 31](#). Palenque, Structure XIX, detail of integrated steps marked with rectangular stones in a dotted line, March 20, 2000.

[Photo 32](#). Kaminaljuyú, Structure DIII-1, clay and talpetate modelled mask, 1963.

[Photo 33](#). Kaminaljuyú, Structure DIII-1, three characters modelled in clay and talpetate, 1963.

[Photo 34](#). Kaminaljuyú, Structure DIII-1, individual on squash modelled in clay and talpetate, 1963.

[Photo 35](#). Kaminaljuyú, Structure DIII-1, the same clay mask shown in Photo 32, when repair was attempted, November 14, 2000.

[Photo 36](#). Kaminaljuyú, Structure DIII-1, remains of a clay and talpetate modelled mask, not easily accessible to visitors, November 14, 2000.

[Photo 37](#). Kaminaljuyú, Structure DIII-1, portion of mask and overview of the building, November 14, 2000.

[Photo 38](#). Kaminaljuyú, Structure DIII-1, general view of the masks area, November 14, 2000.

[Photo 39](#). Xunantunich, El Castillo, west side, replica of frieze. May 24, 2000.

[Photo 40](#). Tikal, Structure 5D-83, main façade, May 5, 1991.

[Photo 41](#). Tikal, Structure 5C-53, portion of south façade, very damp. December 12, 2000.

[Photo 42](#). Tikal, Structure 5D-43 with Temple 1 at a distance, and an advanced deterioration of the stone, February, 1980.

[Photo 43](#). Tikal, Temple 1, south side of the stairs, heavily deteriorated; note the white dust on the joints with the terraces, May 14, 2000.

[Photo 44](#). Tikal, Structure 5D-33-2nd, stone and stucco mask, west side, August, 1972.

[Photo 45](#). Tikal, Structure 5D-33-2nd, mask, west side. December 12, 2000.

[Photo 46](#). Tikal, Structure 5D-33-2nd, west side mask, inside the tunnel, in a very good state of conservation, December 13, 2000.

[Photo 47](#). Tikal, Structure 5D-22, west mask. The light parts represent deterioration. The parts darkened by microflora are better preserved, February, 1978.

[Photo 48](#). Tikal, Structure 5D-22, idem photo 47, though this one was taken on December 13, 2000; note that the mask has almost disappeared. The damp parts with a heavy dark color show a much better state of preservation than the roofed portion.

[Photo 49](#). Balamkú, House of the Three Kings. March, 1993 (photograph courtesy of Graziela Sartori).

[Photo 50](#). Balamkú, House of the Three Kings, following the protective reconstruction, February 18, 2000.

[Photo 51](#). Copán, Structure 10L-21, north section, restoration process through anastylosis, March, 1991.

[Photo 52](#). Copán, experiment: scale construction of dry laid vault, October, 1986.

[Photo 53](#). Copán, replica of Structure 10L-10; the ballcourt is inside the Sculpture Museum, 1997.

[Photo 54](#). Copán, Structure 10L-29, south façade, inside the Sculpture Museum.

[Photo 55](#). Copán, Structure 9N-67, the protective roof is in very poor condition, November 22, 2000.

[Photo 56](#). Tikal, Structure 5D-33-2nd, interior of chamber with modern graffiti on the original stucco. Deterioration here was caused by man and not by humidity.

[Photo 57](#). Palenque, Structure XIX after restoration was completed. There is a footpath for tourists and a protective roof. There are no side walls and therefore ventilation is constant, while the shade of trees helps to stabilize the interior temperature, July, 2000.

[Photo 58](#). Copán, the archaeological cut caused by the erosion of the river. Before stabilization was completed, 1983.

[Photo 59](#). Copán, the archaeological cut, at work in 1991.

[Photo 60](#). Copán, showing in detail how the cut was stabilized and cultural strata restored, 1991.

[Photo 61](#). Copán, the cut during the stabilization works. Detail of arrangement, 1992.

[Photo 62](#). Copán, east court, general view of stairs at cut's edge, before restoration. From Temple 22, looking south, 1987.

[Photo 63](#). Copán, archaeological cut, in the process of completing the bracing in its base, 1990.

[Photo 64](#). Copán, archaeological cut, in the process of stabilization. Wooden scaffolds were used throughout the entire work, 1992.

[Photo 65](#). Copán, archaeological cut, general view, during stabilization works, 1993.

[Photo 66](#). Copán, archaeological cut, when restoration was completed. Portions with architecture and liners, 1993.

[Photo 67](#). Copán, the Hieroglyphic Stairway, detail of deteriorated steps at the base of the stairway.

[Photo 68](#). Copán, Hieroglyphic Stairway, 1990.

[Photo 69](#). Copán, Hieroglyphic Stairway with protective canopy put in place in 1985, picture taken in 1988.

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