

# PRINCIPIOS PARA LA CONSERVACIÓN DE LA MADERA EN ESTRUCTURAS HISTÓRICAS : EL DEBATE Symposium and Discussion of the Updating of the PRINCIPLES FOR THE PRESERVATION OF HISTORIC TIMBER STRUCTURES (1999)

Organizing committee



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**PRINCIPIOS PARA LA CONSERVACIÓN  
DE LA MADERA EN ESTRUCTURAS HISTÓRICAS : EL DEBATE**

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OF HISTORIC TIMBER STRUCTURES (1999)**

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# Presentation

The first Principles were accepted in the International Assembly of the ICOMOS International held in Morelia México in 1999, there, experts discussed the importance of having regulations for the preservation of the timber structures.

After 13 years, the Updating of the Principles started in the 18th Symposium and General Conference held in the Museo Regional of Guadalajara, México in 2012, there many experts from Japan, Italy, Argentina, France and México recognized that a new element of the patrimony had to be considered as an important matter in the conservation and regulation: the interdependency of natural, social and technical aspects: all together in an holistic dynamic. Also new decay agents threaten the conservation of the monumental timber structures.

In September of the 2013, the members of the IIWC committee met in Himeji center for research into castles and fortifications, in the Himeji- Castle Conservation site in Himeji city in Japan, where the 19th Conference and Symposium took place. There the situation of the wooden cultural heritage was reviewed. Based on the country wooden patrimony report, practical conservation principles were claimed to be submitted for the next year as a revised edition in the General Assembly in Florence Italy.

In November of the 2014, in a IIWC meeting held in the Architectural Faculty of the Florence University, we all members participants were agreed that the final Principles must be reviewed with the collaboration of other scientific committees and other national committees. Since then other meetings have been organized to discuss the Principles as the Round Table discussed in the frame of the SHATIS 3<sup>o</sup> conference in Wrocław, Poland in September 2015. The revision of the Principles of Conservation of Historic Timber Structures, according to the proposed schedule by the international Secretariat of ICOMOS should be finished and accepted in 2017. Thus we have the aim to finalize the discussion of the Principles at this meeting.

The discussion of the Principles updating will continue in Falun Sweden from the 13th-16th of April 2016, so dear members of the IIWC and from other committees participants we invite you all to attend the meeting where we believe we have the opportunity to establish criteria for protecting and preserving historic timber structures and wooden cultural heritage world wide.

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# Introduction

The protection of the timber cultural heritage at international level plays an important role of cultural, social and technological nature in the development of the countries. Along the last ten years it has been recognized that the objectives of this protection are not only for the conservation of the material and cultural testimony of the peoples but to give concretion to the vast intangible heritage that are the cultural forms of being of the communities. This inseparable duality of the material monument and the intangible is manifested in a clear and overwhelming way.

The diversification of the timber heritage under this focus imposes urgent reflections before the necessity of characterizing these new categories within all, and how it is sought to protect it. For this, it is pertinent to propose new intervention typologies not only with the technological advances but with the social demands of their transmission toward the future. Recognizing the cultural tradition of the very society as an unavoidable value, in order to shape the guidelines of the professional work that may allow us to protect those testimonies, bearers of that intangible heritage formed by anthropological values in which the social and collective individual is reflected and builds his identity day by day.

This work contains different aspects of on the protection of the timber cultural heritage in countries of Asia, America and Europe that were presented in April of this year during the 20th ICOMOS International Wood Committee Conference and Symposium in Falun Sweden and other works that supplement this universe and that equally come from an active participation of the protection, and restoration of these monuments and the necessity of diffusing them in the broadest possible way.

María de Guadalupe Zepeda Martínez and co-authors reflect on a spot focus of the heritage with the topic of “The Tradition of Detachable Timber Monuments in Mexico and the Updating of the Principles for

the Preservation of Historic Timber Structures”.

Towards a wooden heritage conservation theory in Spain, Mikel Landa and Alazne Ochandiano, both experts, explain that together with stone, wood has been a material widely used for centuries to create architecture in Spain. While Spanish interlaced carpentry reached high sophistication levels joining complex decorative geometry with structural efficiency and Basque wooden architecture, which can be depicted by its wooden churches, is an example of creativity, they are but the flagships of a widespread and rich wooden architecture.

Alejandro Martínez de Arbulo in his text “The Current Principles for the Preservation of Historical Wooden Buildings in Japan” mentions that when the extent of the decay is generalized, causing the leaning of the whole structure and loosening of the joints, a thorough repair becomes necessary in order to recover the stability and load-bearing capacity of the structure. This kind of intervention involves a partial or complete dismantlement of the structure, followed by the repair or replacement of damaged members, correction of leanings and deformations, and reassembly.

Aynur Ciftci and Uzun Zepney, in their work entitled “Construction Techniques and Materials of Traditional Wooden Mosques in Kavak-Samsun, Central Blacksea Region, Turkey” mention that rural architecture has been created by geographical characteristics (topography, climatic conditions etc.) of the region and accessible construction materials, with a long cultural background. The town of Kavak that was chosen as study area, located in Samsun province, Central Blacksea Region of Turkey, has wooden civil and religious architectural heritage due to existence of broad forested areas in the district.

Yasuhiro Watanabe presents his work entitled “Examples of Conservation Works for Historical Wood Buildings in Japan”. He describes and interesting report

about the Cases of Sojiji-soin Daisodo (Half-dismantling) and Butsuden (Full-dismantling) Kersti Berggren presents his text entitled “The Finn Forest Smoke House”, which is an interesting research work about civil architecture.

Ling Cai, Peter W. Ferrero and Yi Deng, present “A Study of Timber Structure of Drum Towers in the Chinese Dong Minority Architecture and Its Development Tendency”. The purpose of this study is to explain the structural characteristics of Chinese Dong Minority drum-tower, and to summarize their geographical location patterns related to the different structural types

Christian Zamora Alvarado and co-authors describes the layout of “La Petatera” bullring in Villa de Alvarez, an example of monumental architecture that has a special feature. “La Petatera” is a construction of wood and mats that every year is built and dismantled as part of a tradition in this former village, now city, located in western Mexico.

Iris Marisol Llerenas and co-authors studies the identification and appraisal of timber species. The aim her work is to determine the types of wood used in the monument known as “La Petatera” in the municipality of Villa de Álvarez, belonging to the state of Colima, Mexico. This is unique in its gender because its constructive system is totally built with woods from the region and because it is assembled and disassembled once the annual bullfight activity ends, for which it is considered a portable bullring.

Francesco Augelli presents his work entitled “Wood in Armenian Culture. History, oblivion and daily destruction of a neglected heritage”. There is many evidence of a wooden ancient past even in the Armenian architectural culture. To the date, however, there are not enough and in-depth studies on this topic. The lack

of studies, and therefore the lack of awareness of the importance of these cultural and ethnographical data, determines a daily loss of cultural material evidence, and with this the memory of the roots of a great ancient people.

The paper aims to demonstrate and retrace, through some examples, how the art and architecture of the great Armenia was heavily based not only on stone, material for which the Armenian monumental architecture is still now known worldwide, but also on wood.

Cecilia Haupt in her text entitled “Wood Doors in Heritage Buildings of Mexico City” makes a description of viceregal architecture. The New Spain had great buildings destined to house the political and religious institutions such as the female convents and houses of conquerors, nobles and rich tradesmen. In some of these buildings we can still appreciate richly worked quarry and magnificent craftsmanship works such as wooden coffered ceilings, major and minor wood works consisting on roofs, doors, furniture and altarpieces. This paper describes some of the most representative works that were and are still today, fundamental part of the city's image.

Ilva Sandin presents a work about “Roof Structures in Swedish Churches: preservation challenges and solutions”, in a very interesting report.

Kersti Berggren presents his text entitled “The Finn Forest Smoke House”, which is an interesting research work about civil architecture.

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# Ancient Timber Structural Systems: An Attempt To Define The Main Components Of The Paradigm

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## Introduction

When thinking to **timber structural systems** one is overwhelmed by the extremely wide variety of elements that this set includes, from bearing structures to framing devices, ..., to complex art objects (statues, carved or painted boards, *retablos*, works of marquetry and inlay), mobile and fixed furniture as libraries, choirs, in addition maquettes, musical instruments.

In this cosmos, a variegated universe is constituted by the set of the load bearing structures, with which this paper is mainly concerned.

## Generalities

Witnesses of timber structures and constructions are documented since prehistory. In the lake areas of eastern France, northern Italy, southern Switzerland and Austria and close Regions, for instance, prehistoric or proto-historic palafitte (stilt houses) are brought to light, since half century, in great quantity in a large variety of types showing that construction techniques of dwellings and stores with timber were already suitable for that use. People who live today their constructive prehistory in lake areas in the periphery of the world still live in palafitte built by themselves or in huts in the forest. Study of primitive constructions is essential for the understanding of the origins and of the development lines of the timber structures.

The fundamental types and configurations as the truss, known in no more than two or three fundamental structural schemes, remained practically unchanged till present times though using sometimes different materials (steel cables in addition to timber, composites of wood, stainless steel, glue laminated timber etc.) and designed with slightly different details. In this sense an important role is played by the tradition and local craftsmanship. The same for the frames.

The importance of the timber structural systems comes from the fact that they have been, till the beginning of the XIX century, the only kind of mechanical device belonging to the field of the discrete in opposition to masonry, the field of continuous. This is due to the excellent mechanical characteristics of the timber that has been the only available material resistant to both compression and traction until the half of the XIX c., when steel became cheap enough and currently available to be progressively introduced in the building industry. Besides timber is available in considerable length, almost ready for use in carpentry except refinements which are anyway optional, in addition characterized by low weight, nice color, attractive look.

But wood has two more wonderful characteristics, the elastic deformability, read the flexibility, and the visco-elasticity. Both these properties occur in a beam, up to a certain extent, without breaking the member; in practice it is very difficult to break a beam of healthy wood dividing it in stumps.

The **asset** of timber structural systems is, therefore immense though the survival capacity of the material, limited in time by the quality of maintenance, causes a continuous **reduction** of the number of the ancient surviving specimens. Nevertheless the fossil specimens or the prehistoric surviving structures as well the structures still built nowadays by people living their constructive prehistory, the surviving ancient structures and some very ancient representation of timber structures offer a wide frame of **types**.

*Puttu Codinu e altre installazioni, incavallatura di civiltà villanoviana, rappresentazioni etrusche come Ipogeo dei Volumni ecc., Palafitte. Capriata classica e palladiana, Polonceau.*

Besides painted panels (“tavole”), *tritticos*, *retablos*, *maquettes*, ..., *Furniture*, *Musical Instruments*, made of wood are to be considered wooden structures too, where the word structure means an articulated complex of joined members the function of which is to stand, support, keep together.

Existing high quality drawings and projects should be included in the asset as intellectual contributions.

## The Timber Load Bearing Structures

A structural system is a complex device essentially designed to perform the function of bearing its own weight, the service loads as well the accidental ones and distribute the internal tensions caused by loads amongst the members, in a rational way, through various types of joints that act as internal constraints. Furthermore to transmit all the cited loads to the underlying structures (other structures made of whatever material or the ground) by means of external constraints.

A structural system is organized to provide strength, equilibrium and stability to the building. Generally speaking, it is conceived to work in the three-dimensional space and is hierarchically articulated.

The timber structural systems are generally composed by structural units (frames, trusses and similar, for instance) connected and stabilized by auxiliary members. The units in their turn are composed by timber members which are connected by joints.

The fortune of the timber over the ages as material suitable for construction of temporary or permanent structural systems are mainly due to its large availability, especially in certain areas, the easy workability and, as said, capacity of withstanding traction tensions in addition to compression, unlike natural or artificial stone. Tensile strength is essential in the performance of a beam, solicited to bending.

## The Patrimony

The PATRIMONY of the ancient load bearing timber structures is constituted by an enormous number of surviving specimens, mostly still performing their service. Just to quote some of the most ancient specimens, one should remember the roof carpentry (half of the 6th c. a.C.) of the Saint Catharina's church in Sinai, constituted by the famous trusses of the roof of the

church which are the most ancient known so far. The whole carpentry and the fortress including the church were designed by the Architect Stephan from Eilath. They are quoted by the Justinian Emperor's historian Procopius from Cesarea as ordered by the same emperor. The dendrochronological analyses confirmed the temporal attribution.

The Buddha Sakiamuni (enlightened Buddha) timber impressive tower, tall 60 m, built in the 11th c. in internal Mongolia, China, is still safely standing. But carpentries of the XIV and following centuries are not extremely rare.

The latin writer Vitruvius (I c. b.C.), deducing his considerations from Theophrastus, the greek philosopher of the IV - III c., who had written the works *Historia plantarum* and *Causae plantarum*, was already able to distinguish the main characteristics of the most used genera of the trees used in the constructions at his time.

But the choice of a given species is conditioned by availability, cost, size, length of the pieces of the stock etc.

## RESEARCHES

The researches carried out on ancient or simply existing timber structures include survey, inventory, recording, classification, cataloguing with definition of the evolution lines. A specialized multilingual glossary and representation rules are requested to share their knowledge.

Object of interest are age, function, acting loads over the time (with specifications), structural scheme, geometry, span, bay, articulation of the components (members, connections, structural units), overall dimensions, size of the members, internal and external connections and constraints. Behaviour over the time, actual condition, serviceability, safety.

The general exterior look of a timber structure depends on a few elements such as geometry, finish, decoration...; shape, working, grain, texture, pattern, color; these elements can be casual or designed. Craftsmanship, assembly, patina (aging), symbolism. About the material, genus and species (assessment of the taxon) are matter of definite

interest; besides the **characteristics** (those related to the single species, grain, defects, ...; decay). The **Ductility of a structure** depends mainly on the nature of the joints.

An essential issue is the consideration of interaction between the structure and the other structures present in the building especially if the timber one and the others are directly connected as it happens for a timber roof resting on masonry walls. Stability of the support is hence a central matter of interest.

**Durability** of the timber structural systems largely depends on limitation and distribution of loads in relation to size of the members, span and bay as well protection of the material. They are affected by seismic perturbations though less than other structures made of different materials. Seismic events damage specially the joints of the timber structures: a large quantity of energy is dispersed through the connections and this prevents the members from being hit by high dynamic tensions. The members anyway are too light for being affected seriously by dynamic forces.

F. Milizia, 1784, was one of the first scholars to put the question of interaction between masonry supports for beams and trusses and floor and roof carpentries in the seism prone areas; he suggested to connect the end of the timber members to the walls in a rigid way by means of flat iron ties ("bandelloni") for cooperation of the two structural systems during seismic events, for instance to prevent outwards rotation of the walls, as well to prevent disastrous reciprocal hammering. Also the considerable deflection of a floor beam, for instance, can cause thrusts with the consequence of pushing forward the external wall.

The **stability** of the whole construction has always been a difficult task (especially with timber which does not allow to make perfectly rigid joints between members; the same problem of instability was, and still is, rather difficult to understand by intuition, as proved by the evolution lines of development of the fundamental types and as recorded by the introduction of new structural schemes.

## Failures

The structure may be affected with failures that concern the single components or more of them. The **course** of the failures is a significant item.

The **joints** undergo malfunction and disconnections; in the nailed joints the effects of humidity on metal as rust and the alternating movements caused by shrinkage are responsible of the embedding of the holes in the wood, combined with the reduction of the nails size that result in their pulling out.

The failures of the structures manifest themselves by means of symptoms: loss of geometry of the whole system or of the structural units or of the single members, movements (translations, rotations etc.) of the structural units or of the members, deformations, cracks. Sign of the failures are very useful for recording the structural behaviour and shouldn't be wiped off.

The **VALUES** of the ancient timber structures are mainly of historic, aesthetic, scientific, technical, anthropological, symbolic kind.

**STUDY** of existing structures is primarily directed to assess their efficiency. It is made by means of **visual inspections, survey, analysis** of the material such as taxonomic and dating assessments, grading (assignment of the members to a service class), detection and definition of the damage and **decay** of the material as well **deformations and failures, dimensional measurements**, detection of signs; furthermore with **historic research, tests, trials**. The dating process, one of the most difficult, needs to be carried out with several methods allowing cross assessments.

The collected data lead to the **Acquaintance** of the structural system and its identification (i.e. the understanding and interpretation of the general structural scheme).

**Calculations** are made both for verification and design (project, strengthening). Some modern calculation methods as the F.E.M. allow to simulate easily various loading conditions assessing the effects that are later compared with those really detected on the structure. They also allow to investigate the efficacy of several solutions in order to see, following a heuristic process, which one fits better the fixed parameters.

**Compliance** with present day practice codes with the aim of utilizing the ancient structure for practical use is always problematic because design concepts at the construction time were different by the

current ones. The most advanced codes anyway forbid the complete adequacy of the structures of the monumental buildings to modern requirements, since this would mean a substantial alteration of the ancient structural scheme.

The conservator has to make every effort to interpret the original concept and try to respect it.

**The investigation means and instruments.**

**Diagnosis** is the critic evaluation and interpretation of all the collected data, assessments, analyses, trials.

Most recurrent **THREATS** to patrimony are brought by biologic factors (the fungal attacks especially; termites or dead watch beetles infestations are able to cause structural failures too due to the reduction in surface of the resistant sections). It is essential in these cases to assess nature and extension of the infection and whether the damage jeopardizes the efficiency of the structure in a safe condition. Other causes of failure and collapse are natural catastrophes, fire, human carelessness and ignorance.

Prevention and therapeutic treatments are often necessary. Composition, application modes, toxicity can be deduced by a set of Eurorms.

## Conservation

Reasons for the conservation of an existing structural system rest of course on **philosophic and moral backgrounds** (general purposes as well specific requirements as “*istanza storica, artistica, tecnica, scientifica, pedagogica*” etc.) as well on utilitarian and economic motivations; all these needs are generally expressed by “charters”, i.e. doctrinal documents concerning the Principles, and by guidelines containing the technical criteria to follow when operating (analysis methodology, reference to special practice codes, choice of the most appropriate techniques, characteristics of the added materials, their compatibility with the old system and materials etc.).

The material remains of the historic buildings and their structures deserve the maximum concern because they are the only authentic witness of the original specimen; once destroyed they will be lost for

ever. In particular it ought to be remembered that the history of the buildings is documented by their timber structures. Therefore, in spite of diversity of philosophic approach to architectural conservation in different Peoples, the conservation of the material remains is a general must.

Indirect and direct **CONSERVATION** of a timber structure should preserve the specimen (by means of the bureaucratic notification of the interest presented by the structure, f.i.) mainly carried out including the specimen in the official lists of the structures to be preserved (inventories and catalogues of eminent specimens, that anyway are generally missing separately for timber structures), respect and enhance its values considering, according to the most advanced theories, the historic, aesthetic, scientific, technical, pedagogic demands.

Doctrinal **documents** issued on ethics and philosophy of conservation should be discussed and updated frequently.

Operations of putting up and disseminating the documentation of an existing structural system are also to be considered a first step towards the conservation of the structure since the availability of records and their delivery to the public authorities concerned with the preservation of the historic buildings constitute a valid deterrent to any alteration or destruction of the specimen and, on the contrary, stimulate its **protection and preservation** without alterations.

Operative conservation of the structures includes the **ordinary maintenance**, the **repairs**, the **temporary and permanent propping**, the **strengthening**. Reinforcement, Upgrading and Retrofitting are activities in some way foreign to conservation.

The team appointed to plan or approve and supervise the conservation works of a building should always include a **specialist in ancient timber structures** (very rare to be found)

The systems to ensure sound condition and stability to the structure over the time by means of small repairs and adjustments deserve special attention both in the design and during the operative phase.

When reiterating the maintenance there is the danger of extensive replacements and substantial changes in the structure that could lead to replicas therefore only routine maintenance should be allowed, the extraordinary forbidden. Unnecessary replacements of material or members should be explicitly forbidden in the maintenance specifications; when replacements are considered necessary for future stability of the building a fully developed and technically documented plan should be proposed and discussed. The adjustments operated on the strengthening devices are, at the same time, an excellent way of checking the device efficacy and the occasion for possible operation of feed-back.

**Evaluation** of the condition and **serviceability** of a structure, since it has important practical and bureaucratic repercussions, is necessarily formulated in accordance with procedures and values established in the current practice codes.

The **calculation** of the planned works should be elaborated according to the most advanced theories but recognizing the necessity of respecting the original structural scheme and the specific function that the structure had been designed to perform.

**Relations** with the environment and **Interaction** between the component materials are matters of interest, hence preservation of the site. To this purpose an essential issue is the consideration of all the structural systems producing interaction with the timber structures; special attention should be paid to malfunctions and failures caused by interaction of different systems.

## Conservation Techniques

**Compliance** with the very restrictive requirements of current practice codes, generally studied for new constructions, is a hard task as already said.

The demand of some modern codes (Italian Technical Norms for building or restoring activity, for instance) when designing the measures for repair of ancient structures is only to limit the task of the intervention to a substantial improvement of the condition of the structure; in seism prone areas the same codes request a seismic improvement of the structure towards static and dynamic forces, i.e. repair and strengthening. The retrofitting with total adequacy of the structural scheme to the codes of practice general

requirements on the contrary is explicitly forbidden for listed buildings. Reduction of the loading level is recommended instead.

A fundamental point is that the conservation techniques are essentially different from those applied in construction though using sometimes similar tools. Several modern building tools and techniques were adapted to be used for repair; a few were invented on the demand of the conservators, which makes the difference with the operational methods of let's say fifty years ago, giving the right response to the strict requirements of the correct conservation.

## Safety

Today there is an increasing awareness of need of **safety** (of the operators, of the users and of the same structure). The specific risks (Tampone, 2015) when operating on an existing timber structure are those connected with insufficient knowledge of the structure, especially of the severity of its decay and failures, insufficient understanding of the aims of the conservation project, contemporaneous presence of several contractors in the same worksite, slippery wooden surfaces covered by biologic patina or simply wet, lack of skill of the workers, insufficient skill in the use of new tools available today, freehand use of dangerous tools as saws and drills.

## Education

It should be carried out for conservation designers and workers but **courses** on **doctrine** and **practice** as well **training** are practically missing. On the other hand, it is a matter of question who should be the teachers? In the few courses actually held at local and international level, in general the replacements of worn pieces and the working of new ones with traditional crafts are thought, local repairs, which have very long tradition too, being almost unknown. These courses are, mostly, mainly concerned with the saving of the traditional skills.

One more important aspect of the education is the didactic function of the restoration works. The repairs and strengthening works carried out on an ancient (timber) structure as well the signs of the failures, should be visible though not affecting the general look of the structure and be clearly put in semiotic relation.



**Dissemination** of results (case stories) is overabundant but most interventions are questionable. What is missing is a constant **dialogue** with private or public owners in order to get them acquainted with the aims of conservation and the most appropriate ways to achieve satisfying results with not very expensive works. Specific **price lists** are totally missing and it is therefore difficult to set up reasonable priced bills of quantities. **Registers** of specializing contractor's are inexistent since the category of general restoration undertakers is reputed sufficient (and it is not).

Apposite **Specifications** are totally missing. The conservative nature of the works should be clearly declared. They should prescribe in primis that demolitions of any parts of the structure or even removal of any member and disassembling the structure are, as general criterion, not allowed. This kind of debilitating operations should be the last chance when no other means are possible, in any case the proposals to operate demolitions and replacements should be largely justified in advance and the related intervention only made after formal approval of the relevant authorities. Specifications should also prescribe that, in general, repairs should be made in situ without disassembling the structure. Great attention should be paid to the connectors; quality of steel, especially the nuts of the bolts, always needs accurate definition.

The **offices concerned** for preservation should include some specialists in ancient timber structures in the team entrusted to examine the general conservation plans of a historic building.

Other important components of the paradigm are **financing**, **fiscal exemptions**, **contributions** by public bodies.

The **bibliography** on conservation is absolutely redundant; nevertheless the works dealing with the conservation philosophy of structures combined with the conservation techniques, are rather rare.

A synthetic bibliographical list is the following:

Vitruvius, *De architectura*, I c. b.C.

Poleni G., 1748, Osservazioni sopra la gran cupola del Tempio Vaticano II, Roma

Milizia F., *Principi di architettura civile*, 1785

Giovannoni G., *Il restauro dei monumenti*, Roma, Cremonese, s.d. [1945].

Giuffrè A., *La meccanica dell'architettura. La statica*, Roma, NIS, 1986.

Ruskin J., 1849, *The seven lamps of architecture*, London

Riegl A., 1903, *Der moderne Denkmalkultus. Sein Wesen und seine Entstehung*

Brandi C., 1963 *Teoria del restauro*, Roma: Ediz. Storia e letteratura

Sanpaolesi P., 1973, *Discorso sulla metodologia generale del restauro*, Edam, Pisa Riggio M., Parisi M. A., Tardini C., Tsakanika E., D'ayala D., Ruggieri N., Tampone G., Augelli F., 2015, *Existing Timber Structures: Proposal for an Assessment Template*, SHATIS, Wroclaw

Tampone G., Semplici M., ..., *Timber structures in the world list*

Tampone G., 1996, *Il restauro delle strutture di legno*, Milano: Hoepli,

Tampone G., Messeri B., 2006, *Compliance of the practice of Strengthening Ancient Timber Structures in Seismic Areas with the Official Documents on Conservation*, in Proceedings of the 15th International Symposium and Conference (18th to 23rd September 2006, Istanbul): *Why Save Historic Timber Structures?*

Tampone G., 2007, *Mechanical Failures of the Timber Structural Systems*, in Proceedings (G. Tampone, M. Semplici sc. Ed.) of the Int. Symposium of the International Scientific Wood Committee: *"From Materials to Structure: Mechanical Behavior and failures of the Ancient Timber Structures"*, Florence, 2007.

Tampone G., 2008, *Valori semiologici delle opere di consolidamento negli edifici monumentali*, in Proceedings (ed. by A. Tomaszewsky) of the International Conference of ICOMOS, ICCROM, Fondazione Romualdo del Bianco: *"Values and Criteria in Heritage Conservation"*, Florence: Edizioni Polistampa, 2008

Tampone G., 1989, *Sostruzione e lamine metalliche per il consolidamento di una capriata lignea nella sala di scherma della Fortezza da basso a Firenze*, 2° Congr. Naz. "Restauro del Legno", Firenze 1989, 1° Vol. di Atti (G. Tampone sc. ed.), Nardini Ed., Firenze 1989

Tampone G., 1989, *Restauro strutturale con lamine metalliche dei solai lignei della sede del Genio Civile a Firenze*, 2° Congr. Naz. "Restauro del Legno", Firenze 1989, 1° vol. di Atti (G. Tampone sc. ed.), Nardini Ed., Firenze 1989

Tampone G., 1989, *Restauro strutturale con legno lamellare di un solaio e di una volta a carena lignei nell'Accademia di Belle Arti a Firenze* (in coll. with L. Campa), 2° Congr. Naz. "Il restauro del Legno", Firenze 1989, 1° Vol. di Atti (G. Tampone sc.ed.), Nardini Ed., Firenze 1989

Tampone G., Franci F., Campa L., *Rinforzo di puntoni e consolidamento di una capriata del teatro di Sarteano mediante centine metalliche* (in coll. with) 2° Congr. Naz. "Restauro del Legno", Firenze 1989, 1° vol. di Atti (G. Tampone sc. ed.), Nardini Ed., Firenze 1989

Tampone G., 1989, *Problematiche del restauro delle strutture lignee ed odierni criteri di intervento*, Relazione generale al 2° Congr. Naz. "Il restauro del Legno", Firenze 1989, 2° Vol di Atti, Nardini Ed., Firenze 1989

Tampone G., 1994, *Un brevetto per il consolidamento delle travi lignee inflesse mediante l'inserimento di lamine metalliche*, in Boll. Ing., 7 – 8, 1994 Firenze

Tampone G., 2001, *Acquaintance of the Ancient Timber Structures*, Invited Key Lecture, Proceedings (Paulo B. Lourenco and Pere Roca Ed.) of the III Int. Seminar on Historical Constructions, Universidade do Minho, Guimaraes, Portugal, 2001

Tampone G., 2002, *Istanze ideologiche e innovazione tecnologica nella conservazione delle strutture di legno*, in *Restauro*, E.S.I., Napoli, 159/2002

Tampone G., 2005, *The Floor and the Ceiling of the Sala di Carlo VIII in the Palazzo Medici Riccardi in Florence*. 1. *Historical Background*, in Proc. Int. conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., 2005, *The Floor and the Ceiling of the Sala di Carlo VIII in the Palazzo Medici Riccardi in Florence*. 4. *Structural Features and Failures*, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., 2005, *The Floor and the Ceiling of the Sala di Carlo VIII in the Palazzo Medici Riccardi in Florence*. 5. *The Conservation Work of the Structural Unit*, in Proc. Int. Conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., 2005, *Il complesso lignario di copertura della Cattedrale di Nicosia*. 1. *Premessa*, in Proc. Int. conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., 2005, *Il complesso lignario di copertura della Cattedrale di Nicosia*. 4. *Rapporto sullo stato di avanzamento di analisi, rilievo e rappresentazione delle strutture*, in Proc. Int. Conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, , 2005

Tampone G., Copani P., Funis F., 2005, *Il complesso lignario di copertura della Cattedrale di Nicosia*. 5. *Progetto di parziale accesso e fruizione visiva delle pitture poste all'interno del tetto*, in Proc. Int. conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., Semplici M. 2005, *Le strutture lignee nella lista del patrimonio mondiale. Rapporto preliminare*, in Proc. Int. Conf. on Conservation of Hist. Wooden Structures, G. Tampone ed., Florence: Collegio Ingegneri Toscana, 2005

Tampone G., Messeri B., 2006, *Compliance of the Practice of Strengthening Ancient Timber Structures in Seismic areas with the Official Documents on Conservation*, 15th International Symposium and Conference (18th to 23rd September 2006, Istanbul): *Why Save Historic Timber Structures ?*, in Proceedings of the Symposium

Tampone G., 2006, *A Strategy for the Rescuing of the Ancient Wooden Churches of the Central Europe*, in *Rescuing the Hidden European Churches Heritage*, Proceedings (G. Tampone and M. Semplici sc. ed.), of the Joint Research Czech Republic, Poland, Slovak Republic, Ukraine, Italy supported by "Culture 2000" of the European Community, Florence

Tampone G., *Rare Domes Simulating Timber Construction in the Hypogea Etruscan Architecture*, in Proceedings (G. Tampone, R. Corazzi, E. Mandelli sc. Editors) of the Int. Congr. "Domes in the World", Florence: Nardini ed.

Dezzi Bardeschi M., 2002, *A Brief History & Suggestions for the New Millennium*, Icomos Congress, Madrid

Tampone G., 2002, *Istanze ideologiche e innovazione tecnologica nella conservazione delle strutture di legno*, in *Restauro*, E.S.I., Napoli, 159/2002

*Linee Guida per la valutazione e riduzione del rischio sismico del patrimonio culturale, Allineamento alle nuove Norme tecniche per le costruzioni*, a cura di: Ministero per i Beni e le Attività Culturali, Segretariato Generale, Roma, Gangemi, 2010.

Sabrina Palanti (care of), 2013, *Durabilità naturale del legno, diagnosi del degradamento, trattamenti preventivi e curativi*, Palermo, Dario Flaccovio Editore

Tampone G., 2015, *Safety in the Worksite of Timber Structures Conservation*, Proceedings of SHATIS Conference, Wroclaw



# The Tradition and the updating of the ICOMOS Principles for the Preservation of Historic Timber Structures: Case: Dismantling Wooden Monuments in Mexico

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## Summary

One year before the adoption of the new International Principles for the Preservation of Historic Timber Structures of the ICOMOS International Wood Committee, to be held in the city of New Delhi, India in 2017, the peer review of this regulatory document in which we are discussing and analyzing the pros and cons of the principles' postulates adopted in 1999 is being developed. The meetings in Guadalajara, Mexico in 2012; in Himeji, Japan in 2013; in Florence, Italy in 2014; and the one held now with reason of the 20th Assembly of the ICOMOS International Wood Committee in Falun Sweden in April of 2016, have been devoted to several panel discussions for the updating of the International Principles for the preservation of wood in monuments. The present work analyzes the case of the dismantling timber architecture of traditional character, handcrafted, and of temporary material permanency, topic of which nothing is referred in any postulate of the Principles that are being revised (versions 1999 and 2014).

The objective is to propose the inclusion of the protection of this category of detachable and temporary timber monuments in the International Principles with reason of their updating. It is questioned, Is detachable architecture of high cultural value? For which, Is it fundamental to ensure and regulate its conservation? The relevance of this architectural detachable property of centennial traditions of assembling and dismantling timber structures, traditional constructive practice that repeats every year is argued under the light of the restoration theory of Cesare Brandi and of the Nara Charter. The omissions in the text of the Principle<sup>1</sup> are observed and pointed out. The case of La Petatera Bullring of Villa de Alvarez in Colima is presented as one of the examples in Mexico.

The importance of including this category of detachable architecture, bearer of values of the tangible and intangible heritage is explained as well as the urgency of regulating this type of cultural property as a way of protection and legal tool of the highest utility for its preservation and management. Finally is presented the contribution to the updating of the Principles with reason of the meeting in Falun Sweden with the necessary addenda to protect and to regulate the conservation and restoration of the temporary-detachable timber architecture.

**Key words:** Vernacular architecture, wood, temporary construction.

## Introduction

The present work responds to several necessities, on one hand, to take advantage of the opportunity of updating the ICOMOS International Principles for the Preservation of Historic Timber Structures in which it is intended to include at least, one category of timber monument with detachable, temporary and recurrent character. On the other hand, it aims as consequence, to reinforce the legal protection framework of La Petatera bullring of Villa de Alvarez in Colima. This monument exemplifies perfectly this category of monument not included explicitly in the Principles, and that is also necessary to protect in other countries, which protection regulation at international level through the Principles, depends on the decisions of the discussions between the experts and the responsible for the timber heritage of the countries committed with ICOMOS-UNESCO to protect their heritage.

<sup>1</sup> Same versions 1999 and 2014.

Seen this way, the cornerstone of this work is the awareness of necessarily having to recognize Cultural Diversity<sup>2</sup>, not only in the testimonies but in the way of protecting them, to recognize not only one, but several categories of timber monuments and several levels and different types of interventions and the plurality in the technical and social ways to preserve them. The International Principles should include them explicitly in order to be universal and their precepts should be traverse in order to have wide applicability in all the countries committed with their protection.

Is this dismantle, temporary and recurrent architecture heritage monument? Why to update the Principles in favor of these dismantle temporary and recurrent monuments? Are local appointments enough to protect them and to transmit them to the future? Which would be the addenda to propose in order to guarantee their recognition and protection? These are the questions posed by this work group. The assessment of this monument category is developed in the conceptual framework of the Theory of the Restoration of Cesare Brandi, and the Nara Charter. Although Brandi refers to the work of art, the theoretical development that presents on the topics of: the formulation of the property by the author, the impermanence of the work, the historical instances and the recognition of the property in the moment of its conservation, are useful. On the other hand the Nara Charter is the essential foundation on which it is agreed that this heritage enjoys the authenticity conveyed to it by the traditional know-how and materials inherent to each culture.

First is presented the general context of the

national and local regulatory scheme in Mexico to protect the timber architecture, focused on the protection of La Petatera; following is presented the case of study, the bullring and the charro and bullfighting festivities (fiestas charrotaurinas); their formal, material, and social description. The problems that put in risk its conservation are detected, as well as the principles that would help to its protection. This part includes equally the justification for carrying out the present study and of proposing the addenda to the international Principles. As a result are presented the addenda to propose in the meeting of Falun, in order to enrich the Principles and to counteract these intentions to avoid the dismantling and reassembling of monuments, with the aim of making them truly universal. As a conclusion, a series of reflections and final recommendations are presented.

### **La Petatera of Villa de Alvarez, Colima, temporary-detachable architecture of social-religious tradition, handcrafted: material testimony of the intangible heritage.**

*La Petatera* bullring is located in the municipality of Villa de Alvarez (Colima). This bullring is built and reconstructed every year in the month of February, starting from materials such as wood, mat and ixtle and regional processes that have over one hundred and fifty years of tradition in this state.



Fig. 1 Panoramic view of La Petatera Ring of The Municipality of Villa de Alvarez, Colima.

<sup>2</sup> Nara Charter principles 5, 6, 7 and 8. Approved in Nara Japan, 1994.

Its constructive records have their origin in a deep religious tradition, when in the 17<sup>th</sup> century, starting from 1658, the town of Colima -ruined by the tremors- decides to appeal to the protection of St. Philip of Jesus as patron saint, to whom, starting from then, they consecrate every year, at the beginning of February, the religious and pagan festivities that include bullfights.

La Petatera is a work built with traditional construction techniques; it is the result of all the times, because it has evolved from the times in which it was a palisade placed in the downtown of Colima, to its conversion into a magnificent structure of handmade engineering with the capacity to house up to five thousand people.



Fig. 2 Process of assembly of the parts and constructive elements of La Petatera



Fig. 3 Here can be observed the magnificent vertical support beams that bear the highest part of the construction and the cans or containers that will support the planks where the public in general sits.

It is an intelligent architectural work, endowed with a flexible, ingenious and efficient structure for the seismic area. The structure is an interwoven skeleton tied in perfect harmony and provided with great structural stability which is viable with a low recurrent cost of construction. It is formed structurally by a lattice of several types of woods found in the region and according to the characteristics of the system, either to absorb traction efforts through beams and main beams, as to transmit the compression forces to the land by means of horcones (supports).



Fig. 4 Forks of initial support.



Fig. 5 Official construction craftsmen of La Petatera.

This structural system is joined together with ixtle cords and ropes. The work begins once the center of the land is located and the circle that defines to the ring is traced, which has a sixty meter-diameter and the built surface near three thousand square meters. The tier area, also built in wood, has an area of two thousand m<sup>2</sup>, what allows a capacity of approximately five thousand spectators. These tiers are divided in 70



sections or stands, which belong to 70 different concessionaires that store, build and later, on dismantle the structure.



Fig. 6 Construction of the circulation Corridor of the whole ring.



Fig. 7 General public of La Petatera in Villa de Alvarez

The architectural ensemble of the bullring is supplemented with the bullpen area, built with the same principles of the bullring. The shades represent the complementary system of the bullring and they consist on the cover that is prepared with otate rugs, all with the same width but different longitudes, which are known as long shades and short shades. On these rugs, the *petate* mats are sewn with rope and pack needles.

“The skirts” are the cover of the square, which are made of mat and are placed in the lower part of the tiers, as well as in the stairways of each of the stalls. To carry out this work, each stage concessionaire contributes five forks, five sills, three large and three short

cans or containers, a dozen and a half planks for the stalls, the seats and the stirrups, half dozen crossbars for the ring, four dozens of mats and six ropes to tie. La Petatera bullring is a monument loaded with values of the tangible and intangible cultural heritage. In both focuses aspects of the cultural property can be observed, which preservation should be ensured and guaranteed, given its fragility.

Threats to the conservation of La Petatera of Villa de Alvarez, Colima and the International Principles as way of protection and tool to regulate its preservation and management.

From the point of view of the tangible heritage, La Petatera is built with wood, vegetable fibers, bamboo cane, liana and mats, all of them highly perishable materials that have a very short useful life. The ephemeral nature of La Petatera is due in fact for its constituent materials, many of which must be renovated during its annual reconstruction. On the other hand, these materials come from the natural setting from which they are extracted and exploded. The natural reserves of the wood used in its construction are also a challenge for its conservation. A threat affecting its construction is the supply of these materials that usually come from the immediate setting, the public lands of the mountain areas in the state of Colima.

Along the years, the municipal authorities of Villa de Alvarez have facilitated the use of the land where La Petatera is built; likewise they charge a fee permission to the Patronage of the charro-bullfighting festivities so that the concessionaires-tabladeros can build the bullring in the times marked by the feast of the patron saint, St. Philip of Jesus. Given that the possibility of the celebration and of the construction of La Petatera practically depends on them, the survival of this tradition should be guaranteed, because officers decide on their own about the celebration of this centennial festivity. For the municipal authorities, this tradition means a high percentage of the approximately 35 million [pesos] collected every year<sup>4</sup> from concepts such as ticketing for bullfights, concerts and parades, where the seating capacity of the public is of approximately 70 thousand spectators, during the five weeks that the festivities last.

However, its physical construction depends mainly on the popular constructive knowledge and on the oral transmission of the empiric know-how that is a voluntary and eventful act, which may or not be transmitted to the future. Therefore, physical and materially, La Petatera bullring is a highly vulnerable product. In the same way, other timber monuments like the trojes of Michoacán are highly vulnerable; according to Ph.D. Luis Alberto Torres Garibay, “the vulnerability of the heritage lies in the potential loss of these meanings and the little value granted to them. When one goes to a community like Sevina in the Purépecha mountain range, one can perceive the great meaning of their traditions and knowledge;”<sup>5</sup>... the reality of these monuments is that the local or national protection still requires that international regulation such as the Principles be even more explicit.

From the point of view of the intangible heritage, this bullring is the realization of the traditional construction techniques, and it is also the community meeting enclosure that depends on the agreement of the 70 concessionaires of the same amount of stands who along with the patronage of the charro-bullfighting festivities and the municipal authority define the participation in the construction tasks.

The intangible heritage is present in the traditional construction techniques, in the combined activities of the celebration to the Patron saint: the cavalcades, the parade, the bullfights and the concerts that are carried out inside and outside the bullring. These are all actions of the common consensus that emanate from the very tradition.

These two aspects of the monument have survived in spite of other deterioration threats, not only of the material aspect, the wood, the fibers and the mats, but also of its intangible cultural values that are some of the degraded expressions, because some participants of the parades and the concerts do not behave properly, putting in danger the quality of the show offered by La Petatera and of the traditional festivity and undermining the centennial tradition that sustains it.

The intangible cultural product of the town demeans, the municipal authorities have prohibited in several years the parade organized by the local taxi drivers associated to this festivity because it causes disorder and violence in the thoroughfare, putting in risk the security of the participants, the public and of the tourism. Another general threat and common to this universe of detachable monuments is, “the danger of falling in the instauration of homogenizing practices; or ignoring the intangible values of the heritage, what has propitiated the loss of the social ancestral behaviors, creating policies of change unaware to the idiosyncrasy of the social groups that bear that heritage.”<sup>6</sup>

Essentially, these are some of the reasons why La Petatera should be protected through the international Principles. The Principles could be a universal tool that can allow offer to the community guarantees on the conservation of the detachable architecture of heritage value of La Petatera of Villa de Alvarez and its management.

## **1. Observations to the document of the Principles that should rule the conservation of the historic timber structures adopted in 1999 and their impact in the detachable monuments.**

This text consists of introduction, 15 principles and 5 thematic items. No part of the text refers to detachable architecture, of handicraft production and associated to the intangible heritage. In this respect, the following observations are presented:

- 1) In the introduction paragraph can be seen the definition of the object of the regulatory scheme as, “all types of buildings or constructions wholly or partially in timber that have cultural significance”<sup>7</sup> the Principles refer to the category of monuments built in single time and forever, in which the author (s) does not intervene the monument again for its conservation, then the restorer observes, (he

<sup>4</sup> Collection in the year 2015, according to declarations the Major of Villa de Alvarez, Ignacio Lambada Torres (AFmedios, January 22 of 2015)

<sup>5</sup> Torres Garibay Luis Alberto. La Tradición de construcción con madera en la cultura purépecha p. 53 in Updating the Principles for the Preservation of Historic Timber Structures. ICOMOS International Wood Committee, INAH, ICOMOS México, Ayuntamiento de Guadalajara, Comité de Jalisco y Científico de Madera del ICOMOS Mexicano A.C. Amate Editorial. Guadalajara, First edition 2013. ISBN 978-607-507-290-6, pp 53

<sup>6</sup> Op. cit. pp. 43

makes the recognition of the work in the conscience, according to Brandi) he studies and interprets these works in the moment of their restoration; the Principles do not refer to the category of monuments that are reconstructed every year where the author(s) is who reconstructs it recurrently, and the very author(s), bearer of the ancestral “know-how”, deposits back the empiric “knowledge”, that is to say the tradition, in the development of the construction. There is no need of a restorer to study or to interpret what the official construction authors know to do, to conserve and to preserve the monument and they demonstrate it each year, that is to say that the construction craftsmen are the conservators and restorers par excellence of this category of monuments. In Japan, trades are studied in a formal way so that temples, palaces and the current rural architecture that need to be restored can be disassembled and reassembled by these official constructors who work with the conservators of the monument. Therefore, the phenomenology of the formulation and of the historical instances changes from one category to another and in consequence, also the technical requirements for their conservation. According to the Principles, in the first case, the actions of disassembly and reassembly should be limited and restricted, because they argue that these actions produce the loss of the original material, and the characteristics of the system and primeval assembly are altered; besides saying that the replacement of missing or decayed members to the long term transforms the original in replica. While the second case is the empiric know-how that gives place to the disassembly and reassembly as essential actions not only for their reformulation but for the conservation and restoration of the tradition that give them origin.

For that reason it is necessary to update the Principles that intend to be universal. The principles, in order to be universal, should contemplate both categories of monuments in their protection coverage.

The text of the Principles (1999) continues saying in the introductory postulates that “This way recognizes the importance from all periods”<sup>8</sup>, the text neither contemplates that the case under examination is about the present moment that gives occasion to the construction of the bullring, because La Petatera is built in six weeks for a period of use and finite life from February 6th to March 15th, that is the time the festivities last. Los Tablados of Yucatán is built during five weeks to be used from December 28th to January 7th, the time that the Holy Kings festivity lasts; as well as the plank stands of Oaxaca, where after the festivities the complete structure is dismantled and removed from the place for 10 months a year. When it is built, “the author” (each and every one of the participant construction craftsmen) are reformulating the cultural property, in its first instance, as the theorist Cesare Brandi would say<sup>9</sup>, the current moment of the construction exists as the tradition indicates, and it is this moment the one that gives place and occasion to both, the tangible and the intangible heritage, being this last one the constructive tradition, the intangible heritage that repeats each year with its real construction, lasting near 45 days, what gives as a result the ring of the bullring, that is to say, the architectural and tangible monument.

In the point of the importance of the times, the Principles recognize the monuments designed in the past and that with the time have accumulated historic instances, they manifest it this way. Their conservation requirements depend on the remaining material testimony that gives the rule to the restorer for his intervention proposal. Instead, the aforemen-

<sup>7</sup> Principles for the Preservation of Historic Timber Structures (1999) the whole paragraph of the document says: “The aim of this document is to define basic and universally applicable principles and practices for the protection and preservation of historic timber structures with due respect to their cultural significance. Historic timber structures refer here to all types of buildings or constructions wholly or partially in timber that have cultural significance or that are parts of a historic area.” <[www.icomos.org/charters/wood\\_sp.pdf](http://www.icomos.org/charters/wood_sp.pdf)> p.1

<sup>8</sup> Op cit. p.1

<sup>9</sup> According to Cesare Brandi, explains the historic instance, he says that the work of art enjoys a double historicity: On one side, the time and place of its creation. On the other side, the time and place in which it is in that moment. The intermediate period between the time when the work was created and the present time may have left a print in the work of art. This is what the author calls “the successive historic presents.” The same happens if we think on the place for which the work was created and that in which it is at the moment of the new perception in the conscience. “The historic instance not only refers to the first historicity, but also to the second.” Second: “The restoration should address to the reestablishment of the potential unit of the work of art, whenever this is possible without making an artistic falsification or a historic falsification, and without erasing any print of the course of the work of art through the time.”

tioned monument that is built now and tomorrow will be reconstructed, does not mind the past because this category of monument does not leave material testimonies of the past, to transmit them to the present, neither produces historic instances. The only past that this architecture can accumulate is 45 days, the length of time of the festivity; then it is totally dismantled without leaving traces in the place. Its conservation requirements are not deposited in its materiality but in the ancestral “know-how” of the construction craftsmen and under the social, environmental and political conditions of their moment, which may allow them to reconstruct it again with the whole wealth of their tradition, because it is indeed a live heritage.

The broadening of this principle not only allows to add this new category for timber monuments of temporary character to be protected, but rather it returns to the Principles, effectively universal until today, being this the updating exercise that occupies us. Returning to the text of the Principles (1999), when it refers to interventions, principle 5 establishes that traditional methods and techniques should be used for all the conservation works. In our case, the conservation of the bullring is given thanks to its reconstruction using the same traditional techniques and materials; there are parts of the bullring, poles and beams, that have been used for over forty years to build the bullring. Other elements can be enabled to substitute the missing or deteriorated parts. In the principle 6 the possibility opens up so that conservation may be carried out after a total process of disassembly, where the deteriorated parts are replaced by new and its subsequent reassembly and reconstruction. This part of the principles should add a special section to refer to the detachable architecture and its natural process of conservation-construction. Of equal way, principles 9, 10 and 12 in the final chapter of the repairs and substitution, intend to carry out the restorations and replacement of deteriorated parts using other new of the same wood and worked with the same traditional techniques and tools, aspects that are applicable to this category of monuments.

**Proposals to present in the round table at the 20th IIWC Symposium for the updating of the Principles for the Preservation of Historic Timber Structures to be held in April in Falun, Sweden.**

**Contribution and addenda** to the updating of the Principles to the text titled: General considerations and declaration of reasons for Updating the document: “Principles for the Preservation of Historic Timber Structures”, presented for its revision to the ICOMOS International Committee in the City of Florence, Italy in 2014.

Following are presented the addenda proposed to protect and to conserve the detachable architecture of traditional production and of temporary and recurrent presence:

1) In the section titled Structural conservation of today in its first paragraph says:

Paragraph 1º: Loadbearing structures in the buildings deserve the same care as a historical site of architectural, naturalistic and industrial interest or of the complete building that these structures keep standing. Their main values are the original configuration, as man's invention, the originality of the materials and their particular assembly, result of the skills and talent of the carpentry operators.

#### **Addendum 1º**

Paragraph after the 1º. Likewise are testimonies of the human genius the examples of detachable architecture which values should be recognized, not only of their materials, their constructive techniques and traditional materials, but of the nature of the very monument and the participation of the community of official assembly craftsmen who ensure their transmission to the future. These traditions traditional constructions are live and thanks to it their preservation to the future is still in hands of the own community.

2) In the part of the considerations in the section entitled Diversity in their paragraphs fourth and fifth where they say:

Paragraph 4º: “This vision of the problem concerning the conservation of the material refers to the original assembly of the members of the structure that is one of the values that is object of preservation. For this effect one should also point out that the assembly of a structure was enabled to work by the carpenters of its time, and this is the result of



their concepts of construction of a timber structure, it is the expression of their skill to build timber structures manually and to make their connections work; this is in other words, a precious material testimony, an essential component of authenticity in a wide sense.”

Paragraph 5° “On the other hand, one should remember that the way of assembling the members of a structure determines the nature of the internal constraints; this also means to lose considerable quantities of fragmented wood that would need therefore replacement. Generally speaking, hence, dismantling even with the sincere purpose of a following careful reassembling is a practice that should necessarily be avoided because it can damage some features of the system and in all the cases is very expensive.”

#### **Addendum 2°:**

Paragraph after the 4° and before the 5°. “However, timber architecture that by nature is detachable and is built with elements and with techniques to make of disassembly a regular practice deserves special attention. This architecture can be the result of associated social-religious traditions that in its case should be respected as part of the monument. In these cases, dismantling and reassembling constitute a correct and legitimate practice for its conservation, in which are recognized the skills and technical knowledge of the communities’ craftsmen who carry out these actions, with expertise, with experience and with the recognition granted to them by the own social group.

For the case, damaged elements that compose the structure can also be replaced by other new, worked with the traditional tools and techniques, as well as with the same timber species that are part of the constructive tradition of the dismantled monument. The essential objective of reassembling is not to fulfill the demands of the tradition exclusively, but rather this operation is the means for restoring the structure, that is to say, the conservation is executed through dismantling and reassembling the monument.

In the Final Text of the Principles for the Preservation of Historic Timber Structures the following is proposed:

In the part of the Preamble where it says that the Principles recognize, it says:

2° recognition: the Principles take into account the great diversity of historic timber structures,

#### **Addendum 3°**

It is added: ...with the same interest that for the timber structures that bear cultural and anthropological values built at present as a result of ancestral traditions and skills.

Principle 5 that says:

Repair operations on historic timber structures, including dismantling and reassembling, should follow the criteria of minimum intervention capable of ensuring the survival of the structure, saving as much as possible their authenticity and integrity, and allowing them to continue to perform their function in conditions of safety.

Replacement of damaged members or parts of them with new timber is a practice to be used only when the repair of the original parts is not possible or when this is considered unfeasible or futile. In any case replacements should be made with respect to the relevant and inherent values.

#### **Addendum 4°**

It is added:

Likewise are recognized the cases in which the nature of the monument requires dismantling as part of its repetitive life cycle; this operation might be carried out totally or partially in agreement with the live traditional techniques of the different cultures and will be carried out with the available traditional constructive materials that in any event should be respected.

In Principle 8 in the second paragraph where it says: Replacement of pieces or members should preferably be made of the same species of wood with the same, or, if appropriate, with better, grading as in the members being replaced. Where possible, this should also include similar natural characteristics. The moisture content and other physical characteristics of the replacement timber should be compati-



ble with the existing structure. Craftsmanship and construction technology, including the use of dressing tools or machinery and other elements, should agree with those used originally.

#### Addendum 5°

It is added:

Replacement of parts should preferably be made of the same species of wood with the same, or, if appropriate, with better grading as in the members being replaced, whenever these restitutions are integrated as required by the tradition and the empiric skills to the structural unit to which belong.



Fig. 8 Dismantling-conservation of the Hiari private palace in Kyoto



Fig 9 Hiari Palace in Kyoto



Fig. 10 Reformulation-conservation of the stands of Tizimin, Yucatán



Fig. 11 Los Tablados bullring in Tizimin Yucatán.

## Conclusions

To conclude, I retake the recent declarations of the Japanese ICOMOS Committee expressed in an official statement titled “Comment on the revision of the Principles for the Preservation of Historic Timber Structures” signed by Yukio Nishimura, president of that committee.

In this letter addressed to the ICOMOS International Secretariat, we make comments to the aforementioned text titled “General considerations and statement of reasons for updating the document: “Principles for the Preservation of Historic Timber Structures”, presented in Florence, Italy in 2014, declaring against what is outlined there: “the actions of disassembling and reassembling should be minimized to

the maximum in the interventions of architectural monuments built with wood” as well as to the concept that the gradual substitution of deteriorated parts of a monument transform it into a replica. The Japanese ICOMOS declares that these stances are inadequate, because they disrespect the traditions of the Asian countries, where disassembly and reassembly actions are practiced as regular operations of maintenance and conservation of monuments and in which the replacement of missing and substitution of deteriorated elements using the traditional techniques and wood constitutes an act of authenticity regarding the intervened monument, according to that agreed in Nara in 1994.<sup>10</sup>

Evidently, the aforementioned document of the General Considerations and the Principles presented in Florence in 2014 lacks of universal contents; for that reason it has been proposed to the addenda, in order to be closer to a global document, broaden its horizons and considerations<sup>11</sup> to the timber heritage of peoples with diverse cultures as the American and Asian. “Cultural and natural heritage should be valued under conditions that favor the preservation of their elements, conditions, habits and traditions. In such a sense, in the tradition of timber construction are present the tangible values that demonstrate the skill of the craftsmen that have achieved its material concretion, but many other aspects are also present, which affect the intangible values. Through the direct reading of the examples of architecture it is possible to discover the tradition of organizing for the work, the procedures followed for the correct elaboration of the diverse components of the constructions, the skills and uses acquired in the handling of the tools and many other aspects that are present permanently.”<sup>12</sup> Based on the postulates 6 and 13 of the Nara Charter, it is proposed the inclusion of the detachable architecture, product of live ancestral

traditions and of temporary and recurrent permanency, heritage that conjugates aspects of tangible and intangible heritage that should be respected.

The updated Principles should respect the cultural diversity to assist the architectural heritage, to adopt all the possible levels of intervention that are based on the plurality of the tradition that is intangible heritage of each people. These heritage examples are the detachable and recurrent architecture of the rings of La Petatera of Villa de Alvarez in Colima and the stands of Tizimín in Yucatán, as well as the stands of Oaxaca and the Purépecha trojes of Michoacán that are built each year for cultural expressions within the greatest community participation of the Mexican towns that constitute the great mosaic of the tangible and intangible cultural heritage of Mexico. Besides the ancestral examples of Asian detachable architecture that are temples and palaces and yet of some examples of current vernacular architecture.



Fig. 12 Removal of materials and dismantling of the Himeji-jo Palace in Himeji Japan

<sup>10</sup> Postulate 13. Depending on the nature of the cultural heritage, its cultural context, and its evolution through time, authenticity judgements may be linked to the worth of a great variety of sources of information. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other internal and external factors. The use of these sources permits elaboration of the specific artistic, historic, social, and scientific dimensions of the cultural heritage being examined.

The Nara Document on Authenticity was drafted by the 45 participants at the Nara Conference on Authenticity in Relation to the World Heritage Convention, held at Nara, Japan, from 1-6 November 1993, at the invitation of the Agency for Cultural Affairs (Government of Japan) and the Nara Prefecture. The Agency organized the Nara Conference in cooperation with UNESCO, ICCROM and ICOMOS. This final version of the Nara Document has been edited by the general rapporteurs of the Nara Conference, Mr. Raymond Lemaire and Mr. Herb Stovel.

<sup>11</sup> Postulate 6. Cultural heritage diversity exists in time and space, and demands respect for other cultures and all aspects of their belief systems. In cases where cultural values appear to be in conflict, respect for cultural diversity demands acknowledgment of the legitimacy of the cultural values of all parties. Nara Charter, 1994.

<sup>12</sup> Torres, Op cit. pp 53





Fig. 13 Process of replacing missing members in the reassembling of elements on the palace's roof



Fig. 14 Process of dismantling of La Petatera at the end of the festivities.



Fig. 15 Removal of materials and dismantling of La Petatera.

The protection expectancy of these monuments increases as long as there are guidelines that pursue the protection at international, national, state and municipal level to protect this heritage. To apply these principles, it is required fundamentally to design the management model to the medium term to equally regulate their use and protection, and to link all the responsible actors, authorities, community and promoters, since we agree with Dr. Gómez Arriola "the recognition of the intangible values bound to the material property makes feasible the existence of the motor or stimulus to ensure its transmission to the future on behalf of the proprietors, or users. When there is not a clear and direct linking between the possessor, or the bearer with the intangible values or meaning of the tangible cultural property, the chain that connects them to the past, to the present and the future and that allows to justify its permanency gets broken. Cultural property without a collective recognition to their significance, necessarily intangible, will be, almost without exception, condemned to its gradual disappearance."<sup>13</sup>

## Bibliography:

1. Nara Charter, 1994 <ipce.mcu.es/pdfs/1994\_Document\_Nara.pdf>
2. Venice Charter, 1964 [www.icomos.org/charters/venice\\_sp.pdf](http://www.icomos.org/charters/venice_sp.pdf).
3. Cesare Brandi. Teoría de la Restauración. Alianza Editorial 2008. ISBN 9788420641386
4. [Congresocol.gob.mx/...DECRETO%2052,27%20520%ENE%202016.doc](http://Congresocol.gob.mx/...DECRETO%2052,27%20520%ENE%202016.doc) consulted
5. Gennaro Tampone. "Consideraciones Generales y declaración de las razones para la actualización del documento "Principles for the Preservation of Historic Timber Structures" Florence, 2014. Author's typed text, submitted by him by Internet to all the members of the IIWC in August of 2015.
6. Gómez Arriola Luis Ignacio. *La pervivencia de Técnicas tradicionales del Trabajo en madera en México*. In Gennaro Tampone y Zepeda Martínez María de Guadalupe, compilers. *Updating the Principles for the Preservation of Historic Timber Structures*. ICOMOS International Wood

<sup>13</sup> Gómez Arriola, Luis Ignacio. *La Pervivencia de Técnicas tradicionales del Trabajo de Madera en México* en Tampone Gennaro y Zepeda Martínez María de Guadalupe compiladores. *Updating the Principles for preservation of Historic timber Structures*. ICOMOS International Wood Committee, INAH, ICOMOS México, Ayuntamiento de Guadalajara, Comité de Jalisco y Científico de Madera del ICOMOS Mexicano A.C. Amate Editorial. Guadalajara, First edition 2013. ISBN 978-607-507-290-6, pp 53

- Committee, INAH, ICOMOS México, Ayuntamiento de Guadalajara, Comité de Jalisco y Científico de Madera del ICOMOS Mexicano A.C. Amate Editorial. Guadalajara, First edition 2013. ISBN 978-607-507-290-6, pp 106
7. "Principles que deben regir la conservación de las estructuras históricas en Madera (1999) <[www.icomos.org/charters/wood\\_sp.pdf](http://www.icomos.org/charters/wood_sp.pdf)>
8. La Petatera. Villa de Alvarez Colima- <YouTube.<https://www.youtube.com/watch?v=Zw6udoVHJpw>>
9. Torres Garibay, Luis Alberto. *La Tradición de construcción con madera en la cultura purépecha* p. 53 in Gennaro Tampone and Zepeda Martínez María de Guadalupe, compilers. *Updating the Principles for preservation of Historic timber Structures*. ICOMOS International Wood Committee, INAH, ICOMOS México, Ayuntamiento de Guadalajara, Comité de Jalisco y Científico de Madera del ICOMOS Mexicano A.C. Amate Editorial. Guadalajara, First edition 2013. ISBN 978-607-507-290-6, pp 53
10. [www.villadealvarez.gob.mx/data/normatividad/1355935135.pdf](http://www.villadealvarez.gob.mx/data/normatividad/1355935135.pdf) consulted on March 3 of 2016
11. [www.inafed.gob.mx/enciclopedia/EMMo6colima/.../o6o10a.html](http://www.inafed.gob.mx/enciclopedia/EMMo6colima/.../o6o10a.html) consulted on March 3 of 2016
12. Yukio Nishimura. "Comment on the revision of the Principles for the Conservation of Historic Timber Structures" Author's typed Document, submitted by her to the ICOMOS International Wood Committee in August 7 of 2015.

# Towards a wooden heritage conservation theory in Spain

**Mikel LANDA and  
Alazne OCHANDIANO**

Each construction material has its own physical properties that condition its use in architecture. Choice on which material to use is also based in availability and economy. Traditional architecture in Spain has been built for centuries mainly with the use of stone and wood, but the use of brick and adobe is also relevant.

Industrial revolution brought new materials and with them new techniques that gradually relegated the use of classical materials. Technology associated to steel first, and then concrete, involved the beginning of a new collection of materials and techniques that still keep being incorporated to the architect's palette.

However, there is one material that has been used since the beginning of architecture and has been able to keep its validity in modern architecture, and this material is wood. Despite the evident crisis that affected its use in the mid-20th century, today its use is recovering.

The same properties that make wood attractive for being used in contemporary architecture are those that made it attractive for building in the past. Most of Spanish heritage has been built combining stone or brick with wood.

Before being cut down, wood has had to bear compression and tension efforts due to the tree's weight and to the action of wind. As a consequence, its capacity to support bending efforts combined with its low density have made it suitable for floors and roofs. In those cases, most elements support bending efforts and some of them tension efforts. Stone and masonry are used for compressed elements such as walls, arches or vaults.

Together with these properties, wood has specific characteristics that have conditioned the architecture while affect to its future preservation. Among those are anisotropy, hygroscopicity and durability.

In order to build with wood, two basic features are needed: wooden elements and a way to join them. The capacity to join wooden elements affects to the capacity to create architecture. Apart from more recent methods such as glued joints, wood elements may be connected by tying, joining and nailing. The most common, but not the only, used to create our historic architecture are the wooden joints.

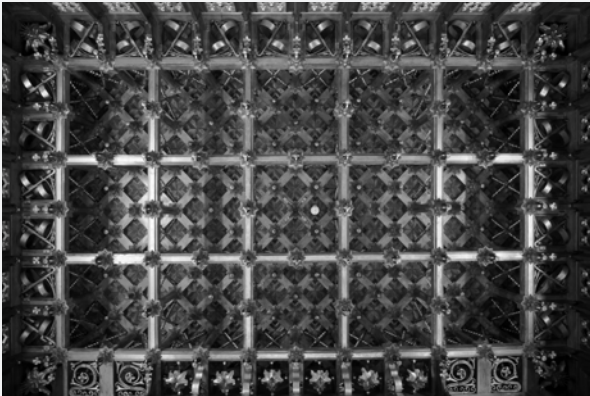


Benin-Ganvié-Pile Dwellings

As joining consists in removing material from two or more wooden elements to make them fit, loads are transmitted along the contact planes and this fact conditions the structural behaviour of the joints. Our traditional joints have almost no capacity or none at all, to resist moments. This fact results in isostatic structures, and stability has thus, to be achieved by using triangulation or by combining wooden structures with masonry. This fact is also relevant regarding to heritage preservation.

<sup>1</sup> De Llano, P. (2006). *Arquitectura popular en Galicia*. A Coruña: Xerais.

Wood has been widely used in Spanish architecture. The Palloza still can be found in Galicia and is one of the most primitive constructions still active in Europe<sup>1</sup>. Wood that is tied with ropes is placed on top of circular stone walls to create its roofs. More usual is the case of wood used for floor structures composed by beams and joists varying their complexity from the simplest beam and plank solution to the complex decorated coffered ceilings. A case of sophistication in coffered ceiling design is Gaudí's Güell Palace in Barcelona.

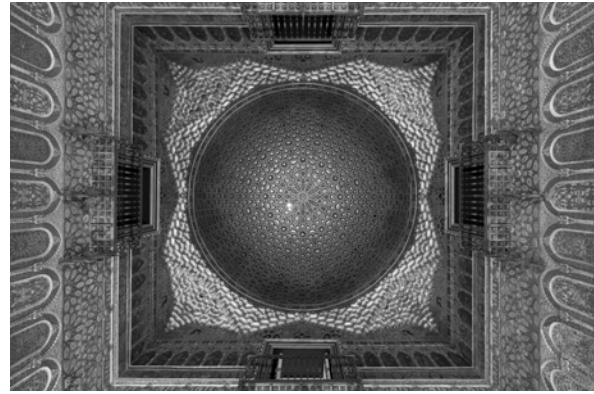


Spain-Barcelona-Palau Güell

For centuries a particular system of structural interlaced carpentry was developed in large regions of Spain, whose main characteristic is the strict integration of complex geometric decoration with structure. It gained complexity gradually and reached a first step of prefabrication with the incorporation of a double hip rafter (moamar)<sup>2</sup>. Sophistication reached its utmost level with the creation of wooden domes where ten-pointed<sup>3</sup> star geometric pattern design was adapted to the spherical surface. The highest degree<sup>4</sup> on carpentry mastering could only be reached by demonstrating the capacity to design and build one of those interlaced wooden domes. Good examples are the domes covering the Ambassadors chamber in the Royal Alcazar of Sevilla and the stairs of the House of Pilate.

<sup>2</sup> "La primera sutileza que incorpora la capintería española, y que va a permitir su gran desarrollo, es el desdoblamiento de las limas (Limas moamares), lo que posibilita la prefabricación de la armadura por paños, simplificando su montaje." Nuere, E. (1989). La carpintería de armar española. Madrid: Ministerio de Cultura. Dirección General de Bellas Artes y Archivos, p. 68.

<sup>3</sup> "El trazado de diez lefe es aquel que está compuesto exclusivamente por ruedas de diez." Nuere, E. (2001). Nuevo tratado de la Carpintería de lo



Spain-Seville-Real Alcazar. Wooden dome

Another case that deserves to be mentioned is the architecture of the wooden churches in the Basque Country. Located in a small area, there is a wide variety of designs and solutions for vaults<sup>5</sup>, domes and roofs, as a consequence of a long tradition in building with wood.



Spain- Basque Country-La Antigua church

However, the use of wood is not limited to monumental architecture, and in most of the centres in cities and villages, architecture is made with a combination of wood and stone. Nonetheless, and despite being a country with a long tradition in building with wood, with an extraordinary richness in heritage and a long tradition in its preservation, the relation of professionals on heritage preservation with wood is still not normalized.

Blanco. Y la verdadera historia de Enrique Garavato Carpintero de lo Blanco y Maestro del Oficio. Madrid: Munilla-Lería, p.65.

<sup>4</sup> "Para alcanzar el máximo grado del oficio, era imprescindible, saber hacer amén de una "quadra de mocárabes", una "quadra de media naranja de lazo lefe". Nuere, E. (1990). La Carpintería de Lazo. Lectura dibujada del manuscrito de Fray Andrés de San Miguel. Málaga: COAAO Delegación de Málaga, p. 286.



The Venice Charter issued in 1964, sets the theoretical principles for the conservation and restoration of monuments and sites. From the very beginning, the charter was seen as focused in the preservation of stone buildings<sup>6</sup> and responding to a Eurocentric mentality. Such a mentality fits with the Spanish tradition in heritage preservation, and might be the reason why most professionals in our country don't feel the need to explore further, in a territory that apparently is not of any use in their professional practice.

In 1987 Knut Einar Larsen was invited to visit Japan and have a close view of the Japanese tradition on heritage preservation. As a result he wrote in 1994 the book *Architectural Preservation in Japan*<sup>7</sup> that is key to understand the Nara Conference on Authenticity, and the resulting Nara Document on Authenticity issued that same year. The book starts with the following question: *"do historic buildings made of wood behave differently from buildings made of more durable materials so that the internationally accepted preservation doctrine is less relevant?"* The answer resides in the content and existence itself of the Nara Document on Authenticity.

Being Spain a country with a large number of professionals and institutions devoted to heritage preservation, wood is in fact considered as secondary and professionals devoted to its preservation a minority. This situation implies a gradual loss of wooden heritage as result of the prevailing *"practice on restoration that might be very conservative when intervening in walls while very prone to substitution regarding to old wooden structures."*<sup>8</sup>

Responding to the question posed by Larsen in his book, the preservation of wooden heritage has needed the Nara Document on Authenticity to feel comfortable in the ambit of International Charters. Conceived in the spirit of the Charter of Venice<sup>9</sup>, it introduces the concepts of cultural heritage diversity<sup>10</sup> and cultural context<sup>11</sup>.

In the case of wood and due to its specific features, solutions for its preservation have to be specific both regarding to theory and techniques. In that

context, the IIWC issued the "principles" document<sup>12</sup> in 1999. The approaches set in the document are general and following the spirit of Nara have to be adapted to each cultural context. In fact there is no single way, but several approaches that have to be accepted in order to reach a global vision of the issues related with wooden heritage preservation<sup>13</sup>. The 1999 document is now in revision and the complexity drawing up such a general document resides in attaining the establishment of a framework that comprises every culture and approach without resulting too ambiguous.

Preservation of wooden heritage comprises extremely opposite approaches. One of them might be represented by an Italian philosophy that understands *"minimum intervention"* as the preservation of the actual condition of wood without any alteration, even avoiding the recovery of its structural function. In this case, another structure, e.g. metallic, takes on the load bearing function.

The opposite interpretation of the same *"minimum intervention"* concept might be the Japanese approach of disassembling and reassembling a wooden heritage property. As an example, the Kokawa-dera<sup>14</sup> door in Kokawa. Intervention comprises a comprehensive research, including historic-structural diagnosis and the repair and replacement of damaged members. The purpose of this process is also to preserve as much of the original material as possible.

The 1999 *"principles for the preservation of historic timber structures"* are the unified theoretical basis of the IIWC and involve the version that represents the prevailing vision of the experts on wooden heritage preservation of the world. Both examples mentioned above, are the result of different interpretations of the *"minimum intervention"* principle conceived each one in a specific cultural context. Such different approaches are but two of many possible, and show how every concept stated in the "principles" can be a subject of discussion.

<sup>10</sup> Ibid. art. 6.

<sup>11</sup> Ibid. art.11.

<sup>12</sup> IIWC. (1999). Principles for the preservation of historic timber structures. Mexico: ICOMOS.

<sup>13</sup> *"We have come to realise that there is in fact no single way, but rather several approaches which must be accepted..."* Larsen, K. E., & Marstein, N. (2000). Conservation of Historic Timber Structures. An ecological approach. Bath: Butterworth-Heinemann, p. IX.

<sup>14</sup> Henrichsen, C. (2003a). *Historische Holzarchitektur in Japan*. Stuttgart: Konrad Theiss verlag.

<sup>6</sup> Stipe, R. (1990). A quarter of a Century. Symposium sub-theme The Venice Charter. 9th General Assembly and International Symposium (pág. 407). Lausanne: ICOMOS-Switzerland, pp. 407-424.

<sup>7</sup> Larsen, K. E. (1994). *Architectural Preservation in Japan*. Trondheim: Tapir publishers.

<sup>8</sup> Santana, A. Op.cit, p. 56.

<sup>9</sup> ICOMOS. (1994). The Nara Document on Authenticity. Nara, Japan. Art. 2.

In such a context it seems reasonable to create a debate that will help lay down a preservation theory in Spain adapted to our cultural context and being compatible with the prevailing general theory on heritage preservation. It also seems reasonable to incorporate that specific approach to the IIRC discussions in order to enrich the necessary debate.

## Towards a theory of wood heritage preservation. Material authenticity

Along time, approaches regarding to wooden heritage preservation have evolved. Intervention criteria today are different to those prevailing in the 19th century, and techniques have also evolved. Similarly, evolution<sup>15</sup> of the society itself as well as economic and cultural factors affect to preservation.

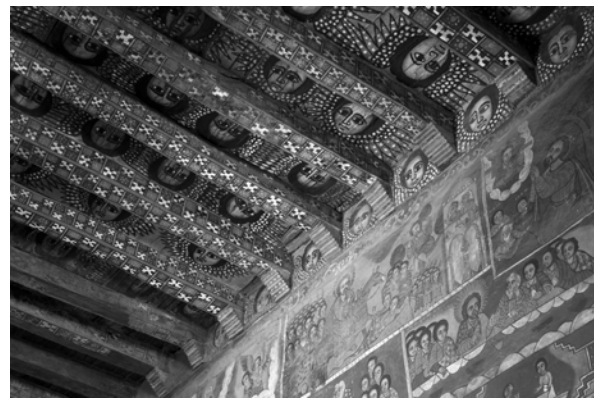
The main goal in preservation and conservation is to maintain the historical authenticity and integrity of cultural heritage, as stated in the 1999 principles. Among the many definitions of integrity and authenticity, we have chosen the following: “integrity refers to the process of identification of all the elements that together define the significance of the property; Authenticity instead refers to the qualification of such elements in terms of their truthfulness and credibility”<sup>16</sup>.

Material authenticity is related with truthfulness and credibility of the materials that form it, of all of those materials. We understand that in the stone fabric, all the material together with the historical alterations are important, and thus, have to be understood as pages of a book that transmits the history of the building, and as a consequence respected. Accordingly, we also have to understand that part of the material authenticity of the property resides in its wooden frames.



Spain-Navarra-Donamaría medieval tower

Similarly to the stone fabric, when preserving wooden architecture a comprehensive diagnosis is needed aimed to understand not only its actual conditions but historical, constructive aspects and the relations with other materials. The more we want to keep to the minimum intervention idea, the more comprehensive will have to be the research and diagnosis of the wooden fabric. This includes every wooden element be it part of the structure, walls, partitions, decoration, and furniture, including joinery, carvings and paintings. This idea is present in the discussions of the updating of the principles and could be enunciated as follows: “...to do so one should preserve as far as possible in all its credibility, every element qualifying the significance of the property”.



Ethiopia. Debre Birham Selassie Church-Gondar

## The structural function

In the above definition of integrity, the word “elements” refers both to tangible and intangible. Therefore, both the materiality of the wooden frames and their function are included, and in the case of a structure, its function is resistant. It is thus relevant that the preservation of a structural wooden construction includes every effort necessary to maintain its resistant function.

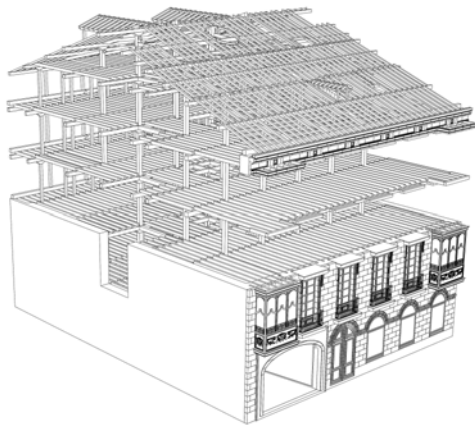
As stated above, wooden joints in our cultural environment have limited or no capacity at all to support moments, and as a consequence wooden structures are isostatic. One of the features of isostatic

<sup>15</sup> ICOMOS. (2014). Nara+20. On Heritage practices, cultural values and the concept of authenticity. Nara: ICOMOS.

<sup>16</sup> ICOMOS. (2013). Revisiting Conservation Philosophy of Wooden Structures: Restoration Methodology and Philosophy of Conservation of Wooden Structures. Nara, Japan.



wooden structures is that each element is independent from surrounding elements and their relation is through force transmitting planes. Thus, one element belonging to a frame can be repaired or replaced without altering the structural functionality of the ensemble.



Urban house. Vitoria-Gasteiz

This attribute enables to focus the issues related with built heritage preservation with very different scopes, as might be the single element, a part of the structure or the construction as a whole. Similarly, any intervention in a wooden structure should keep the relation among single elements without altering the structural function of each one of them. Provisos to this assertion might be considered when the preservation of the structural function implies corrections<sup>15</sup> to the original frame due to pathologies or changes in the load path.

Like any construction, wooden structures suffer deformations that might appear in individual elements (e.g. bending of a beam) or larger parts as loss of verticality in facades. Deformations in the wooden structure might be the consequence and even the origin of deformation in other parts as the stone or brick fabric. Except when stability is compromised, an artificial alteration of those deformations should be avoided.

<sup>15</sup> ICOMOS. (2014). Nara+20. On Heritage practices, cultural values and the concept of authenticity. Nara: ICOMOS.

<sup>16</sup> ICOMOS. (2013). Revisiting Conservation Philosophy of Wooden Structures: Restoration Methodology and Philosophy of Conservation of Wooden Structures. Nara, Japan.

<sup>17</sup> Yeomans, D. (2003). *The Repair of Historic Timber Structures*. London: Thomas Telford Publishing, p.131.

## To intervene

Wood heritage preservation is not different to any other material regarding to the need of documentation, previous studies, diagnosis and multidisciplinary approach. In order to achieve the maximum material<sup>18</sup> preservation, a comprehensive diagnosis<sup>19</sup> of the wooden structure will be required.

The purpose of any wood heritage preservation works should include the material conservation if possible, of every timber element on the construction. However frequently, the conservator has to intervene in the wooden frame. Pathologies might reduce functionality, for instance, structural, of an element, set of elements or structure. The intervention in that case should be aimed to recover that said functionality. In Knut Einar Larsen's words, "*repair is a painstaking intervention in the historic fabric, aiming at replacing only decayed parts and otherwise leaving the structure and the materials intact*".<sup>20</sup> In the case of a fabric suffering loss of resistance, we will define **repair** as all the actions aimed to recover the lost structural efficiency of a wooden element or frame. If the pathology results in deformations that endanger the stability, repair could be defined as those actions aimed to recover a secure geometry for the structure with the minimal alteration of the actual shape.

It might result that even if the structure has not suffered any loss of efficiency, it is still necessary to intervene. Spain is a country with a rich and diverse heritage. A change of use is frequently implemented with the purpose of preserving the building. One of the consequences<sup>21</sup> of the change of use is an increase in loads affecting to the structure. Under these conditions it might be that the structure is not capable to resist the new conditions, forcing the conservator to intervene in order to increase the structural efficiency. We will define thus, to **reinforce** as the actions aimed to increase the structural efficiency of an element, ensemble of elements or a structure, adapting them to the new conditions.

<sup>18</sup> "Creemos que comprender la estructura de madera como un conjunto y conservar cada elemento de madera y mantener su función estructural ayuda a mantener su autenticidad histórica y su integridad patrimonial." Landa, M., & Ochandiano, A. (2015b). Recuperación del mecanismo basculante del patio de butacas del Teatro Palacio Valdés. Avilés. papeles del portal. *Revista de Restauración Monumental* (7), p.191.

<sup>19</sup> Laner, F. (2011). *Il restauro delle strutture di legno*. Palermo: Grafill.

<sup>20</sup> Larsen, K. E. *Op.cit*, p. 5.

<sup>21</sup> Henrichsen, C. (2003b). *Reparaturen und statische Sicherungen an historischen Holzkonstruktionen*. Stuttgart: Konrad Theiss verlag.



Spain-Navarra-Condestable palace

When none of the former interventions is viable, replacement might be the last solution. Four are thus, the intervention modes available in a wooden frame: maintenance, repair, reinforcement and replacement.

## Intervention techniques

Wooden architecture is diverse, as diverse are the climates, cultures, traditions, tools, techniques and species that affect it. Having specific features that differentiate it from the rest, the knowledge required to intervene in wooden heritage has also to be specific. Accordingly intervention techniques are also specific. Being true that techniques have to be dependent on the project<sup>22</sup>, it is also true that they have to be mastered to be able to design freely. Lack of knowledge about the material, the architecture built with it and the intervention techniques result in a dramatic loss of wooden heritage. Whoever masters the preservation theory but not the techniques will be unable to accomplish his ideals, risking using his theoretical knowledge to justify the loss of heritage. Otherwise, whoever masters the techniques but not the theory might solve specific issues without knowing the adequacy of the techniques or the approaches implemented.

The 20th century crisis that dramatically reduced the use of wood in our country led to a dramatic loss on knowledge. However, much of the knowledge needed to the preservation of heritage resides in tradition. The recovery of craftsmanship is thus crucial.

<sup>22</sup> "Ma condivisibile credo sia il concetto che le tecniche siano in subordine al progetto." Laner, F. (2005). *Tecnologia del recupero delle strutture lignee*. Verona: Peter Cox.

Although not usual in our country, basing the preservation techniques on carpentry and traditional techniques is the usual way in other countries with a wider wooden tradition. "The need to use modern materials in repair work may also result from the lack of competent craftsmen"<sup>23</sup>. This lack of knowledge affects to the whole ensemble of actors involved in the process, including architects.

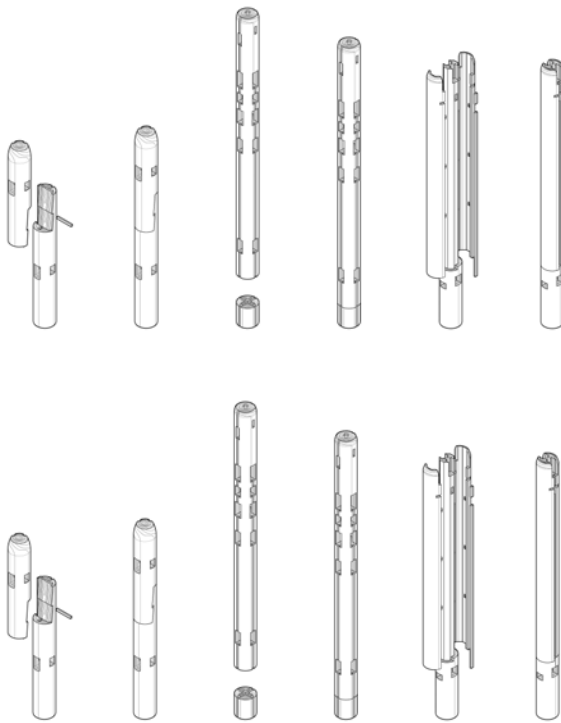


Norway-Old Kleppe farm.repair of logs with grafts

Nevertheless, the best way to face wood heritage preservation is by using techniques based on wood to repair or reinforce wood. For centuries, Japanese carpenters have repaired wooden structures cutting out the damaged parts, replacing them with wood and joining both parts with joints, respecting thus, the most of the original structure<sup>24</sup>. Although not systematized nor organized, there is a large catalogue of solutions spread in many countries, valid to face an extensive collection of pathologies of wood. Of those, many are based on the use of traditional joinery while others have been designed anew but derived from traditional joinery adapted to specific requirements. There are some solutions with the same origin that have been designed anew to perform maximal structural efficiency. The logical name for them all is **grafts**.

<sup>23</sup> Larsen, K. E., & Marstein, N. Op.cit, p.5.

<sup>24</sup> Hyunjung, C. (2011). *A study on the members of Historic Wooden Architecture, Conservation Methods and Repair Techniques*. Tokio: Tesis Doctoral.



Japan. Repair of wooden elements with grafts

We might define a graft as a repair or reinforcement carried out in a wooden structural element with the only use of wood and joining both parts with joinery, fasteners, glue or a combination of them.



Italy. Venezia. L'Arsenale. Repair of a tie beam with a graft

The 1999 principles state that “any proposed intervention should for preference follow traditional means”. Being limited the capacity of traditional joinery to solve structural issues in different situations to those that fuelled the original design, variations of those originals should be considered, namely those

based on them and aimed to be executed with wood. Solutions based in the efficiency of other materials and techniques alien to wood should be considered once the former are discarded.



Spain. Aviles-Palacio Valdes theater. Repair of mobile structure. Grafts

The different behaviour of alien materials and techniques might result in pathologies. Their use should be the result of a thoroughful research about the adequacy of those techniques and materials to the specific case. The name of these solutions: **prosthesis**.

All the above implies the availability of wood of the same species, quality, moisture and dimensions as the original. It also presupposes the existence of carpenters that should be used to traditional carpentry and heritage preservation techniques. Finally, it presupposes the existence of professionals of every discipline and especially architects with knowledge of the material, traditional architecture, preservation theory and techniques.

# The Current Principles for the Preservation of Historic Wooden Monuments in Japan

*Alejandro Martínez*

## 1. The Development and Current Practice for the Conservation of Wooden Monuments in Japan

Timber remained the main construction material in Japan until the modern era, and together with building techniques, repair techniques developed through centuries. The climatic conditions in Japan, with mild temperatures, large rainfall and high humidity are ideal for wood attacking insects and fungi. In addition, Japan is prone to natural disasters such as earthquakes and typhoons. Nevertheless, ancient timber structures were kept and maintained through periodic repair and maintenance, and timber structures as much as 1300 years old are still standing in Japan today.



Fig.1 Main Hall of Todaiji Temple, condition before the repair works in 1891.



Fig.2 Japanese carpenters at work, Kasuga Gongen Kenki, 1309.

Traditionally, carpenters repaired the structures by replacing rotten or damaged timbers by new ones. Partially damaged members were often reshaped and reused in a different position. In the case of large section members, the damaged part would be cut out and spliced with new wood without substituting the whole element. Pillar bottoms, which are vulnerable to rot because of humidity, were commonly repaired this way. When the extent of the damage required it (approximately every 150-300 years), a major repair through partial dismantlement and reassembly was carried out, especially in the roof structure. The Japanese building system, based on posts and beams joined with woodwork joints, allows for a relatively easy dismantlement with minimal loss of material. Complete dismantlement of buildings to transport the parts and reassembly them in a different location was also a common practice. However, even after going through several repairs, since the damage to the building is usually localized in the roof, eaves, pillar bottoms and outside members, in many cases most of the main structural members remained original throughout the centuries.

The first law for the protection of cultural heritage buildings in Japan was enacted in 1897. From then, ancient wooden structures were conserved as national monuments. The figure of the conservation architect appeared, and started to play a significant role in combination with that of the master carpenter. The result was the development of a new approach to the repair of ancient buildings. The Japanese method for the preservation of wooden monuments further evolved throughout the 20th century to become a highly specialized operation with a scientific and systematic approach.

The main features of the current methodology for the conservation of wooden monuments in Japan are:

- a) Respect for the original material. In the repair of timber structures, as much as possible of the old



material is reused. Damaged members are repaired by splicing decayed parts with new timber. Small section timbers and heavily damaged elements, which traditionally would be replaced, are also repaired through this method, and complete replacement is limited to extremely damaged members. This kind of repair is possible thanks to specialized carpentry techniques, used in combination with modern technologies such as epoxy resins. In addition, elements that had to be replaced are stored if they have documental value, and discarded timbers are usually stored in the roof.

b) Preference for traditional techniques. Priority is given to repairs through traditional tools and techniques; and any new members or parts of members are dressed using tools and techniques that match the original ones.

c) Thorough research and survey of the structure. During the repair work, a careful survey of the traces left on the wooden members, such as nail holes, carpenter's marks, traces of previous joints, and traces left by dressing tools, is carried out by the conservation architect. This allows to identify the building tools and techniques that were originally used, the original design and subsequent alternations, and the construction history of the building.

d) Systematic documentation. Starting from 1930, a thorough report including measured drawings, photographs, the result of the research and survey, and a detailed description of the works that had been carried out is published. The reports follow a standardized format, and the budget for writing and publishing them is included in the overall repair budget. 300 copies of each report are distributed to all major public libraries and universities, and made available to researches and the general public. Up to date, over 2000 of these reports have been published.

The type of repair which is carried out is determined by the extent of damage. In buildings where the roofing is made of vegetal materials, such as thatch and cypress bark, a reroofing must be carried out every 20-30 years. When the damage is extended to the eaves and outside elements a partial repair of the decayed members is carried out. Sometimes partial repairs require jacking up the whole structure in order to replace decayed pillar bottoms or reinforce the foundation. If the damage affects most of the roof structure, a

partial dismantling is carried out in order to repair and replace the decayed elements. If the extent of the damage is generalized, affecting main structural members, and compromising the structural safety of the building, a thorough repair through complete dismantling and reassembly is carried out. In the case of repairs through partial or complete dismantling, the high difficulty of the operations requires the conservation architect to work permanently on site, establishing a temporary office next to the repaired building for the duration of the works and following closely the whole process. Conservation architects and carpenters receive a specific training and are licensed by the government.

## 2. The 1999 Principles for the Conservation of Historic Timber Structures and the Japanese Practice

The first proposal of the 1999 Principles for the Conservation of Historic Timber Structures was drafted by the then president of the ICOMOS International Wood Committee Nils Marstein and secretary general Knut Einar Larsen in January 1994. Written a few months before the Nara Document on Authenticity, their proposal is an inclusive document that shows deep recognition for the concept of cultural diversity.



Fig.3 The members of the ICOMOS Wood Committee having tea during the Himeji meeting, May 1994. In the center, Dr. Ito Nobuo (left) and Dr. Knut Einar Larsen (right). (Photo provided by Dr. Knut Einar Larsen).



Fig.4 Different kinds of repairs of rafters made by splicing damaged timber with new wood, Rin'oji Temple, 2015. The date of the repair is burnt into the new.

At the invitation of Nobuo Ito, Japanese member of the IIRC, Larsen had spent one year (1989-1990) in Japan studying the Japanese conservation method of wooden structures. The results of this study were published under the title *Architectural Preservation in Japan* (1994).

Although the 1999 charter was based on several previous documents, many of the principles included in it match those of the standard Japanese practice. It is possible to infer that, through Larsen's and Ito's work, the Japanese conservation method had a significant influence in the writing of this document.

This influence is especially notorious regarding the preference for traditional repair methodologies. Article 9 prescribes that *"If a part of a member is replaced, traditional woodwork joints should, if appropriate and compatible with structural requirements, be used to splice the new and the existing part."* This is also the standard in Japanese conservation practice, where while modern repair technologies such as epoxy resins, carbon fibers and steel reinforcements are also employed, splicing damaged members with new timber through traditional carpentry techniques remains the main method of repair. The new timber employed in the repair meets the requirement of the charter of "being made of the same species of wood with the same, or, if appropriate, with better, grading as in the members being replaced."

The recommendation that *"craftsmanship and construction technology, including the use of dressing tools or machinery, should, where possible, correspond with those used originally"* is also followed in the Japanese methodology. A careful research of traces present in old wooden

members allows identifying the tools and techniques that were originally employed, and new timber elements introduced in the repair work are dressed in the same way as originally. In certain cases, research has allowed to recover tools and techniques that were in disuse and almost completely lost. An example of recovered technique in Japan is the spear-plane *yarigan-na*. This kind of plane, with a leaf-shaped blade mounted on a shaft, fell out of use after the medieval era when it was substituted by the base-mounted plane. However, during the repair of Horyu-ji in the second half of the 20th century, the tool and the planning technique were recovered through the examination of traces left in old members and the study of documents depicting its use. Similar results have been achieved also in Norway, where the northern European *sprett-telgjing* technique used until the 14th century to finish the surface of exposed logs with an adze was revived in the 1990s after being lost for centuries, through research of old wooden members and tools and similar techniques in Russia. These discoveries have a scientific and cultural value of their own, and contribute to enrich our understanding of wooden architectural heritage.

The Japanese repair method also follows the recommendation that "nails and other secondary materials should, where appropriate, duplicate the originals." Japanese traditional wrought iron nails' appearance and behavior is different from that of modern wire nails. Although their cost is much higher, traditional hand-made wrought iron nails are often employed in conservation work, especially in parts of the building where they are going to remain seen.

The recommendation in article 10 that "appropriate traditional or well-tested modern methods may be used to match the colouring of the old and the new with due regard that this will not harm or degrade the surface of the wooden member" is also part of the Japanese standard practice. In Japan, this practice dates back to the pre-modern era, when new timbers used in tea rooms were colored to match with older materials. In current conservation practice, new timbers are colored if they are going to remain seen in order to harmonize then with the rest of the structure.

In addition, article 11, which advises that *"new members or parts of members should be discretely marked, by carving, by marks burnt into the wood or by other methods, so*

that they can be identified later” also matches the standard Japanese practice, where new elements are identified with a mark burnt into the wood with the date of the repair.

### 3. Traditional Techniques in the Conservation of Wooden Buildings

The described repair methodology is possible in Japan only because of the survival of the traditional knowledge regarding building techniques.

Modern construction materials like brick, steel and reinforced concrete were introduced in Japan during the late 19th and early 20th century and played an increasingly significant role in Japanese architecture. However, a significant difference between Japan and some Western countries is that in Japan modern building technology never completely substituted traditional architecture. Throughout the 20th century, western style architecture coexisted side-to-side with Japanese architecture, and even today, Japanese style architecture built with traditional carpentry techniques is preferred in the case of temples and shrines. Therefore, in Japan, traditional building design and architecture is not a revival nor an imitation, but a true form of contemporary architecture in its own right.



Fig.5 Enkyoji Maniden, a wooden temple built in 1933.



Fig.5 Training young carpenters in the use of traditional tools.

This fact has also an impact in the approach to architectural conservation. In western countries, a deeply rooted principle is that interventions in historical buildings should “bear a contemporary stamp”. However, in Japan, carpentry and other traditional building techniques are also “contemporary”, in the sense that they are alive and have continued almost uninterruptedly from the pre-modern era.

Nevertheless, the demand for this kind of techniques is limited to religious architecture, few examples of residential architecture, and conservation work. The number of skilled craftspersons is decreasing also in Japan and measures must be taken to ensure the passing on of their knowledge.

The legal framework of “Selected Conservation Techniques” was introduced in Japan through the 1975 amendment of the Law for the Protection of Cultural Properties. Through this system, techniques that are considered necessary for the preservation of Cultural Properties are selected, and the individuals and organizations that hold them are certified by the government as custodians of these techniques. Selected techniques related to the preservation of wooden architecture include carpentry, different roofing techniques (thatch, tiles, cypress bark), plastering, traditional painting and lacquering, and metalworking. In addition, design techniques such as the traditional kiku technique, and techniques for the elaboration of tools and the harvesting of raw materials such as cypress bark or raw lacquer are also selected. A total of 71 Conservation Techniques are selected; 57 individuals and 31 organizations are certified as custodians (as of July, 2014). Custodian

organizations hold training courses with governmental subsidies, and individuals receive annual subsidies for training and handing on of their techniques. "Architectural conservation", i.e. the specialized knowledge that is required of conservation architects to perform their work, is also included as one of these techniques, and training programs are centralized and carried out with governmental support.

Protecting the architectural heritage means not only conserving historic buildings, but also keeping the technical knowledge that made possible to build, maintain and repair them, especially in the few regions where this knowledge has not already been lost. Recognizing the cultural value of this knowledge and taking steps for its preservation is a task of the utmost urgency.





# Examples of Conservation Work for Historical Wooden Buildings in Japan

## -The cases of Sojiji-soin Daisodo (Half-dismantling) and Butsuden (Full-dismantling)

**Yasuhiro WATANABE**

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### Sojiji-soin

Sojiji-soin is one of the main temples of Zen Buddhism. It is situated in Wajima, Ishikawa Prefecture in Noto Peninsula, at the center of Honshu, the main island of Japan (Fig1,2). The temple was founded in 1324. Since then, it has been honored as the heart of Zen Buddhism in Japan. However, the buildings of the temple had experienced several big fires. So, almost all the buildings remaining today are from early 20th century.

### Noto Peninsula Earthquake

Noto Peninsula Earthquake happened April 25th 2007. It recorded Magnitudes 6.9 and brought region one death and several hundreds of casualties. Also number of completely destroyed houses was 684 houses (Fig3), and partially destroyed houses counted around 30,000 houses.



Fig1. Place of Sojiji-soin



Fig2. Sojiji-soin From Google earth



Fig3. Completely destroyed houses by the earthquake

## Conservation Project

Immediately after the earthquake, agency of cultural affairs registered Sojiji-soin's buildings to registered cultural property. Thanks to this action, Sojiji-soin's conservation project is able to receive some aids for architectural consultation fee.

The project is divided to two main periods. The first period was from 2008 to 2014, and the second period is from 2015 to 2021. Throughout the project, 15 registered cultural properties are to be conserved. To avoid repeating same destruction by earthquake, seismic diagnoses were taken place at the beginning of each period. And Daisodo, Butsuden were analyzed that they need to be installed seismic reinforcement.

### Daisodo (Sermon Hall: 787m2, built in 1907)

#### Damage of Daisodo

Daisodo is a main building of this temple, post-and beam structure mainly by zelkova.

Front part of the ground for the building slid 15cm forwards and sank 16cm downwards. And stone wall fell off (Fig4). As a result of movement of the ground, plaster wall fell off, showing the bamboo frames. Not only walls were damaged, but also pillars were tilted that joints of thresholds for sliding doors loosened (Figs). The tilted pillars caused floor to sink, and it was dangerous to have ceremonies. For post-and-beam structure, the loosened joints and deformation of structure are critical damage for safety.



Fig4. Stone wall fell off



Fig5. Stone torches broken, main doors are damaged

#### Result of Seismic Diagnosis

Result of seismic diagnosis was that Daisodo fails seismic resistance. So structural reinforcement was designed.

#### Conservation Practice

The aims of conservation project were a) repair the damaged timber/walls/other architectural facilities, b) install the reinforcement to prevent further damage.

Half-dismantling method was chosen for Daisodo's conservation. Dismantled parts were roof tiles, roof structure (partially), floor, plaster wall, terrace, attached toilet and preparation room. Dismantled timbers were inspected, catalogued, and repaired or replaced depending on the decay.

Beneath are the main processes of the conservation project.

**1) Dismantle attached toilet, preparation room and terrace.**

**2) Install steel piles to support the ground and prevent further slide (Fig6).**

One of the reasons that caused the ground slid was that front part of the ground was artificial and not stable. Prior to conservation project, we ran entire ground survey to decide which method shall be suitable for the building and the ground. As a result, we could see that there is solid layer about 7 meters beneath of the building. So steel piles were piled to the ground to prevent the artificial ground from further slide.





Fig6. Piling steel pile



Fig7. Dismantling floors

### 3) Dismantle the floor and make preparation for jacked-up (Fig7).

The weight of buildings was about 3000kN. The entire building was jacked-up. We used about 30 interlocking jacks. Prior to the procedure, decorative materials, such as chandelier and altars were stored in air-conditioned room to prevent any damage.

Floors are dismantled, making spaces for jacks, saddles and central control devices.

### 4) Jacked-up, Remove base stones, Pile the steel piles under the pillars, Construct underground beam, Jacked-down (Fig 8-11).

Jack-up procedure took 5 days to bring the entire building to 1.1m above from the ground. After Jack-up, level monitoring was done every day. During jacked-up period, we had experienced the Great East Japan Earthquake. At Sojiji-soin, it measured quite strong tremor, but there was no harm to the jacked-up building.

The stones were about 1 m<sup>2</sup>, and thicknesses were about 80cm to 1m. So we removed stones first, and dig the ground to construct the underground beam. For piling the piles, we could not use auger, so we used the 3000kN of building self-weight to pile. For each pillars, we piled 4 to 8 piles according to the structural analysis. After construction of underground beam, we put back the base stones.

During jacked-down procedure, we corrected the tilted or deformed pillars. The deformation of space between pillars led to loosened joints, so we corrected order of pillars according to original drawing from 1907. Zelkova is unpredictable materials of movement after dismantling, so we tried to avoid dismantling the structural pillars or beams as much as possible. Finally tilted pillars and loosened joints were fixed as the original drawing.

It took almost a year from Jacked-up to Jacked-down.



Fig8. Jacked up



Fig9. Entire building is jacked-up





Fig10. Piling steel pile



Fig11. Underground beam and base stone

#### 5) Construct temporal structure to cover.(Fig12)

Sojiji-soin is also known as famous sightseeing spot. So we constructed the temporal structure with visitors' facility. Visitors were able to see the process of conservation work.

#### 6) Dismantle roof tiles, plaster walls.(Fig13)

Roof tiles were dismantled, washed and inspected to reuse. Plaster walls were dismantled. The inner soils were stored to reuse.



Fig12. The temporal structure to cover the building



Fig13. Dismantling the roof tiles

#### 7) Inspect status of roof structure, decide where to dismantle, repair or replace.

Roof tiles were loosened because of the earthquake and harsh environment. It caused water leak and made timbers decay. According to inspection, each corners had severe damage, especially North West. And the projecting roof for decorating the building was also severely damaged. The North West corner needed to install steel frame to support the timber. However it was not enough strong to support the whole weight of the roof, we inserted the additional supporting timber on both sides (Fig14-15).

The projecting roof was seriously damaged. Important structural timber decayed so that they are structurally useless. So those timbers needed to be replaced (Fig16-17).



Fig14. The North West corner decay



Fig15. The North West corner steel reinforcement



Fig16. Decayed projecting roof structure



Fig17. Repaired projecting roof structure

#### 8) Draw 1:1 roof structure and decide the policies of conservation.

Roof structure was moved because of the earthquake, and decayed timbers caused the roof to deformation. So to reassemble the replaced timbers, we needed to make the original shape clear. During the inspection, we also surveyed the level marks, angle of the rafters, and other information to draw the 1:1 ideal picture of the entire roof.

#### 9) Reassemble roof tiles, plaster walls.

After the repairing the roof timbers, the roof tiles were reassembled. Then temporal structure was dismantled. Plaster walls were reinforced that the thickness of the walls increased, and the inner frame was also improved.

#### 10) Install reinforcement under floor, Reassembling floor and etc.

To increase the seismic resistance and support the post-and-beam structure, we put solid grid and penetrating tie beam under the floor (Fig18). Floors, attached facilities were reassembled. We renewed fire alerts.

#### 11) Completion and Publication

It took 52 month to entire conservation project (Fig19). We issued 350 pages of conservation report after the project.



Fig18. Under floor reinforcement





Fig19. Daisodo, Conservation completed

## Butsuden (Buddha Hall: 523m<sup>2</sup>, built in 1918)

### Damage of Butsuden

Butsuden is situated at right angle to Daisodo. It is also post-and-beam structure, but by Hiba arborvitae. It is similar to cypress and is typical material for this area. Compared to zelkova, Hiba arborvitae is easier to handle after dismantling.

Because of the earthquake, Butsuden sank 10cm. And the tilt of the pillars measured maximum 14/1000, which is more than double to present building standard low's capacity. Before the conservation projects deformation of roof became worse and more dangerous for users, thus scaffolds were installed to support roof (Fig 20).

As Daisodo, plaster wall fell off (Fig21), corridor tilted (Fig22). Also, roof structure was loosened by the deadly shake from the earthquake. Butsuden is the place for worship, but sometimes it is used as visitors' facility for staying overnights. So it requires severe safety for public. Not only from the earthquake, but also from critical water leak, they caused the damage to the building. It is known that Noto peninsula is area of heavy rain, snow and humidity. However the style of the roof was not considered for this harsh climate. So heavy rain and snow stacked on the roof for a while and thawed water leaked into the roof structure. This leads to the decay of the timber and caused the roof structure being unstable. Decay and fragile roof structure resulted dislocation of timber by the earthquake (Fig 23).



Fig20. Butsuden Scaffolds are for supporting roof



Fig21. Plaster wall fell off and cracked



Fig22. Corridor tilted, floor sank 3.5cm in 1m (3.5%)



Fig23. Roof structure dislocated

### Result of Seismic Diagnosis

As same as Daisodo, Butsuden fails seismic resistance. Structural reinforcement was designed as Daisodo. Butsuden was decided to install seismic resistant plaster base, so we took samples of the wall for further inspection.

### Conservation Practice

The aims of conservation project were same as Daisodo, a) repair the damaged timber /wall/other architectural facilities, b) install the reinforcement to prevent further damage. Daisodo could take half-dismantling method. However Butsuden got damage on the most important pillars, which are two out of four of main corner pillars. And not only pillars, but also beams and corner timbers were apparently decayed. And some of those decayed timbers were lost completely so there was no way but to replace the timber.

Butsuden is post-and-beam structure so all pillars and beams are connected. And it is not possible to dismantle pillars partially. Thus half-dismantling method was not appropriate to apply, for Butsuden needed to replace the decayed pillars and beams nearby.

Beneath are the main processes of the conservation project.

#### 1) Dismantle attached buildings and construct temporal structure to cover. (Fig24)



Fig24. Temporal structure to cover

#### 2) Dismantle roof tiles, plaster walls, and entire structure.

Full-dismantling method begins from inspection. Before dismantling roof tiles, we recorded styles of roof tiles, their condition, and materials and estimated the percentage of reusable roof tiles. Concerning dismantling the structural timber, first we took record of the shape, joints and measurements. During dismantling, each timbers were carefully removed from each other. Before storage, each timbers were again inspected for planning repairs (Fig 25-31).



Fig25. Dismantling rooftiles



Fig26. Decayed structural timber





Fig27. Decayed structural timber



Fig30. Decayed structural timber



Fig28. Decayed structural timber



Fig31. Decayed structural timber



Fig29. Decayed structural timber

## 2) Dismantle roof tiles, plaster walls, and entire structure.

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On the end of February, we have completed dismantling the entire structure (Fig30).

The timbers were put in huge storage (Fig31).



Fig32. Dismantling completed



Fig33. Timber in huge storage

### 3) Construct underground slab and reassembling the structure.

After dismantling timber structure, we will construct underground slab to make the entire structure being stable on it, preventing further cracks and unequal settling by earthquake. When foundation is ready, we will reassemble the entire structure according to the previous inspection and plans. Then we will install structural reinforcement materials. Those are seismic resistant plaster base, horizontal brace at the top of pillars, and solid grid under the floor.

In the end of project, we will issue conservation report. The contents of conservation report are regulated by agency of cultural affairs.

## Conclusion

Conservation practice varies in every project. None of them are same, even in the same temple. As above, Japan is a country of frequent earthquake, great difference with temperature and high humidity. In this severe climate condition, timber does decay; get damage by fungus and insects. And buildings are post-and-beam structure and structural timbers are also ornamental timbers. Culturally, aesthetically and functionally, to put additional timber beside pillars or other structural/ornamental timber is not adoptable in Japanese traditions. So in conservation work, there is need to replace those timbers. We put all efforts to avoid full-dismantling conservation work, however in some cases it is not avoidable. Nevertheless, when there are standards and international principles, they should be respected at projects by highly responsible architects.







# A Study of the Timber Structure of Drum Towers of Chinese Dong Minority Architecture and Its Development Evolution

Ling Cai, Peter W. Ferretto  
and Yi Deng



Fig.1 A drum tower is the center of the settlement of the Dong minority

## 1. Introduction

The Drum Tower is one of the most important and charismatic public buildings in the architecture of the Chinese Dong Minority.

Dong people have a high sense of identification with their drum towers, and consider it as the center of the settlement order in Dong society (Fig 1). It has many important social functions. It is a symbol of the clan, a place for both assembly and to have discussion on public affairs, a place for holding sacrificial ceremony and grand activities, and also a space for villagers to have daily communication.

The layout of drum towers is relative simple. The outstanding architectural characteristics are reflected from their structural system. The architecture technique becomes an important part of the Dong architectural culture. There is supposition that different structural types have been adopted, and the structure technology was developed which helped expressed a relationship between the conceptions of the Dong people and the transmission of architectural technology. Thus, the development tendency of the architectural

technology can be studied through the investigation of the structural types and analyzing the geographic distribution of the drum towers.

## 2. Structural Typologies of the Drum Tower

The existing drum towers were mostly built from the early Qing Dynasty until the fairly recent years. Timber is the unique material used in constructing the Dong drum towers. Following the Chinese traditional categorization methodology, namely the “major carpentry” viewpoint which is based upon the structural techniques of the roof, specific drum towers are divided into two types: “Tai-liang” and “Chuan-dou” structures. The difference between these two kinds of structures is specifically the beams or lintels between the two columns (Fig 2). The structure directly leads to the different roof shapes of the drum towers, such as an overhanging gable roof, a gable-and-hip roof and a pyramidal roof. The indigenous construction techniques used by local carpenters can improve the inner space, the outer height and general façade of the tower.

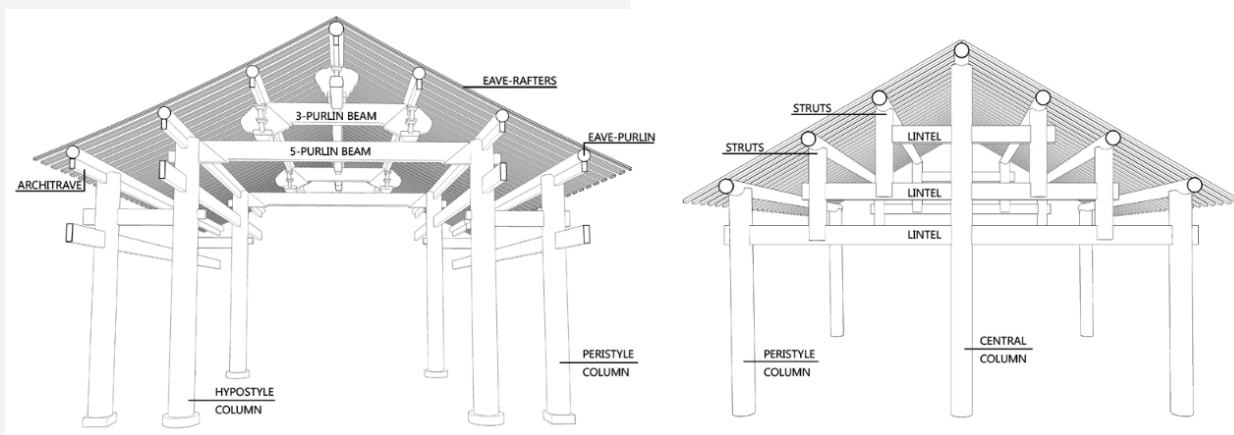
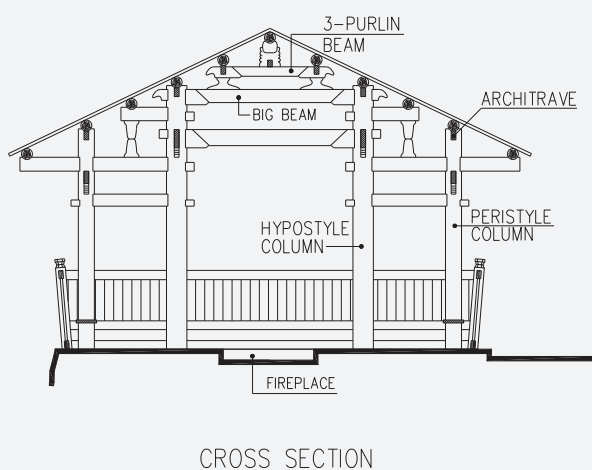


Fig.2 Two mainly kinds of the structure of the Dong buildings

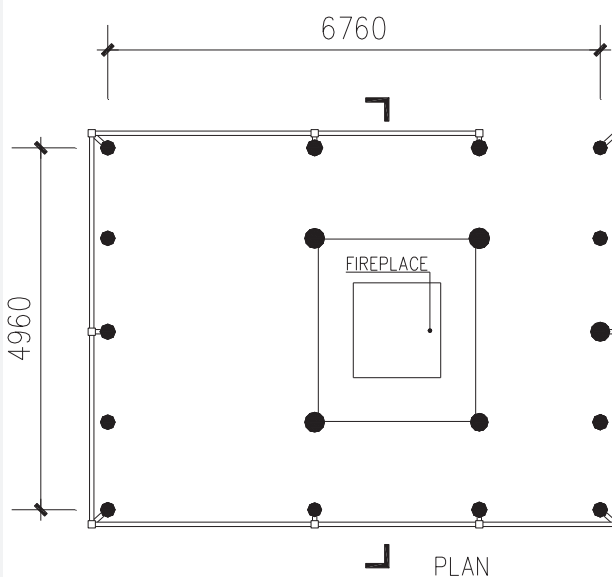
## 2.1 “Tai-liang” Structure

The first type is the “Tai-liang” drum tower. These kinds of drum towers are very similar with the main hall of Han nationality buildings. “Tai-liang” means there is a big beam between two peristyle columns, or two hypostyle columns, on which two struts support the 3 or 5 purlin beams. The purlins – horizontal members that support the rafters – are positioned along the stepped shoulders of the skeleton. The surviving example of the 3-purlin beam is the Long Shi drum tower (Fig 3) in Yu Tou village, Tongdao County of Hunan province. Another example of a 5-purlin beam is the Ya Shang

drum tower (Fig 4) in the same village. The “Tai-liang” structure can form a wider space between the two peristyle columns or two hypostyle columns, which depend on the length of the big beam. These kinds of drum towers often have some common characteristics: the first, by having a rectangular shape; the second, by having roof styles that often include an overhanging gable roof and a gable-and-hip roof, or even a composite roof style. Sometimes, huge columns are used to support the ground floor of the drum tower in order to adapt to any distinctive topography.

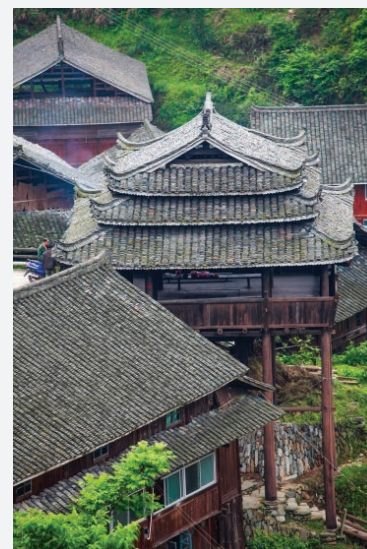


CROSS SECTION



PLAN

Fig.3 The Long Shi Drum Tower Complex



The structure and modeling of the “Tai-liang” drum tower is simple and clear. It is often combined with other kinds of buildings such as the village gate, the temple, an auxiliary building, thus forming a complex with special shapes along with a variable public space within the villages.

The two examples of a drum tower complex which consists of a village gate, a drum tower and an auxiliary building, are the Yang Lan drum tower (Fig 5), and the Xia Chen Tuan drum tower (Fig 6). The Heng Ling drum tower (Fig 7) complex consists of one drum tower and two village gates, which date from three different eras of the Qing Dynasty.

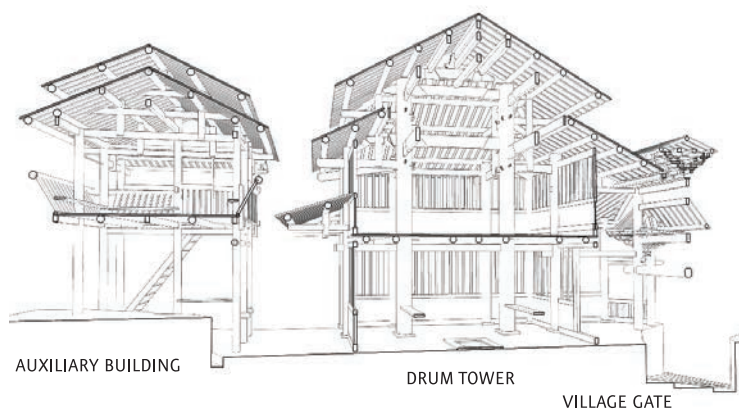


Fig.5 The Yang Lan Drum Tower Complex

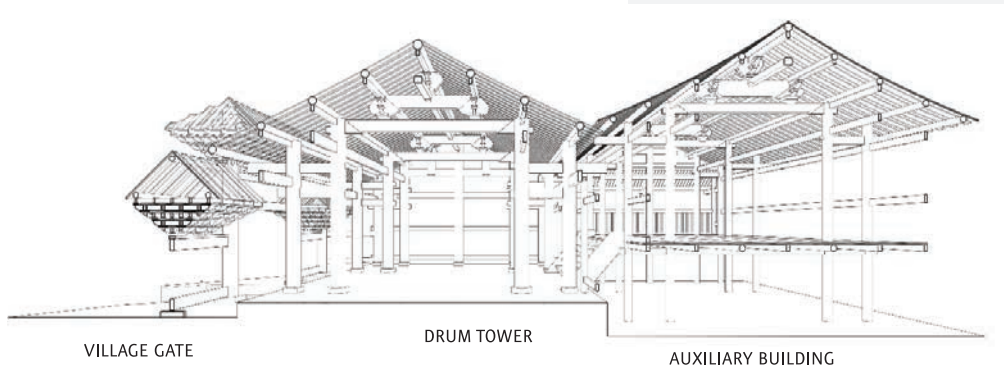


Fig.6 The Xia Chen Tuan  
Drum Tower Complex







houses with no more than three floors. The “Chuan-dou” drum towers of Dong, are generally more than five stories or eaves. The drum towers take full advantage of this type of structure by expressing the creativeness and development of the traditional timber structure of China.

Whether using the central-post or king-post, the “Chuan-dou” drum tower can be classified into two types: “single core-column” drum tower and “ring-columns” drum tower.

The “single core-column” drum tower is recorded in literature for the first time in the Chinese Ming Dynasty. There are only three “single core-column” drum towers in the entire habitation area of the Dong minority. The method of construction is to put a core-column at the center of the plan, with eight horizontal lintels running in a radial direction from the core to the peristyle columns. The core-column reaches the top of the building and forms a structure of a multi-layer umbrella with those lintels (Fig 9).

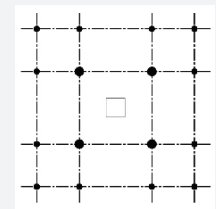
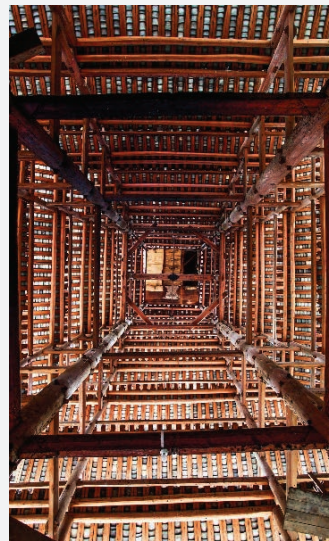


Fig.9 An Example of the Single Core-column Drum Tower (The Shu Dong Drum Tower)



CORE-COLUMN

To meet the evolving needs for good function within the drum towers, the core-column becomes an obstacle when using its inner space. The need to enlarge the inner space encouraged people to improve the structural method of the drum towers through time. In the original structure of the single core-column drum tower, the ring-columns structure was square, hexagon or octagonal in the plan, with two rings of columns (Fig 10). The ground touching core-column became the king-post after being elevated. So, this modification made it possible to promote the height of the drum tower, which was previously limited by the height of the core-column.



Plan and upward view of a square ring-columns drum tower

Plan and upward view of a hexagonal ring-columns drum tower

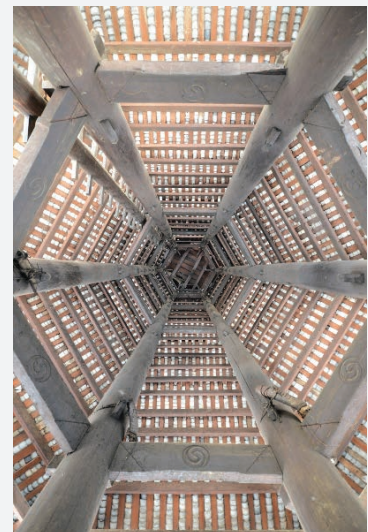
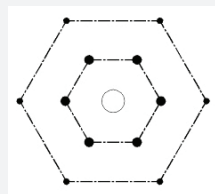


Fig.10 Examples of the ring-columns drum tower

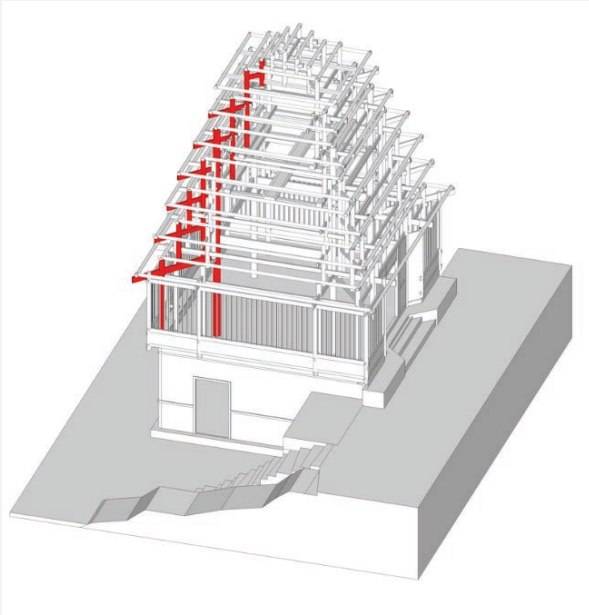


Fig.11 Repeatable frame (with a red mark) in a ring-columns drum tower

There is a repeatable frame in the ring-columns drum tower (Fig 11): the peristyle columns and the inside columns are connected by the horizontal lintels. These first-layer lintels support the struts and the first-layer eave-purlins. The struts and the inside columns are connected by the second-layer of horizontal lintels, which support the struts and the second-layer eave-purlins. This is repeated until the struts close to the inside column.

The height of the drum tower will not be limited by the height of the inside columns, because the lintels between the inside column and king-post can support the struts and eave-purlins, until the struts close to the king-post.

In order to enhance the stability of the structure, several layers of the horizontal architrave are used to connect the struts, and the inside columns. In this way, the inner roof frames work together as a whole.

The interior treatment of the drum towers is called open-frame construction; that is, there is no ceiling and all structural members that support the roof are exposed. Here is exhibited an ingenious example of the carpenter's art, entirely structural in function but extremely decorative in appearance.

### 3. Techniques of expanding inner space and improving outer facade

#### 3.1 Expanding Inner Space

The columniation in the interior is often adjusted to suit a utilitarian purpose. The inner space of the ring-columns drum tower can be expanded through different ways.

A row of columns is added to the peristyle to expand the utilization area in the Heng Ling Xin drum tower, which causes a multi-eaved overhanging gable roof emerging with the multi-eaved pyramidal roof (Fig 12).

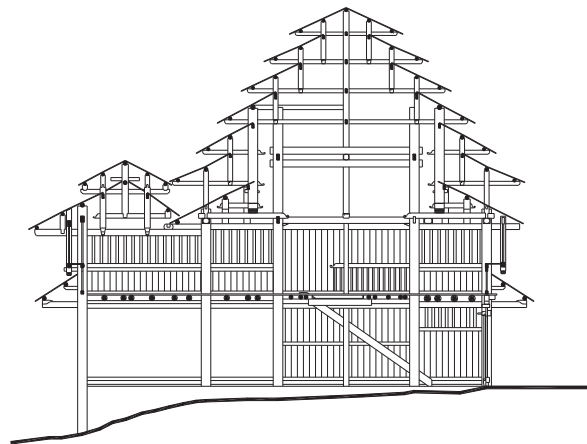


Fig.12 Heng Ling Xin drum tower

When columns are omitted in the hypostyle tower to improve the interior space, not only is the plane affected but also the framing of the roof. Specific examples are the Zeng Chong drum tower (Fig 13) and the Ji Tang drum tower (Fig 14) as shown below.

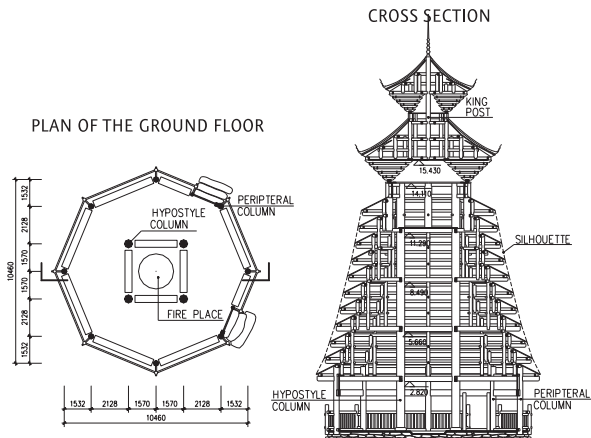
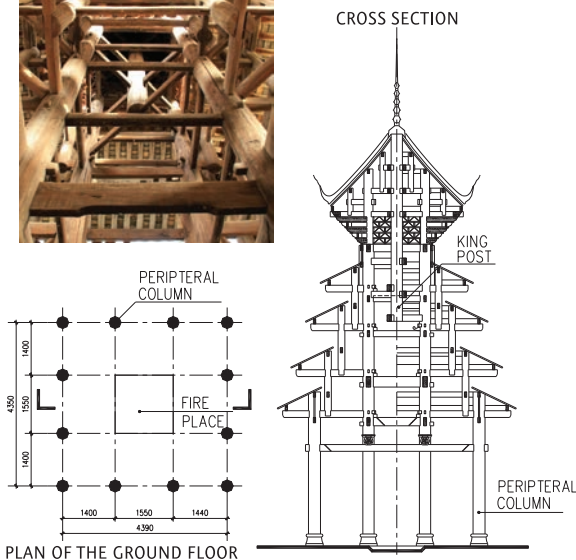


Fig.13 Zeng Chong drum tower (built in 1672)



Fig14. Ji Tang drum tower



### 3.2 Changing outer facade

Many kinds of techniques have been intelligently created by the local carpenters to meet the various requirements for improving the façade of the drum tower.

The common technical measure which has been adopted for changing the facade of the drum tower is to increase the number of supporting struts. That is, the upper roof of the drum tower transforms from a lower hexagonal hipped roof into an octagonal pyramidal roof by using the four inside columns to form an octagonal plane, with the increased struts and the lintels. The methods for increasing the number of columns is diversified (specific examples are listed below in Fig15).

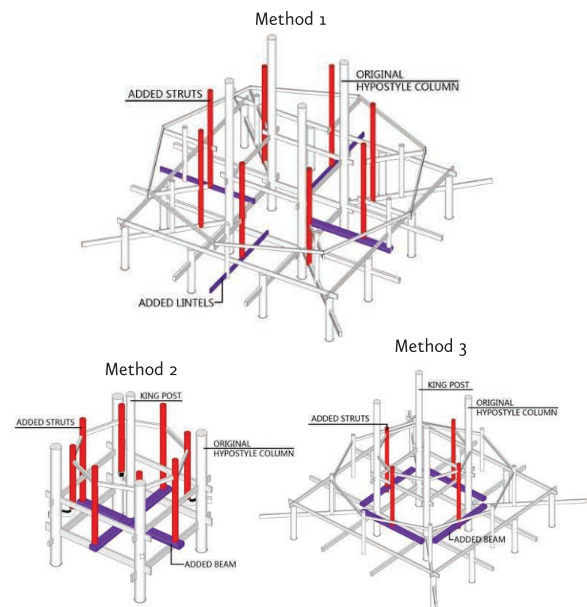


Fig.15 Various techniques for changing outer facade

### 3.3 Tou-kung

The tou-kung is used to support the overhang of the top eave and also has a strong decorative effect on the drum towers (Fig 16).







Fig.16 Tou-kung of the Dong's drum tower

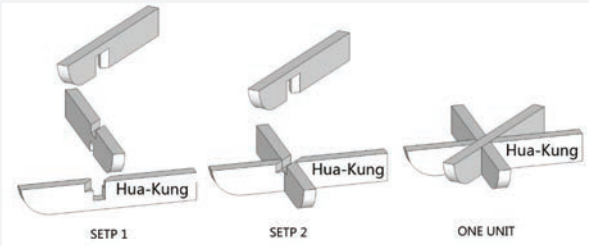


Fig.17 One unit of the Tou-kung in Dong's drum tower

In the tou-kong of the drum tower, a basic unit consists of three familiar configurations, which make use of the tenon and mortise joint (Fig 17). But structurally, the most important and longest member is the hua-kung (named after the terms of the tou-kung of Han nationality buildings), which extends to form cantilevers to both the front and rear, at right angles to the façade of the building.

This basic unit is repeated many times along the horizontal lines. A long transverse Kung intersects the units and joins them in their entirety. The units may be used in successive tiers, each extending front and rear a certain distance beyond the tier below. Such a tier and extension is called a "jump". Small tous or long plates are placed between the tiers of the hua-kung (Fig 18). Generally, there are three or five jumps in the tou-kung of the drum tower, which form dense and ornate decoration.

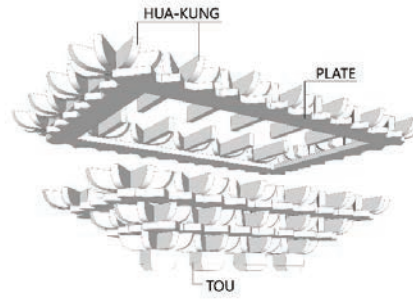
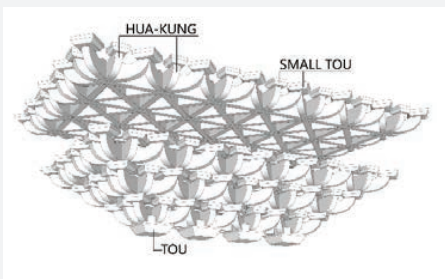
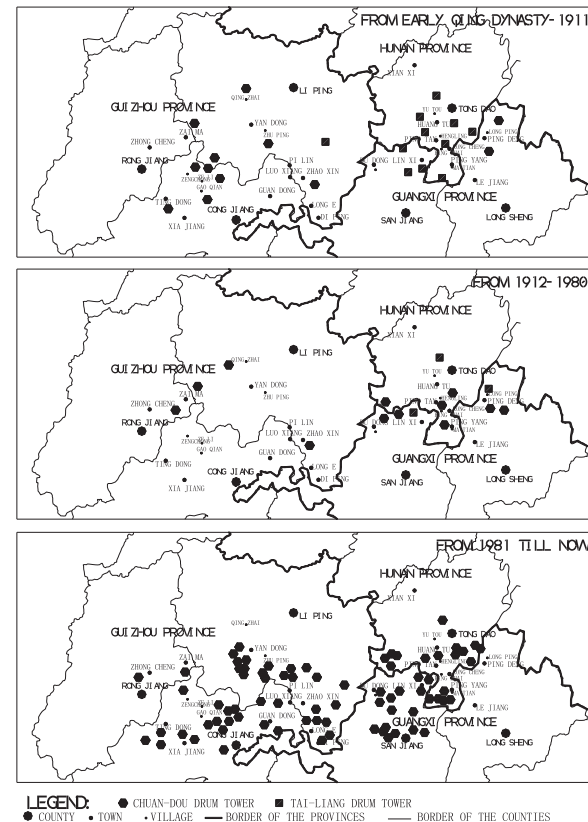


Fig.18 Tou or long plates between the tiers of the Hua-kung

#### 4. Geographical Distributing Pattern of the Structural Types of the Drum Tower

The Zeng Chong drum tower, the earliest one in existence, which is located in Zeng Chong village, Congjiang County, was built in 1672. Currently, even the latest constructed drum-tower is still being constantly updated. If we investigate the geographic distribution area of the Tai-liang and the Chuan-dou drum-towers from three continuous eras respectively, the diagrams below could be concluded.

The three diagrams demonstrated the general regularities as below (Fig 19):



The first era (from the early Qing Dynasty-1911), the geographic location of Tai-liang and Chuan-dou drum-towers illustrate relative centralization and independence;

The second era (from 1912-1980), the construction of Tai-liang and Chuan-dou drum-towers both dramatically decreased;

The third era (from 1980 till now), the Tai-liang drum-towers were rarely constructed, and in fact, the Chuan-dou towers came to be the main type selected in this era.

These three distribution diagrams also reveal a phenomenon that beginning in 1672, when the earliest drum-tower in existence was established, until now, the geographic distribution of Chuan-dou drum-towers has been continuing to expand. There are no Tai-liang structural drum-towers in Guizhou; while in Hunan, two types of drum-towers coexist in the Qing dynasty. However, the Tai-liang drum-tower, which was used to overwhelm the Chuan-dou ones by numbers in the Hunan province, has gradually been abandoned during the later stages of the development process. And the Chuan-dou drum-towers evolved to become the only choice to be built. This kind of situation was more remarkable after the 1980s. This is exactly the development trend of construction technology for drum towers.

While having various types of complexity, the Tai-liang drum-towers are limited in height. Although the Chuan-dou ones are limited to the regular polygon on the plane, craftsmen had been attempting to achieve certain structure innovations to enhance the possibility of developing additional height and transforming the façade. With fascinating contour shapes as well as having a flexible façade, the Chuan-dou drum-towers have advantages over the Tai-liang ones in their symbolic significance.

In conclusion, the gradual disappearance of the Tai-liang drum-towers in modern times, as well as the development of the Chuan-dou ones on the façade with its continuing expansion in the geographic space, all reflect the Dong people's choice. It means the selection of the characteristics within the drum-towers is culturally and symbolically significant. The towering Chuan-dou drum-towers, with complicated and flexible

façades, are considered as the buildings more representative of the Dong minority.

## **5. The Evolution of the Structural Technology of the Drum Tower and the Cultural Transmission in Dong Minority**

By reviewing corresponding geographic spaces of Tai-liang and Chuan-dou drum -towers based on the evolutionary trend of the structure, we may find that the diversity of culture within the architecture is closely connected with the difference of the social culture in various geographic spaces.

### **5.1 Border Areas Development**

The governance and time period in which the central dynasties governed the Dong regions are significantly different. It is important to explain the cultural differences in the Dong minority's habitation regions. The development of border areas by the central government stretched from the northeast Dong residential areas to the southwest hinterland. The northern area of the Dong minority's habitation regions has been included in the jurisdiction and scope of the central government as early as the Tang dynasty. While for counties such as Liping, Rongjiang and Congjiang inhabited by the Dong minority in Guizhou province, the system of the central government appointing officials for the direct management has been implemented since the Song dynasty and really established during the Qing Emperor Yongzheng reign.

The development of border areas directly caused the influx of a large number of Han nationality immigrants. The Han went into the Dong minority's habitation regions by acting as officials, defending soldiers and by spontaneous immigration. The most prosperous period for immigration was during the Ming and the Qing dynasties. The army and the people going into the Dong minority's habitation regions for cultivation and were mostly the Han from Jiangxi and Hunan provinces. The immigration direction from east to west has helped to determine the direction for cultural transmission of the Han. Therefore, the immigration at the Ming and Qing dynasties is an important cause for the distinguishing of the east-west architectural culture in the Dong minority's habitation regions.



In the Dong minority habitation regions of the Hunan and Guizhou provinces, Hunan is closer to the habitation regions of the Han from a geographic perspective and the Tai-liang structure is therefore affected by the hall-type buildings of the adjacent Southern Han nationality. Accordingly, the Chuan-dou drum towers appear mainly in Guizhou, which is relatively more remote. Because of this, the more native structural techniques of the minority are maintained in this area.

## 5.2 Cultural Revitalization Movement

Why did the geographical distribution space for specific types of structural technology of the drum tower change as time goes by? In other words, why did the “chuan-dou” drum tower replace the “tai-liang” drum tower and become the only choice when building a drum tower now?

In the past, conditions that limited travel and the resulting limited ability to communicate any kind of change, helped to insure that there was a herd mentality among those building drum towers. The carpentry methods stayed primarily similar and little effect on the surrounding villages. After 1980, though, the drum tower experienced a process of renaissance, which is relative to the “Cultural Revitalization” movement of rediscovering, rearranging and carrying forward the national culture at that time. A large number of previously neglected rural minority villages were discovered. The “Chuan-dou” drum towers in the Guizhou province have been widely reported by the modern media as a symbol of Dong minority architecture or even the culture of Dong. Gradually, values have been formed that this type of drum tower represents the culture of Dong Minority. Pointedly, the “Chuan-dou” drum tower in the village of Zhao Xing in Liping county of Guizhou frequently has appeared in many physical media pieces. This kind of drum tower strengthens the belief that it represents the Dong minority through the cultural transmission. Once formed, values become a kind of mind-set and the belief is cemented that all drum towers should be built like this. According to the statistics of the 1992 edition of <Sanjiang Dong Minority Autonomous Annals>, the number of the “Chuan-dou” drum towers increased from two (2) in the late Qing dynasty to six (6) during the period of the Republic of China and 28 after the founding of P. R. China. Twenty of them were built after 1980.

Of additional interest, the local carpenters have played the role of communicators. The construction methods of the drum tower have inevitably been affected by those of other regions because of improved travel abilities and the shared communication among the carpenters from different places. This can be proved from the construction process of specific drum towers. According to the carpenter SHI Yinxiu, after being invited to repair the Diping bridge in Guizhou in 1981, he built the Baxie Drum Tower in 1985 in Guangxi and followed the technique of the drum tower used in Guizhou. He used the tou-kung to support the top roof of the building. The carpenter then went to Guizhou to learn the techniques used in the drum towers before he built the drum tower of the Pingpu village in Guangxi province in 2000. According to my interview with the villagers and craftsmen in the Dong villages in Tongdao county, Hunan province, they generally have preferred the “Chuan-dou” drum tower because of its supreme height and beautiful look. Furthermore, this perception will influence the activities of reconstructing and expanding the drum tower. During my visit in Liping county, Guizhou in 2003, architect LU Wenli was invited to expand the old drum tower by the Zhuping village. He retained the ring columns of the old one, but added more struts and purlins to make the “new” drum tower have more layers of roof and tou-kung after his expansion.

The “Chuan-dou” drum tower became a cultural representation of the Dong minority through the national cultural renaissance movement and was promoted by the modern media. At first it may have been looked upon as just a technique used and expressed in the regional art. But it has gradually been formed to a more accurate standard in the whole habitation region of the Dong. The role of the identification standard also adapts to the demand of the tourism business in the remote Dong area. Due to the popular aesthetic preference of the “Chuan-dou” drum tower, it has been used in many tourist or governmental projects, such as folk custom villages, natural scenic areas and even the ethnic style buildings in the squares of many a city. Therefore, this accepted type has played a guiding role in the technique transmission and development of the drum towers.

Conclusion: There is an east-west difference in the geographical distribution between the “Tai-li-

ang”and the“Chuan-dou”drum towers. The“Tai-liang” drum towers affected by the Han building are concentrated in the east of the Dong area (Hunan Province), while the“Chuan-dou”drum towers are mainly distributed in the west of the Dong area (Guizhou Province). In the process of development, the number of “Tai-liang”drum towers decreased but the “Chuan-dou”drum towers became more popular. This process reflects the gradual process of the development of the structural technique. Due to the cultural revitalization movement, the drum tower with a “Chuan-dou”structure has become the mainstream of structural types in the Dong area.

### **Acknowledgement**

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# Bullfighting Ring Arena “La Petatera” of Villa de Alvarez, structure and description

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José Raúl Carrillo Gutiérrez<sup>6</sup>, Carlos Palacios Mendoza.

## Introduction

Throughout history, the monumental architecture is associated with power. In general one of its characteristics is the search for a total stay through time and the identification of a culture that obtains heritage like an inheritance from the ancestors. This example of the monumental structure holds a special characteristic, it is denominated Plaza de toros “La Petatera” it is a wooden structure and *petates* o *tanates*<sup>7</sup> that is built up and unbuilt every year, as part of a tradition, of a town, now a city, located in the western part of Mexico.

“La Petatera” of Villa de Álvarez originally has a religious end and with the passing of the years it has combined itself with culture reaching a point of being part of Colima’s identity, the popular folklore of the Charrotaurinas festivities for people of Villa de Alvarez shows a particular pleasure that is lived every year in the month of February. “La Petatera”, las cabalgatas<sup>8</sup>, los mojigangos<sup>9</sup>, the bullfighting, horseback riding, the dance and music concerts, and all the of the other cultural events are essential of a secular tradition that dates back from 1857 are in honor of the Saint San Felipe de Jesus.



Picture 1. “View arena Villarvarensis”, Ortiz Iris, Villa de Álvarez, Colima, Febrero 2016.

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Picture 2. Outside view “La Petatera”, Ivonne Calvillo, Villa de Álvarez, Colima, Febrero 2016.

## Background of La Plaza de Toros “La petatera”

There are various documents that describe the background of the festivities in the city of Villa de Alvarez where the Plaza de Toros “La Petatera” is located, the majority of them, coincide that the beginnings of the festivities of the town date back to the XVII century due to the continuous “forest fires and earthquakes that left forty of the fifty-two houses in ruins that existed back then”<sup>10</sup>.

In the need to search for a “magical cure against the batter of the land, gives a simple and mystic formula that is related to the nowadays tradition and social organization”<sup>11</sup>.

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<sup>6</sup> Master of Earth Sciences , Faculty of Civil Engineering, University of Colima, Mexico .

<sup>7</sup> Mats made of palm leaves

<sup>8</sup> A group of people in a parade horseback riding

<sup>9</sup> Gigant costume puppets

<sup>10</sup> Mijares Bracho Carlos, La Petatera de la Villa de Álvarez en Colima Sabiduría decantada, Universidad de Colima, 2000, pág. 16)

<sup>11</sup> Idem 7



The towns people of the time gathered to choose the future patron saint, like costume they did not agree and was decided by: “a hand of luck”, some people that now about this subject say that the names of the possible known and miraculous saints were written. Just then “appeared a mysterious Franciscan monk that no one had ever seen, this character recommended them that they should include the name of the Franciscan and first Mexican martyr, Felipe de Jesus, who died in Japan, crucified with other members of the same order and that’s how they did it and after they shuffled the cards they took out the first one and his name showed up, they did it again and it happened again, and finally it happened once more... When they looked for the monk to tell him the good news, he had disappeared the same way he had shown up.”<sup>12</sup>



Picture 3. “San Felipe de Jesús Ofiicer Mass”, Ortiz Iris, Villa de Álvarez, Colima, Febrero 2016.

From these events on it has been done year after year the promise of taking the patron saint through various counties in procession, sermons and mass.

The Plaza de Toros “La Petatera” monument has had various constructors that have the responsibility to build it up, transmitting the knowledge and technique of its manufacturing to generations of families of Villa de Alvarez, highlighting names of men like, Higinio Campos, J. Jesús Banda, Severo Urzúa “El bule”, Maximino Dueñas, Rafael Carrillo “El tigre”, Ramón Cervantes and the one that recently has being upfront Desiderio Contreras “El pájaro”.<sup>13</sup>

Mr. Desiderio Contreras, tells us the beginnings of the construction of the plaza and how it has become a tradition. According to predecessors, that some Martinez gentlemen began to make bullrings, and gave indications of feeding the visitors, ranchmen, livestock men, to the event calling it a greeting, they began making “the plaza” where nowadays the main plaza kiosk is in La Villa and that is how it became custom the making of formal bullfight rings and adapting the space according to the needs reaching the point of what we know nowadays like “La Petatera” of Villa de Alvarez.

Severo Urzúa, Constantino Rodríguez y Chico Gudiño are some of the the first builder and founders of this tradition. Severo Urzúa “le paso el otate”<sup>14</sup> to Rafael Carrillo, being a “mozo”<sup>15</sup> until becoming an expert in the construction based on the empirical knowledge, at the same time Mr. Desiderio helped Rafael becoming his successor and nowadays is the main protagonist in the construction of “La Petatera”.

At the beginning the bullfighting ring was a small construction and without any sittings which first registry of execution was in the main plaza in la Villa. Around the 1930’s, it was located in the fields of that belonged to the Enrique Andrade School and in 1940 the festivities were celebrated in the “La frontera”<sup>16</sup>, on the north side where it was held for two years in a row.

In 1943 Mrs. Isabel Toscano widow of Gutierrez, donated land property that were on the north part that led to the town of Minatitlan, in front of the farm yards of the “Haciendita” in what was the casino, now casa de la cultura<sup>17</sup> and DIF Municipal<sup>18</sup>. One year prior to that sittings where installed with boards: built by Mr. Severo Urzua. This place was walled, with the purpose of making it durable, even though it was removed by orders of the state governor, Mr. Noriega Pizano, in this place the plaza was around for about 35 years.

Later on it was moved to the fields of the sports unit, 200 meters west of the Villa de Alvarez downtown, which lasted for 25 years. In 2001 it was moved once again 300 meters west of the sports unit on the street of Merced Cabrera, one of the main streets of

<sup>12</sup> Idem 7

<sup>13</sup> Ramírez Cobian J. Inés, Olvera Cruz Salvador. Historia de los Festejos Charro-Taurinos de Villa de Álvarez. H. Ayuntamiento de Villa de Álvarez, Villa de Álvarez, Colima. 2001 pág. 70

<sup>14</sup> passed the baton

<sup>15</sup> young worker

<sup>16</sup> the frontier, that was the name of the fields/ pastures a few meters from the main plaza

<sup>17</sup> municipal arts center

<sup>18</sup> municipal office of family development

the city, it was built in this place by Mr. Ramon Cervantes Gomez; he had participated in the construction for 8 years. Until 2002 Desiderio Contreras intervenes once more.<sup>19</sup>

Nowadays the plaza is built a couple of hundred meters west of the city maintaining its form, structure and same number of sittings that year after year are built, also the use of wooden rolls, prop support and cans that serve to withstand the weight and the boards for the sitting and the silver plating.

### Formal Description of The Plaza de Toros “La Petatera”

La Plaza de Toros “La Petera” is an example of monumental architecture that looks to give a religious, political, and economic significance to Villa de Alvarez society through its permanence and usage of natural material through time. Its main feature is that it can be built and unbuilt time after time, a unique architecture and that has lasted with these characteristics for more than 175 years. Made up with at least ten different types of wood and covered with petates, hence the reason why it is called the Petatera.

The structure formally corresponds to a circumference of 175.87 meters making up a circle of 56 meters of diameter. Sectioned with 70 boards or sitting arrangements that belong to the licensees.

The circular structure stands by “pies derechos” (right side footing) that confine or hold the structure with cans tied or held with ixtle (fiber) ropes in a way that the structure is united without making the structure rigid, additionally a chain is formed that serves as a union with all the right footings tied up with ixtle (fiber) ropes that permits the existence of flexible confinement of hold up to transmit weight and movement without falling or separating the wooden elements. This handcrafted constructive system can hold up a weight of up to 5,000 people.

The design and dimensions that the arena of Villa de Alvarez has nowadays started sin the year 1944 when by the initiative of the Mr. Felipe Ahumada and

Mr. J. Ines Ramirez Cobian made up a model or mockup of the arena based on boarded sittings, adapting itself to the final proposal by the community after a couple of years<sup>20</sup>.



Architectural plant of Plaza de Toros “La Petatera”, Zamora Christian, Ortiz Iris Villa de Álvarez, Colima, 2016

The chain is the main element for the support holding of the monument, it is made up of the circular form supported by prop supports, transmitting the weight and the structure itself, it unites longitudinally speaking all the wooden elements and on top of it, section of stands, aisles, and stalls or seats.

Seven prop supports are needed, to support the small stall, these are situated in different sections to divide the weight that are transmitted beginning form the third row that hold the boards.

The experience that some of the builders that for years have used this handcrafted constructive system in the monument like: Desiderio Contreras<sup>21</sup>, Julio Solorio<sup>22</sup> y Daniel Guerrero<sup>23</sup>; amongst others, agree that “a variety of wood should be used... in the skeleton. Some of the most resistant according to the criteria of each staller like the black guayabillo for the wooden posts, the stalls of rosewood, huesillo, and white cedar. For the squares, supports, boards, and platforms strapping wood like pine are used”

<sup>19</sup> Tortajada Rodriguez, Plaza de Toros de Villa de Álvarez, La Petatera 1940-2001. Universidad de Colima2003, p. 63).

<sup>20</sup> Idem 10

<sup>21</sup> Actual constructor de la Plaza de Toros “La Petatera”

<sup>22</sup> Propietario de un tablado de la Plaza de Toros “La Petatera”

<sup>23</sup> Propietario de un tablado de la Plaza de Toros “La Petatera”



Picture 4. "Amarre de la trancas", Zamora Christian, Villa de Álvarez, Colima, February 2016.

The wooden structure is covered with natural textile fibers, forming a covering with *petates* o *tenates* (mats of palm leaves), made in the town of Gómez Farias Jalisco, brought each year to replace, just the ones that are not in good conditions.

*Petates* are also used to cover the bamboo structure and *otate* (reed) is used like shades and like draping of the stands, on the aisles between the boxes and the stands.

Each platform measures 2.5 meters front and 3.5 meters in depth 36 *petates* are needed: six in the skirt, three in the support, four or five in the stall, twelve or thirteen in the shade, two in the stair, and 2 more in the outside parte where the number of the stall is put.



Picture 5. "Roundwood view of a mooring area and shadow", Ivonne Calvillo, Villa de Álvarez, Colima February 2016.

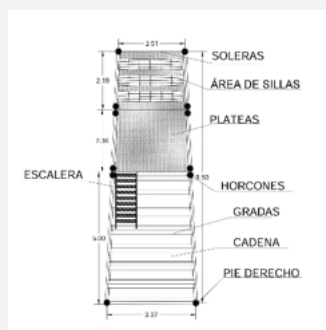


Figure 1. platform plant

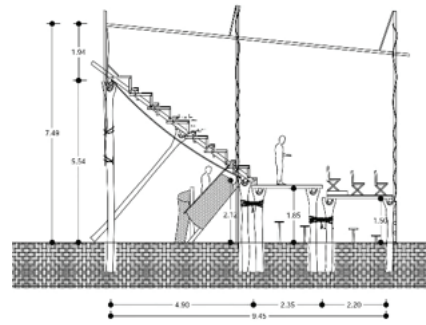


Figure 2. Section of the platform

Architectural plans, Ortiz Iris, Zamora Christian, Villa de Álvarez, Colima

## Construction Process of The Plaza de Toros "La Petatera"

Describing a construction process of a monument that by its construction characteristics is considered demountable, is a magic experience. Being in the field where there is no evidence that a construction existed, accompanying Mr. Desiderio Contreras "Don Yeyo" with family and friends who walks toward the central part and "*midiendo a ojo*"<sup>24</sup> identifies where the center of what will be the bullring of this magnum handcraft, and when it is built, it is incredible to see its monumental character. The most splendid part of all this is to know and to demonstrate that the labor was done with the hands of handcrafters that for years have dedicated themselves in transmitting the knowledge.



Picture 6. "El pajarito" in prayer to God, Ortiz Iris, Villa de Álvarez, Colima, February 2016.

Once the sign is found, of a year ago of the construction site, the young workers dig to extract a piece of hose that is hidden underground to be able to identify it as a guide line. Later on a metal rod is nailed which will support a ring that holds a wire with the

<sup>24</sup> calculating by sight



exact measurement of the radius of the bullring. In that moment you can just perceive a silence in that place, and the words of Mr. Desiderio Contreras, who initiates a ritual drawing in the ground with a stick of otate a cross saying the following words:

*“Jesus of Nazareth in the name of your heavenly father a ask, that this cross that I draw helps us build up this construction that everything is done right, take care of this plaza it is yours let it never be destroyed by the hand of men and take care of all of us that work here, in the name of the Lord and let us begin”*

*After this act the people present applaud with joy as a symbol of happiness that is how the guide line starts of the majestic arena of the Petates.*

With the otate (reed) as a unit of measurement, wooden stakes and tighten wire at hand heads up is given to the guide line of the 70 platforms. Beginning in the direction to the north with the platform number 35 a wooden stake is nailed, after clockwise and with the otate (reed) with a longitude of 2.5 meters is posted as reference on the ground and another wooden stake is nailed with the number 36, repeating the same procedure until reaching half of the circumference of the platform with the number 70 after that the counting begins with number 1, 2 which are called *official platforms*. At the end of the line the numbering stops at the platform with number 34. There for the line resides in the pointing out of digging to put the *horcones portantes*<sup>25</sup>, once the platforms have been identified the wire is tightened and in the same direction to the right circles are drawn with *calhidra*<sup>26</sup> where the isolated digging site for each post will go.

The digging labor is done the following morning, during 38 days of work is done to build up the 70 platforms and the yards for the bulls. Each platform counts with 4 dug holes with manual tools like bars, shovels, picks. Each platform has designated workers although team work is always present in each activity, since everyone helps each other out forming a big team. The digging sites are supervised by someone who is in charge of revising the correct dimensions, for that to be done an otate is used which previously was signaled measuring 1 meter.

<sup>25</sup> wooden posts

<sup>26</sup> white like material such as chalk

<sup>27</sup> just by sight

Once the excavation points are done, the arrival of trucks loads with wood and petates (mats made of palm leaves) that correspond to each platform and that year by year have been stored to be used exclusively to build the Plaza de Toros “La Petatera”. The unloading begins with the right footings and posts which are the ones that are posted in each hole. The workers put the wood next to each platform making piles of wood that later will make the structure. As the days go by Mr. Desiderio Contreras lines up the posts in a way that they are radially aligned to the center of the bullring, this is done a “*puro ojo*”<sup>27</sup> with the end post that will serve as axes to align the ones in the middle. In each platform the same alignment procedure is done fitting the fork support to receive the support or milestone.



Picture 7. The process of construction, Ivonne Calvillo, Iris Ortiz. Villa de Álvarez, Colima, february 2016.



Picture 8. The structure in process, Ivonne Calvillo, Villa de Álvarez, Colima, february 2016.

The work is organized in crews, while some rest others continue the following tasks. Ones the majority of the post are aligned and dug in the sills are risen using system pulleys with ropes. The work must be done in a group of work since each platform is a complement of a whole and there cannot be any error of leveling, tying or dig in because it can harm the whole structure. Mr. Desiderio Contreras has been responsible for 24 years of the handcraft monument.



The construction system and the type of materials used, allows for a certain dimensional flexibility that readjusts simultaneously in the moment of replanting the plaza as a whole. With the material used, in the way that they are handled, and the way that they are joined to create the structure, as well as the usage of the petates to close it in and cover it (shades), it is possible to detect ancestral practices maintained by the farmers and craftsmen of Villa de Alvarez that maybe since Pre-Hispanic times have been transmitted and makes that into cultural heritage.

## Final Comments

For people of Colima the traditional festivities of la Villa, mean the folklore of a culture full of diverse events that enrich the town year by year, La Petatera, giant puppets mojigangos, the parade of people and horses, the bullfights, the farewell of the clowns, and the rest of the events are a symbol of identity and tradition that characterizes and forms part of the history of Villa de Alvarez, we are born and raised with that love to the culture of a society we belong to and joins us a town, braking paradigms of any political state, it is more like the experience that characterizes living such experience of being part of a tradition that is celebrated each February, celebrating our patron saint "San Felipe de Jesús". Began by the promise of protecting its citizen and families.

The experience of gathering with the people that make possible this construction with love and compromise like people of Villa de Alvarez allows for this tradition to transcend like part of work that represents the efforts of each family that has participated for more than 175 years, it is a master piece of art made up of first hand material and techniques, work that should be recognized.

The organization and the solidarity in the work allows that this monument should maintain itself standing and not lose its strength, here it is not possible to work in an isolated form, it is essential team work, each element depends on the other creating a strong union that holds itself.

With that skill, knowledge of each of the people that form part of this construction form a piece of art, it goes far beyond a simple construction, it is made with passion to keep a tradition alive which is taught to be able to live it, love it, respect it; appreciate the effort, no matter how small it might be, everything that it means from the guideline of the petatera, considering a ritual full of faith, having an importance for the State of Colima and its government declaring it "Patrimonio Cultural Intangible del Estado"(Intangible Cultural Heritage of the State of Colima)<sup>28</sup>

## References

Boreau Capital International Culurales , Colima State Government 7 a World Heritage Cultural Treasures of the State of Colima. July 2013

Cervera Calduch J.- M.- Elizondo Mata Mendoza Pérez -González Loza L.A. J.R. -Huerta Sanmiguel A. Architecture without planes. Plaza de Toros La Petatera, Architectural Expression. [http://biblioteca.universia.net/html\\_bura/ficha/params/titulo/arquitectura-planos-plaza-toros\\_petatera/id/57304696.html](http://biblioteca.universia.net/html_bura/ficha/params/titulo/arquitectura-planos-plaza-toros_petatera/id/57304696.html)

State Congress Legislature LVIII 2015-2018 Colima, Colima, Col. Decree No. 52 that declares the "Fiestas Charrotaurinas " of the municipality of Villa de Alvarez, as well as traditional actividade todasd encompassing this festival , as Intangible Cultural Heritage of the State , January 2016

Chanfon Carlos Olmos, Theoretical Foundations of the Restoration, Faculty of Architecture UNAM, Mexico , DF 1996.

Contreras Tene , D. ( Oct. 19, 2015 ) .Interview with the Director responsible for the construction of the Petatera.( C. Palacios, I. Ortiz , & C. Zamora , interviewers)

Guerrero Ramirez , C. A. ( 15 October 2015 ) . Interview with historian of the municipality of Villa de Alvarez, Colima. (Zamora C. , & I. Ortiz , interviewers)

<sup>28</sup> Congreso del Estado de Colima LVIII Legislatura 2015-2018, Colima, Col. Decreto No. 52, Enero 2016

Juan Oseguera Velazquez , Graphic History of Colima, Impre - Jal S.A. Guadalajara, Jal . 1979

Ramirez Cobian J. Ines, J. Barreda Delgado Pulido Juan-Juan Vaca , Monograph of the municipality of Villa de Alvarez, Ministry of Culture of Colima , Colima, Col. 2002

Ramírez Cobian J. Ines - Cruz Olvera Salvador . History Charro - bullfights Villa de Alvarez, H. City of Villa de Alvarez, Colima, Col. 2001 .

Solorio Cervantes, J. (November 8, 2015) Interview with Administrator of the Petatera (C. D. Palacios Mendoza, & C. Zamora , interviewers)

Tortajada Rodriguez , R. ( 2005 ) Plaza de Toro de Villa de Alvarez, La Petatera 1940-2001 .V.Novelo, The artisan tradition of Colima, Unirsity of Colima. Colima, Col. Mexico, pp . 266-267.



# Identification and Assessment of timber species case: Plaza de Toros la Petatera.

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María de Guadalupe Zepeda Martínez<sup>3</sup>, Carlos Palacios Mendoza<sup>4</sup>, Christian Trinidad Zamora Alvarado.

The objective of this case study was to determine the types of wood used in the monument known as “Plaza de Toros la Petatera” in the town of Villa de Álvarez that belongs to the State of Colima, México, being the only in its genre. It is conformed of a constructive system completely made of endemic wood. It also has a special characteristic of being assembled and unassembled once the bullfighting annual activities are over and therefor considered a portable bullfighting plaza.

Such construction according to the Ordinance Num. 52 published in the Official Gazette of the Constitutional Government of the State of Colima on January 30th, 2016 approved by the FIFTY-EIGHTH LEGISLATURE OF THE HONORABLE STATE OF COLIMA CONGRES, declaring the “Bullfighting and Horseback Festivities” of the town of Villa de Álvarez, including all the traditional activities that belong to this event, like Intangible Cultural Heritage of the State, it is also approved that whichever is the Secretary of Culture of the State guarantees the protection and promotion of such bullfighting and horseback festivities. Mentions:

SECOND.- In an extract of the motives exposed that the initiative possess, the following can be seen: “The present initiative has as a purpose to enhance awareness between authorities, representatives, and the citizens, of the importance that Colima’s traditions have in the makeup of our identity as a group; of our background, that differentiates the state within Mexico and brings us unlikeable richness... Las Fiestas Charrotaurinas de Villa de Álvarez, an activity where art, religion, and local culture are joined, have been celebrated in this town during the last 158 years. Within this annual tradition, the visitors can enjoy different events and shows, and appreciate elements such as: the construction of the bullfighting ring “La Petatera” of Villa de Álvarez, made with posts and petates (mats made of palm leaves). “La Petatera” of the town of Villa de Alvarez is also inscribed

within the inventory of the Instituto Nacional de Antropología e Historia (INAH), being recognized as Intangible Cultural Heritage of the Nation, since February 2009.

The timber materials used in the Petatera plaza are endemic species like: Tepehuaje (*Lysiloma acapulcensis*), Cypress Salve (*Cupressus sempervirens*), Pine (*Pinus*), Encino (*Quercus magnoliafolia*) including others, such species were able to be identified since XVI century according to the paleographic document by Acuña, in the following chapter: “*La Relación de la Provincia de Motines de Colima*”, (nowadays the State of Colima) where it is mentioned “wild trees, that are of hard sierra wood”.

According to the doctoral tesis of Maria Guadalupe Zepeda Martinez to what it says:

...Historic Wood: can be observed some wood species that are shown in the geographic Relations of the XVI century... from this assessment non written and fundamental traditional knowledge are rescued to obtain the efficiency of this material not only in the restoration of monuments but also in new architectural constructions. Knowing that the species are efficient in architectural usage allows indicating the supply needed of the adequate wood for different usages.

It can be inferred that the timber species found in the “La Petatera” could be considered historic wood, species with cultural value.

According to the sampling taken from the site at the moment of the construction of the Plaza de Toros “La Petatera”, it was recollected from the results the finding of 13 different species belonging to the families of Fabaceae, Cupressaceae, Fagaceae, Pinaceae, Papaveraceae y Boraginaceae used as supporting elements of construction. (see square num. 1)

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Sample the wood	Scientific Name	Families
1° sample Tepeguaje	Lysiloma Acapulcensi	Fabaceaea
2° sample Cypress	Cupressus	Cupressuaceae
3° sample Encino	Quercus	Fagaceae
4° sample Brasil	Caesalpinia echinata	Fabaceaea
5° sample Bambu	Bambusoideae	Poaceae
6° sample pine	Pinus	Pinaceae
7° sample pinabete	Abies Alba	Pinaceae
8° sample parota	Entorolobium cyclocarpum	Fabaceaea
9° sample Lloro sangre	Bocconia arborea	Papaveraceae
10° sample barcino	Cordia elaeagnoides	Boraginaceae
11° sample fibra petate	Leucothrinax morrissii	Arecaceae
12° sample sogá de ixtle	Aechmea magadalanae	Bromeliaceae

Square No.1 Classification de species endemic

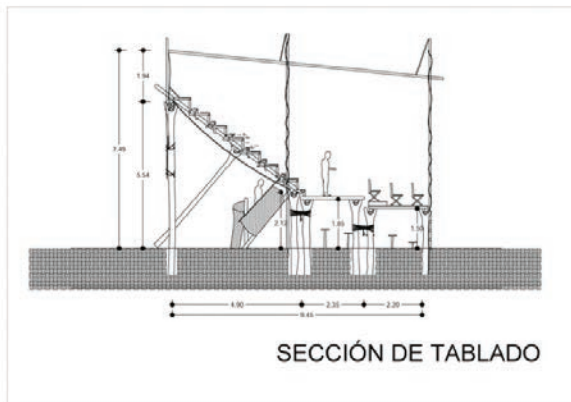
The mechanic properties such as bend, compression, and resistance of the mentioned wood allows them to be used in the construction; for 158 years this characteristics have determined the function of each one in the makeup of the structure “La Petatera”, being a tradition the how it has been constructed such monument passing from generation to generation


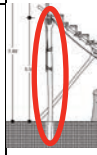

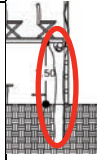

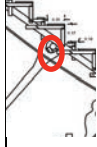
the form of work, where empiricism is the only base technique that there is, the cluster of experience of those generations is what has determine the usage of one specie, its treatment and storage, reason that sometimes other species are used substituting the ones that are commonly applied, the election of another specie resides then in the preference of the tabladero (wood owner and worker) that decides to use one or another wood being it a substitution of a piece that already fulfilled its function or the wood of his preference is another one, this is as always the physical and mechanical characteristics are equal to the specie that is being substituted for, in which we will find species that are predominant and alternative species, in the following square num. 2 it is mentioned according to the construction element of the structure, the correspondent wood. Some species are used witho any brushing maintaining even the tree bark, being the part of the trunk applied to assemble the structure, this is tied up with ixtle (fiber), a rope made up of palm leaves using different knots for each element that allows to maintain the construction elements fixed between them.

Structure element	species predominant (Common Name)	Scientific Name	Alternative species
Pie derecho	Huesillo	Oxandra lanceolata	Tepehuaje, Balsamo, encino, granadillo, Nogal, guayabillo, palo fierro.
Horcones	Tepehuaje	Lysiloma acapulcensis	Primavera, encino, guayabillo, xolocuahuil, huesillo, culebro, palo sangre, parotilla, guamúchil, palo fierro, guayabo, barcino, nogal, checalcahue, chigüillín, temezquite, bálsmo,
Cadenas	Huesillo	Oxandra lanceolata	Ciprés rosa morada, chigüillín, pino, palo fierro
Horcones de cadena	Encino	Quercus chihuahuensis	Tepemezquite, chigüillín, tepehuaje,nance, palo fierro, barcino,roble,
Latas	Ciprés	Cupressus sempervirens	Huesillo, nogal, chigüillín, xolocuahuil, pino, rosa morada, ocote, encino, cucharo, palo de fierro
Soleras	Bálsamo	Myroxylon balsamun	Huesillo, chacalcahue, chigüillín, xolocuahuil, palo fierro, granadillo, pino, nogal
Velas polines Escuadras Estribos Gradas/tablas Trancas	Cypress	Cupressus sempervirens	Nogal, huesillo, encino, xolocuahuil ,pino
	Pine	Pinus sp.	Palma
	Pine		Nogal, palma, ciprés
Estructura ppal. Sombra	Bambú	Guadua angustifolia	
Estructura ppal. Sombra	Otate	Guadua angustifolia	
Revestimiento	Petate.	Cyperus articulatus var. nodosus	

Square no.2 Predominant and alternative species.







The totality of the structure is made up of 70 (platforms) tablados , this is composed of supporting elements and sustained elements, the ones which work structurally by sections, like you can see in the image.



Structure element	species predominant (Common Name)	Scientific Name	Species	Location the element
Pie derecho	Huesillo	Oxandra lanceolata		
Horcones	Tepehuaje	Lysiloma acapulcensis		
Cadenas	Ciprés	Cupressus lusitana		



Square no.3 Structural elements of support

The structural elements of support called elements of support, these are right footings, wooden pillars or posts and chains the ones which hold the complete structure, they are found distributed between the entire perimeter of the surface, where the wood used for this purpose, el Huesillo (*Oxandra lanceolata*), Tepehuaje (*Lysiloma acapulcensis*) y cypress (*Cupressus sempervirens*) their firmness makes of these types of wood excellent for this purpose. (see square num. 3)





Structure element	species predominant (Common Name)	Scientific Name	species	Location the element
Horcones de cadena	Encino	Quercus chihuahuensis		
Latas	Ciprés	Cupressus sempervirens		
Soleras	Huesillo	Oxandra lanceolata		

Square No.4 Structural elements of support stands (gradas)

As it can be seen in squares num. 4 and 5, other elements of support are the chain, can, sill pillars, the wood is Huesillo (*Oxandra lanceolata*), Encino (*Quercus magnolifolia*), Cypress (*Cupressus sempervirens*) , the function of such elements is to support or hold the structure called gradería (stands), in this area pine boards are installed that are used as part of the stands or bleachers where wooden seats are set.

Structure element	species predominant (Common Name)	Scientific Name	species	Location the element
Polines, escuadras, estribos, gradas, trancas	Pine	Pinus sp.		

Square No.5 Structure element the stands (gradas)

Structure element	species predominant (Common Name)	Species	Location the element
Velas	Cipres	Cupressus sempervirens	
Cubierta (sombra) Largueros	Bambú	Guadua angustifolia	
Cubierta (sombra) Transeptos	Otate	Guadua amplexifolia	
Revestimiento	Petate.	Leucothrinax morrisii	

Square No.6 sustained structure (Cover)

Lastly, the sustained structure (Cover), the wood used with this purpose with the exception of the sails is the Cypress (*Cupressus sempervirens*), the rest are materials that are only used twice, the bamboo (*Guadua angustifolia*) and the otate (reed)(*Guadua amplexifolia*), the mechanic characteristics are very low therefor the resistance of the materials will tend to fail. (see square num. 6)

El petate(mat made of palm leaves), is the material that is the origin of the name of this monument, it is the only material obtained from another place, this material will have the function of coating or lining of the entire support structure, as well as, the sustained structure or (cover).

El petate has an elaboration system from Pre-Colombian times, making this material one of the most important in Mexico.

Diverse are the raw materials used in the elaboration , in the case of the petate used in this monument is the palm (*Leucothrinax morrisii*), the leaves are the prime material for its elaboration. This is the handcraft work where the technique has been passed down from generation to generation, like it can be seen in the images.

## Conclusion

La Petatera with unique characteristics is a monument done by society, the tradition in its materials, constructive systems and the activities that are done once finished, “the above produces an asset disposal of the social group towards the wooden structure”.(Zepeda,2012)

To guarantee that it continues depends on two factors, first, that the tradition of instructing generations to generation continues existing what has been learnt from the constructive system and the identification of the wood; nowadays it still continues, it is important to reinforce in the new generations the importance and significance of their labor.

Second, guarantee the raw material and the controlled usage the tree species, through strategies in society, organizations like the CONAFOR and State Government and City Hall Councils, in such a way that the equilibrium is guaranteed in nature and the adequate usage of the species.

Carlos Chafon Olmos, says: “Architecture is essentially a social product”; therefor the existence or inexistence of it depends on the equilibrium found in both society and architecture being a clear example the making of this construction year by year of the Plaza de Toros “La Petatera” Intangible Cultural Heritage of the Nation, México.

## Referencias

Acuña, R. (1987). Relaciones Geográficas del siglo XVI:Michoacán. México: UNAM.

CIRE. (08 de Marzo de 2016). *Cupressus lusitana* Mill. Obtenido de Paquetes Tecnológicos: <http://www.conafor.gob.mx:8080/documentos/docs/13/911Cupressus%20lusitana.pdf>

Contreras Tene, D. (19 de Octubre de 2015). Entrevista al Director responsable de la construcción de La Petatera. (C. Palacios, I. Ortiz, & C. Zamora, Entrevistadores)

Flores Alejandres, A., & Alejandres Rodríguez, M. (03 de Febrero de 2016). Entrevista a proveedores de madera de La Petatera. (C. Palacios Mendoza, Entrevistador)

Guerrero Ramírez, C. A. (15 de Octubre de 2015). Entrevista a historiador del municipio de Villa de Álvarez, Colima. (C. Zamora, & I. Ortiz, Entrevistadores)

Guerrero Zamora, D. (02 de Diciembre de 15). Entrevista a Tabladero de La Petatera. (C. D. Palacios Mendoza, Entrevistador)

Gutiérrez Carvajal, L., & Dorantes López, J. (2004). Especies forestales de uso tradicional en el estado de Veracruz. Recuperado el 20 de Febrero de 2016, de Verarboles: <http://www.verarboles.com/>

INEGI. (Septiembre de 2001). Catálogo técnico de nombre comunes de las especies forestales maderables. Recuperado el 22 de Febrero de 2016, de cieigveracruz.egobierno.gob.mx: <http://cieigveracruz.egobierno.gob.mx/files/2015/02/Cat%C3%A1logo-t%C3%A9cnico.pdf>

Palacios Mendoza, C., Ortiz Llerenas, I. M., & Zamora, C. (2016). Elementos Constructivos, La Petatera. Villa de Álvarez: Fotografías y Dibujos.

Richter, H., Silva Gumán, J., Fuentes Talavera, F., Rodríguez Anda, R., & Torres Andrade, P. (Marzo de 2012). Fichas de propiedades tecnológicas de la maderas; Proyecto ITTO PD 385/05 Rev. (I,F.). Recuperado el 27 de Diciembre de 2015, de International Tropical Timber Organization: [http://www.itto.int/files/itto\\_project\\_db\\_input/2596/Tecnica/Capitulo%207%20Fichas%20Tecnologicas%20de%20las%20Especies%20de%20Madera.pdf](http://www.itto.int/files/itto_project_db_input/2596/Tecnica/Capitulo%207%20Fichas%20Tecnologicas%20de%20las%20Especies%20de%20Madera.pdf)

SEMARNAT. (2 de Febrero de 2016). Fichas técnicas sobre características tecnológicas y usos de maderas comercializadas en México. Recuperado el 12 de Enero de 2016, de Conafor: <http://www.conafor.gob.mx/biblioteca/catalogo-maderas-tomo2.pdf>

Solorio Cervantes, J. (08 de Noviembre de 2015). Entrevista a Administrador de La Petatera. (C. D. Palacios Mendoza, & C. Zamora, Entrevistadores)

Zepada Martínez, M. G. (2012). La madera en la arquitectura y carpinterías barrocas de Jalisco: Preservación vs. Sustitución. Guadalajara.





# Wood Doors in Heritage Buildings in Mexico City

## Cecilia Haupt

*Icomos Mexico*

### Presentation

The city of Mexico, capital of the country, the same as Rome, has its origin in a foundational myth, and so far, after more than 800 years, the city conserves the name that its founders gave it.

Mexico City was founded by a tribe, the Mexica, who appropriated of a small island, located amid a great lake; and after years of intense work and hard fights against their neighbors, they created a powerful empire and built a blinding city.

That glory only lasted three centuries, since in 1521 started the Spanish conquest and after two years of bloody fight, the city of Mexico-Tenochtitlan was destroyed and a new form of life began, under the European rule.

### The new city

Viceregal architecture is characterized to have gathered a singular combination of elements that were conserved along the three centuries of the viceroyalty, highlighting the use of richly worked quarry in covers and jambs of windows, wide walls lined with the beautiful stone called “tezontle”, of reddish tones and great nimbleness, which was defined by the Mexican poet Octavio Paz, winner of the Prize Nobel, as: “dry blood color stone.” An additional detail of the viceregal constructions -and that speaks about the appraisal that the Mexican had for coloring- are the domes and cupolas, even wide walls, covered with multicolor tiles. From the thousands of centennial constructions that have survived, such as churches and convents, government buildings and nobiliary palaces are still conserved in many Mexican cities; the splendid wooden doors are remarkable examples. I will present some of them.

### The viceregal city

In a date as early as 1524, even before the destroyed city began its full operation, Hernán Cortés, the conqueror,

founded the first hospital in Mainland on one of the main avenues; the Hospital de Jesus that today still keeps its assistance functions and preserves the layout that it had in the 16th century. It also conserves some important ornamental details intact: the beam roof and the beautiful wooden coffered ceiling that is the unique copy that has survived in excellent conditions in the city of Mexico, and that is composed by 57 octahedrons of precious wood, with a rosette in the bottom covered in red and with a Malt Cross. It is known that Nicolás de Yllescas performed the gilding of the coffered in the year of 1587, but on the other hand we ignore who the constructor was.

The reconstruction of the city, the razed capital of the Mexica empire, began as soon as it was possible to return to downtown to proceed to the distribution of the extensive lots between the conquerors. This way began the population, the creation and operation of institutions and the administration of what already was the capital of the most extensive Spanish viceroyalty in the American continent.

Some years later, in January 14 of 1527, the Town Council of the city of México, capital of the New Spain, appointed Alonso García Bravo as “surveyor” to perform the “layout” of the city, according to the European Renaissance norms in force. In February 8, the Town Council suspended the construction in the lots already assigned until García Bravo had revised the dimensions of each lot. This way began the construction of a city that to the date conserves vestiges of the layout traced in that far time.

We know with detail, -because there are the Town Council records- the development of the administrative works that gave form to the government of the city. Concerning the topic of our interest, the timber works, it is registered that in July 5 of 1532 it was agreed to pay to Juan Franco, carpenter, the amount of 17 pesos and 4 gold tomines, to make the doors of the City Town

Council. This amount was completed in September 13 with other 20 and half pesos that were paid to another carpenter, Francisco Martin, for other doors for the same houses of the Town Council.

One year later, in 10 October of 1533, 25 gold pesos were paid to the carpenter Juan Francisco for the doors of the recently built Audience building.

However, it was up to August 30 of 1568 when the Town Council issued the Ordinances for carpenters, carvers, assemblers and violeros (guitar makers), which for three centuries would regulate the operation of that important guild of artisans. Since that moment were defined the working conditions that ended in thousands of major and minor wood works: roofs, doors, furniture and altarpieces that were and are still today, fundamental part of the city's image.

The relation of payments in the records of the Town council continues, in November 11 of 1594, 50 pesos were paid in advance to the carpenter that made the Town Council stalls. Another circumstance, of the greatest importance in the organization of the New Spain, was a religious festivity, the Corpus Christi celebration, which meant an expenditure of 80 gold pesos that were paid in May 28 of 1597 to the carpenter Juan de Saucedo for the elaboration of the stages where the diverse acts of the religious celebration were carried out, to which the civil and ecclesiastical authorities converged and practically all the inhabitants of the city. Meanwhile, the city was being built.

## The emblematic buildings

Once the distribution of the lots was made, the construction of houses of all categories and dimensions began, as well as of buildings for the diverse instances of the administration and the religious orders; among others the Cathedral and the temples of the orders that had presence in the wide conquered space since 1525. Some of these were the Nun Convents that would have great importance in the development of those first years.

### Nun Convents

During the 300 years of the Viceroyalty, 21 nun convents were built in the capital of the New Spain, of the diverse religious orders that settled in the territory. In this relation we will only refer to three of them. The Concepción Convent

The first nun convent founded in the American continent and in the capital of the New Spain was the convent of the Pura y Limpia Concepción, of the Conceptionist Order of Saint Beatrice of Silva, founded in 1540, hardly 17 years after the destruction of the capital of the Mexica empire, with charities collected by the first archbishop brother Juan de Zumárraga. It began with two simple adobe houses that Andrés de Tapia donated to the bishopric so that in them settled a church, a college or a beaterío (devout house). In 1589, King Philip II placed the Concepción Convent under his Royal Patronage, although its appointment as Royal was obtained until the 18th century, when King Charles III granted it with all the jurisdictions and prerogatives. The first novices were the daughters of the conquerors that accompanied Cortés and of some of the first residents. In the records appears the name of the young Ana, daughter of Alonso de Ávila and Juana López, who pronounced the four votes of poverty, chastity, obedience and enclosing from hands of the Illustrious Brother Juan de Zumárraga in September 22 of 1542, taking the name of Ana de San Buenaventura. The next was the daughter of Juan de Tapia and María de Echánez that took the name of Úrsula del Espíritu Santo.

A group of mestizo girls, the most outstanding in the New Spain, also arrived, Catalina and Isabel Cano Moctezuma, granddaughters of the last Aztec Emperor, daughters of Juan Cano Saavedra and of the princess Doña Isabel Moctezuma. When they professed in May 28 of 1597, they gave up the rights of the property and estates of the important encomienda that Hernán Cortés granted to Doña Isabel.

The church had to be rebuilt in 1655 by sinking problems, due to the muddy ground of that area of the city. It has a single nave as most of the nun churches of the New Spain, in the exterior the two twin covers can be observed, with their splendid doors that allowed the access of the public to the religious services, but that kept the nuns from being observed, since they lived in an enclosure régime for life. At present, only the centennial church is conserved, without the original altarpieces, since the enormous convent was almost completely destroyed during the 19th century.

### Santa Inés Convent

The doors of Santa Inés Convent are undoubtedly the most outstanding artistry copy of the wood carving

works of the 17th and 18th centuries in the capital of the New Spain. It is another Conceptionist convent, founded in the year of 1596. It calls our attention because it conserves, in spite of all the vicissitudes suffered during the 19th century, some outstanding elements.

The current construction, the cloister and the church were built in the 18th century; the two-body tower was destroyed at the beginning of the 20th century, as many other viceregal constructions. The two facades of the church finished by 1770, conserve the most beautiful doors carved in the 18th century that show scenes of the life and martyrdom of Saint Agnes, as well as the figures of the patrons of the convent, Diego Caballero and Inés de Velasco, owners of the most extensive and productive sugar mills in the New Spain, those of Amilpas and Amanalco, who donated their flows to found a convent to which poor young maidens could enter without contributing any dowry. A Papal bull issued in March 23 of 1595 made the project possible. In 1599 began the convent life with 33 nuns that left the Concepción Convent to be of the same religious order, establishing in that way a remarkable relationship between the convents.

Although it lost its altarpieces, paintings, and other wealth that were plundered, vandalized and destroyed in the 19th century, due to the secularization law, and after having been used for diverse commercial activities, the temple opened again to the Catholic religious cult, and the convent that in this case was not destroyed, as most of the 21 that existed in the viceroyalty, is headquarters of the José Luis Cuevas painting museum.

### **Corpus Christi Convent**

Another female convent, this of the order of Discalced Capuchins of Saint Francis, was founded in 1720 by the viceroy Baltasar de Zúñiga Guzmán, to house only daughters of noble Indians or caciques. It was the first and only convent institution that allowed the entrance of indigenous women. Although it did not have the support of the New Spain's society, ferociously racist and classist, the viceroy continued his endeavors and in 1727 obtained the Papal Bull of approval.

The entrance of the Indian youths to the convent was made with great magnificence, with music

accompaniment and fireworks. It is registered that Sister María Magdalena de Jesús, daughter of the caciques of Tlaxomulco (diocese of Guadalajara) arrived accompanied by a caravan formed by the family and a great entourage of indigenous people from the region.

Indigenous youths from the regions of Oaxaca, Puebla, Tlaxcala, Valladolid and Jalisco entered. Among the noble Indians that joined was found María Teresa de los Reyes Valeriano y Moctezuma, sixth granddaughter of the Aztec Emperor; Apolonia de la Santísima Trinidad, daughter of caciques (indigenous lords) from the city of Mexico; Sister Gertrudis de Señor San José, daughter of the caciques of Xichititlán.

The temple and the convent were built outside of the limits of the original layout, on a wide lot in front of the Alameda Central, the great public park, the first one that existed in the American continent. The constructor of the temple, Pedro de Arrieta, modified the traditional outline of the two lateral covers of the nun convents and used a single facade at the feet of the nave. This innovation would appear later in other religious constructions of the New Spain. The enormous cover is decorated by the original door, remarkable example of the viceregal carpentry.

After the destruction of the cloister in the 19th century, the church was used for diverse purposes: cellar, temple of the schismatic Mexican Church and finally it became Museum of Popular Arts. At the beginning of the 21st century, after an intense restoration, it was destined to preserve the headquarters of the Notarial Archives. During the restoration works, the mummified heart of the viceroy founder of the convent was located buried near the remains of the altar, inside a silver coffer, as a viceregal legend affirmed it.

In the three mentioned cases, the rich ornaments, the altarpieces, archives, libraries and furniture, even the wrought iron grills and the bells, disappeared as a result of the ferocious Secularization laws, enacted by the middle of the 19th century, which dispersed and destroyed important portions of the cultural heritage.

### **The New Spain's nobility**

An expert of the history of the nobiliary palaces, Luis Ortiz Macedo, refers the construction of 32 nobiliary



palaces in Mexico City, of which less than the half survive in acceptable conditions; to that extent has been the destruction of our built heritage.

Now we will refer to three elegant houses, of noble families, colloquially called palaces by the inhabitants of the city of Mexico: that of the Counts of Santiago de Calimaya, that of the Counts of San Mateo de Valparaíso and that of the Counts of Heras Soto that are conserved under acceptable conditions and with their intact wooden doors, although for completely inadequate uses, and with parts of their interior distribution modified.

### **Nobility titles**

The first nobility title in the New Spain was granted by the Emperor Charles V to the conqueror Hernán Cortés, under the denomination of marquis of the Valle de Oaxaca, to reward the incorporation to the Spanish Crown of the wide territory of what would be the New Spain.

### **Palace of the Counts of Santiago de Calimaya**

The first viceregal title of count was conferred by King Philip III, to Fernando de Altamirano, with the name of Santiago de Calimaya; the title was used by fourteen descendants to the last of them, Don Ignacio Cervantes Ayestarán who was also the thirteenth marquis of Salinas del Río Pisuegra. We know a contract celebrated with the stonemason that gives news of the quarry work that was carried out in the primitive houses located “on the street of the Hospital that goes to Ixtapalapa” today Pino Suárez Avenue. In 1768 a strong earthquake caused big damages to the construction, so in 1776 it was necessary that the then count Juan Manuel Gutiérrez Altamirano, requested the construction of the current building to the architect Francisco Guerrero y Torres.

Of the palace of the Count of Santiago de Calimaya it is worthy to mention the beautiful facade that highlights for the rich ornamentation of the main access door that worked simultaneously as door for carriages. It is a unique example in our city, which reminds us the intense business dealings that the New Spain had with the Philippine Islands; the monumental door was entrusted to a merchant from Philippines and it was manufactured in Manila. Initially, this outstand-

ing piece of the Baroque carpentry was lacquered in vermilion and gold borders; in the day when the hall door was placed, a multitude attended to admire it, because the news was published in the *Gaceta del Virreinato*.... (Gazette of the Viceroyalty). As sign of the presence of the Mexica culture in the viceregal city, a corner of the building shows an enormous monolithic snake head of basaltic stone that was originally in the Major Temple of the Aztecs. Likewise, it is the only nobiliary palace of the city of Mexico that was occupied by the proprietors until the mid-20th century. At present time it has a completely different function; it is headquarters of the Mexico City Museum.

### **Palace of the Counts of San Mateo Valparaíso.**

Philip V awarded Colonel Fernando de la Campa y Cos, knight of the order of Alcántara, the title of Count in 1727. The second countess, Ana María, married Miguel de Berrio y Zaldívar, first marquis of Jaral de Berrio, knight of Santiago and Chief Accountant of the Audience of Mexico. They ordered the construction of the splendid residence. It was built in 1769 by the architect Francisco Guerrero y Torres who put a spectacular design of quarry chains or laces ornamentations carved on the facade, besides a turret in the corner with a niche, and a facade with a typically Baroque composition, flanked with infantile atlases on both sides of the coat of arms, framing the enormous wooden panel door.

The construction was modified in the years 30's of the 20th century to serve as headquarters of a bank institution that respected the wealth of its interiors, although controlling the access to the public that cannot enjoy the beauty of the construction.

### **Palace of the Counts of Heras Soto**

This building was not built as nobiliary palace, but a series of financial transactions by the middle of the 19th century, put the construction in hands of the heirs of the title Heras Soto, that same as those aforementioned, is an excellent sample of the viceregal architecture of the New Spain.

In 1972 it was acquired by the Mexico City Government that destined it to house the Historical Archive of Mexico City that contains documentation from 1522 to 1928.

## **Bibliography**

Actas del Cabildo de la Ciudad de México (1524-1532). México.

Amerlinck de Corsi, Concepción. Conventos de monjas. Grupo Condumex, 1995.

Archivo Histórico de la Ciudad de México (AHCM) Fincas de la Ciudad, 1712-1819.

Bérchez, Joaquín. Arquitectura mexicana de los siglos XVII y XVIII. México, 1992.

Flores Marini, Carlos. Casas virreinales en la Ciudad de México. Fondo de Cultura Económica, 1970.

González Polo, Ignacio. El Palacio de los Condes de Santiago de Calimaya. UNAM, 1973.

Muriel, Josefina. Conventos de monjas en la Nueva España. México, 1946.

Ortiz Macedo, Luis. Palacios nobiliarios de la Nueva España. Universidad Nacional Autónoma de México. Third edition, 2009.

Romero de Terreros, Manuel. Residencias coloniales de México. México, 1918. Sánchez Navarro y Peón, Carlos. Historia de un viejo palacio. México, 1952.



# Wood in Armenian culture. History, oblivion and daily destruction of a neglected heritage

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## Abstract

There are many evidence of a wooden ancient past even in the Armenian architectural culture. To date, however, there are not enough and in-depth studies on this topic. The lack of studies, and therefore the lack of awareness of the importance of these cultural and ethnographical data, determines a daily loss of cultural materials evidence, and with this the memory of the roots of a great ancient people.

The paper aims to demonstrate and retrace, through some examples, how the art and architecture of the great Armenia was heavily based not only on stone, material for which the Armenian monumental architecture is still now known worldwide, but also on wood. The contribution will also have the character of complaint for the destruction of wood components of buildings perpetrated, still now, daily in the Armenian cities and villages.

**Keywords:** Wood, timber, forests, cultural heritage, vernacular heritage, conservation, valorisation.

## Introduction

Armenia is worldwide known for its outstanding medieval churches built of volcanic stone (tuff and basalt) and that over the centuries have characterized itself as “the stone country” (Karastan).<sup>1</sup>

But we ask ourselves: the ancient Armenians lived in the churches? Certainly not. The documents and the increasingly rare examples, show that most of Armenian houses were built of wood or stone and wood. With

wood were always made roofs, floors, doors and windows, and the typical Armenian large verandas and balconies.

Alpago Novello,<sup>2</sup> Italian pioneer, in the West, in the rediscovery of Armenian architecture, rightly stated that: “(...) Armenian world is still, in some aspects, in part, to know; for example, those who write, (...), had the opportunity to “discover” (this is not of archaeological excavations, to be clear, but investigations of the surface), Armenians churches, villages and cemeteries until now completely unknown and unpublished (and relatively well preserved!). Furthermore (and this is maybe one of the most important aspects), after the first stage of knowledge, we must try to understand what is behind and within the marks left by the man on the territory, to pick up the meanings and implications of the choices, going from polished stones or from different cultural testimonies to life and to human needs (both those immediate - material type, as well as those more thinnest, but perhaps more important, of a spiritual kind). Is, in short, to rebuild the immense and complex “puzzle” that is formed by the (inseparable) triad territory, artifacts, life”.

And in fact in this triad evoked by Alpago Novello there are much evidence of an ancient past where the wood was part of daily life and the architectural culture of Armenia.

In spite of a territory which today appears with a more reduced forest cover, the evidence of a widespread, and not only vernacular, use of wood in the

<sup>1</sup> In the Italian online version of the well know Wikipedia encyclopaedia, the item Armenia-Architecture, states that: “Few traces remain of the proto-Christian architecture and therefore the first documented fertile period dates from the seventh century, with the construction of many churches and presence of elements which precede the medieval architecture,

such as the taste of the vertical, the dynamism, the dematerialization of the interior spaces. (...) The buildings were erected, mostly due to volcanic stone, carved with great care on the outside. (...)”

<sup>2</sup> Adriano Alpago Novello, in AA.VV. Armenia. Incontro con il popolo dell'Ararat, Tipolitografia Armena il Barbacane, Venezia, 1987



Armenian architecture and in the daily uses, are numerous and bear witness to what in the past Armenia was more green than it is today.

As is known, the original name of Armenia was Hayk (founder of the Armenian nation), which became later Hayastan, translated as "the land (stan is a typical Persian suffix to indicate a territory) of Hayk."

According to the legend, Hayk was a descendant of Noah, the builder of the Ark of wood that would have saved the human and animal species from extinction determined by the flood. (Fig.01)



01 - The build of Noha Ark in Athanasius Kircher, Arca Noe, 1665.

Some biblists and theologians, among them in the seventeenth century, the well-known Jesuit, historian and German scientist Athanasius Kircher, put Armenia in the mythical Eden.

Certainly no one can imagine the Eden like an arid place, devoid of plants and trees. In fact, the Eden is always understood, called and portrayed as the "garden of Eden". (Fig.02)

According to the biblical account of all the trees planted in the garden, there were two specials: the "tree of knowledge of good and evil" and the "Tree of Life". We can find this kind of a symbol of life in other ancient cultures and civilizations such as the Egyptians, Assyrians and Babylonians.

The Katchkars, the famous Armenian crosses, would be merely a stylized representation of the tree of life represented by the ancient civilizations that preceded Christianity and whose branches/arms, to emphasize its mystical ancestral plant origin, sometimes bring fruits. (Fig.03)



02 - Map of Topographia Paradisi Terrestris in Athanasius Kircher, Arca Noe, 1665.



03 - Example of tree-Katchkar cross.

## Historical evidence of the use of wood in Armenia

A study conducted in 2005 showed that in ancient Armenia was heavily forested with approximately 1,200,000 hectares occupied by trees of various species also useful as a construction material.<sup>4</sup>

At 2005, the same research has counted approximately 300,000 hectares of forest, a quarter of the historical ones.<sup>5</sup>

Being in the past Armenia rich in forests, the timber was abundantly used by builders and craftsmen.

The State Archive of Armenia, the Matenadaran in Yerevan, preserves ancient texts that, through the miniatures, represent carpenters, joiners and cabinet-makers as well as examples of tools and uses of wood.<sup>6</sup>

<sup>3</sup> Moreno-Sánchez, Rafael and Sayadyan, Hovik Y., Evolution of the Forest Cover in Armenia, International Forestry Review, Vol. 7 (2), 2005.

<sup>4</sup> In 2012 near the Lake Sevan, I believe I have identified the remains of a fossil forest with pieces of trunks of very big size.

<sup>5</sup> Moreno-Sánchez, Rafael and Sayadyan, Hovik Y., op.cit.

<sup>6</sup> A.Guevorkian, The crafts and mode of life in Armenian miniatures, 1987

But, aside from the evidence found in the indirect sources of ancient texts and iconography, there are numerous clues materials, those of direct sources, found in archaeological sites, museums and in some ancient buildings, of a very old and noble use of wood in Armenia. Some examples:

The History Museum of Armenia in Yerevan houses a precious wooden carriage of the Bronze Age (about 1800 BC) discovered by archaeologists in Lchashen near Lake Sevan.

In the archaeological site of Dvin (V-XIII century AD) there are column bases and capitals that had unequivocally, as the main structure, a timber element. (Fig.o4)



o4 - Column's capitals that had timber element as the main structure found in Dvin site.

We can find similar tracks at the Church of the Holy Apostles (Surp Arak'elots-874 AD), which overlooks Lake Sevan where are visible traces of an ancient narthex (gavit) with stone bases for wood columns.

Other important ancient wood works are, always by way of example: a wooden carved capital of 874 AD belonging to the Church of the Holy Mother of God (Surp Astvatsatsin) on Lake Sevan (Fig.o5); a walnut panel, preserved in a private collection in London, carved in 1188, belonging to the Church of Holy Cross (Sourp Nshan) in Haghpat; the walnut carved door of 1212 from the Church of St. John the Baptist (Surp Hovhannes Karapet Vank) in Mush destroyed by the Turkish army in 1915 and now in a private collection in Canada; the southern walnut door of 1486, belonging to the Church of the Holy Apostles (Surp Arakelots) on Lake Sevan.<sup>7</sup> (Fig.o6)



o5 - Wooden Armenian capital of 874.



o6 - Important ancient Armenian wood works from X (left), XI (middle) and XV (right) century.

From the photographic records it is clear that once there were carpenters and joiners. (Fig.o7)

Today these kind of craftsmen are almost entirely disappeared focusing only in a few limited areas such as near the town of Dilijan and the around areas.

There was, until less than a century ago, a widespread tradition of wooden buildings for homes,



farms and for important buildings such as manor houses and the balconies of the cells of monasteries housing. Important function has had the wood, also in Armenia, combined with the walls in stone, as a seismic system composed of wooden beams arranged horizontally along the walls and sometimes inside the wall sections. Today, the few surviving buildings, which are wrongly not considered of cultural interest, are increasingly rare and are disappearing forever.



07 - On left, Carpenter's workshop, Armenia 1916.  
On right, Misak Mikhaian's house in Noradouz, about 1915.

For sure up to the '30s wood has still played an important role in Armenia as evidenced by the working class neighbourhoods of Yerevan combining, a stone and concrete rationalist architecture with some elements, such as those of wooden verandas, typical of civil traditional Armenian architecture.

From the point of view of the forest heritage, the Armenian economic crisis of the '90s, following the independence from the former Soviet Union and the subsequent energy crisis that ensued, led to the last major blow to the forests of Armenia from which has obtained the fuel necessary for the survival of the population.<sup>8</sup> Many wood components of historic buildings,

often already in disuse, have been looted for the same reasons.

## The situation today

Regarding wood, we ask ourselves: is the climate in Armenia conducive to timber cultivation?

The answer is yes it is. The climate in Armenia is the most favourable today as well as it was in the past. Maybe the problem would be to adopt an effective policy of safeguarding, implementation and regulation of the exploitation of forest resources that are now mostly in the north east and south of the country. A certain autonomy of timber, even for new construction, it would be very beneficial for Armenia.

There are tree genres of tree in Armenia, coniferous and deciduous, of good quality. The nut trees, much appreciated not only for the fruit, but also for the production of furniture of great value, are abundant. As shown above, their use in the past is still evident in the architecture and art. These works testify to the completion of the architecture of the great craftsmanship of the Armenian people.

Today, however, only few elders know the ancient use of some tools and young people are no longer interested in the ancient traditions of artisanship.

On the initiative of a few sensitive people, conscious of the value of material culture, have sprung up in Armenia some museums that display the tools for manual processing of wood. The museum demonstrates the loss of the everyday life of an ancient craft and art. The ethnographic museums in Yerevan and Dilijan are an example.

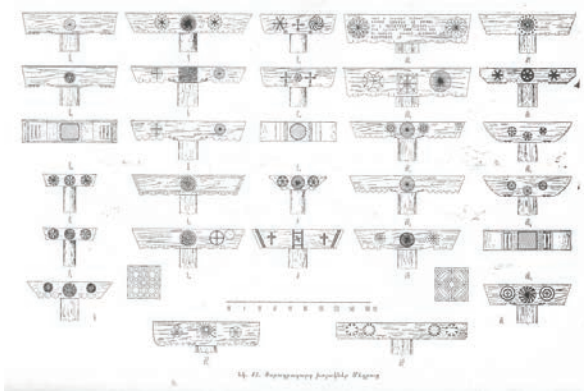
Still present, but also in serious danger of extinction, are the traditional wooden buildings, now found almost exclusively in rural settings, called Hazarashen and very well described by Alpago Novello in 1987: "In the field of civil architecture, (...) deserves mention here at least the characteristic type of peasant dwelling houses, so singular as to be accurately remembered by historians such as Xenophon and Strabo (and also by Vitruvius in his Ten Books on Architecture), but

<sup>8</sup> Piloyan Boudjikianian D., Armenian independence and deforestation, ICE case studies, n. 179, May 2006

which is found in use today. It is a sort of mound building, partially underground, consisting of a large, multi-use (in which sometimes overlook smaller rooms), square-shaped, with a central two or four upright wooden support and a kind of pseudo vault, consisting by a series of wooden beams arranged one above the other with polygonal, narrowing progressively upwards, where it opens an air intake and light, connected according to a zenithal axiality the hearth buried at the center (tonir). This structure is called hazarashen (with a thousand beams, in Armenian) or darbazi (in Georgian). Such examples are found also in cultured version, in stone, in a series of tombs in Phrygia, and the system is also widespread in some regions of Central Asia, as well as in India (of rupestrian type)".<sup>9</sup>

I observed in 2005 a similar system at the Great Mosque in Yemen Sana'a (about 630 AD).

Very helpful was the study, published in 1972 by Papukyan, a real forerunner on the structural characteristics of wood in the Syunik region. (Fig.08) But scholars are still too few in relation to the large amount of work to be done before it is too late.



08 - Wooden capitals drawings from Papukhian N., The vernacular architecture of Syunik, 1972.

Today the situation of timber construction is in a dramatic situation. We witness everywhere and every day, misuse, neglect and frequently the demolition of these historic buildings. (Fig.09)

An old building in Talin, identical to that described by Alpago Novello in 1987, was already a ruin in 2007 when I saw it. Maybe today no longer exists.

<sup>9</sup> Alpago Novello A., op.cit.

In Berkanush, settlement near Artashat, until 2007 there were the ruins of a church with walls made of clay and an internal colonnade hexagonal shape carrying a wooden roof. Today the remains of the church were been completely demolished and removed and a new building has been built.

Due to its favourable geographical location in an area rich in forests, Dilijan is a place where still today the use and woodworking is widespread. However, many buildings that characterize the small town are frequently abandoned and in serious condition. Improper uses, elements replace with incongruous materials, improper transformations, are at the order of the day and are quickly eroding or altering the feature authenticity of the buildings and therefore attractiveness for tourism in Dilijan.

The restorations, where they did it, unfortunately do not respect the authenticity of the material preferring the replacement and reproduction in style, contravention in this way, the basic principles enshrined in the preservation and internationally shared. In 2007 the old wooden elements were been removed and stacked in the area pending their natural destruction, while other old decorative items, dismantled, were waiting for their copy.

It was been documented, as demonstrated the case of the Afrikian house of Pushkin Street in Yerevan, that sometimes the natural collapse of historic buildings with wide wooden component is artificially fostered through the creation, by men, of gaps on the roof. All this in order to speed up the release of areas to speculation. (Fig.10)



09 - Old and new. Example of architectural "improvement" in Yerevan. Picture of 1977 from HinYerevan.com





10 - Example of architectural "improvement" in Yerevan. A portion of the beautiful Afrikyan house. Picture taken on June 2014 before the complete demolition of the old building occurred on July 2014.

Some positive signals: more and more people realize they are losing important part of their historical memory, and not about the churches or other exceptional objects.

About the reforestation, something is moving also through the efforts of Armenia Tree Project and through the dissemination of the need to protect native species of Armenia carried out by the Acopian Center for Environment group.

About architecture, in general, it is interesting the awareness-raising activities spread widely for the historical memory consists of "minor" historic buildings, industrial archaeology buildings, modern architecture of Soviet period and for vernacular ones also, carried out by the group headed at Hin Yerevan and by the Social Forum group called Save Yerevan.

Nevertheless, there is still much to be done, before it is too late, regarding the raising, training and active conservation of the woodworks in the historical Armenian architecture.

## Conclusion

Art, architecture and daily life of historical Armenia, retain everywhere relevant evidence of the use of wood. These fragile evidences, sometimes also of monumental interest, reduce themselves daily for neglect and probably for unawareness of their values and meanings.

If we want retain the material memory, not only the stone one and for episodes, of the great Armenian architecture, urgent action are required. Starting from the exploring process of the survivor wooden heritage.

This first phase should be accompanied by appropriate operations of provisional safety measures to prevent the worsening of the decay situation and with it the permanent loss of these irreplaceable examples of national culture.

Urgent also increase public awareness to avoid replacement or not appropriate maintenances.

For these reasons it is necessary to train new generations of professionals (architects, engineers, restorers, craftsmen) able to take care of the country's past. Enhancement and care of the past that is, nowadays, not just a moral obligation and a cultural resource, but it can also become, through tourism, an important economic resource for the country.

## References

Alpago Novello A., in AA.VV., Armenia. Incontro con il popolo dell'Ararat, Tipolitografia Armena il Barbacane, Venezia, 1987

Augelli F., The ancient actuality of wooden structures. Know to conserve, Proceedings of Yerevan State University of Architecture and Construction YSUAC, Vol I (48), Yerevan, 2013 pp.36-41 Augelli F., Learning from the restoration site: save the biodiversity of historic wooden and elements, Scientific Papers of NUACA. 2014. VOLUME II (53), Yerevan, 2014, pp.11-20

Augelli F., Wooden cultural heritage. Guidelines, standards and methods of representation, Scientific Papers of NUACA. 2014. VOLUME II (53), Yerevan, 2014 pp. 21-33

Augelli F., The reasons of the need of conservation of assets, places and cultural identities of the peoples in

the thought of Pier Paolo Pasolini. Scientific Papers of NUACA. 2014. (in print)

Ghazaryan M., Wood's Artistic Engraving in Armenia, Khorhrdayin Grogh publishing house, Yerevan, 1989  
Guevorkian A., The crafts and mode of life in Armenian miniatures, 1987

Harutunyan L., Trees of Armenia, Publishing House "Sovetakan Grogh", Yerevan, 1983

Moreno-Sánchez R., Moreno-Sánchez S., Hovik Y., Evolution of the Forest Cover in Armenia, International Forestry Review, Vol. 7 (2), 2005.

Papukhian N., The vernacular architecture of Syunik, 1972

Piloyan Boudjikianian D., Armenian indipendence and deforestation, ICE case studies, n. 179, May 2006

Kircher A., Arca Noe in tres Libros digesta, Amstelodami apud Joannem Janssonium, Waesberge, 1665.

Nersessian V., Carved Wood, in Treasures from the Ark. 1700 years of Armenian Christian Art, The J. Paul Getty Museums, Los Angeles, 2001

## **Sitography**

<http://www.armeniatree.org>

<https://www.acopiancenter.am>

<http://en.wikipedia.org/wiki/Armenia>

<http://hinyerevan.com/#!/>

<https://www.facebook.com/HinYerevanCom?fref=ts>

<http://www1.american.edu/ted/ice/armenia-forest.htm>



# Roof structures in Swedish churches: preservation challenges and solutions

**Ylva Sandin**

## Roof trusses - an unexplored treasure

In 2014, the Vasa Museum had over a million visitors. More than 21 million visitors have until today seen the ship in its current museum. People are fascinated by the exciting story of the magnificent ship that sank on its maiden voyage in August, 1628. At the museum exhibitions and guided tours will provide you with knowledge about Sweden in the 17th century, about shipbuilding and life onboard a war ship. To be on site and see the real actual ship, almost four hundred years old, gives you a sense of contact with the 17th century society. When Vasa sailed out, the roof structure of Forshem Church had carried its roofing and kept the building dry for nearly five hundred years. It continues to do so today. Nine hundred years after it was built, it still carries its load. It represents an equally exciting peephole into our history as the Vasa ship, but is completely unknown to most people. In many of our oldest church attics, there are timber structures that are unique, often beautiful and exceptionally old.

Our knowledge of historic Swedish church roofs and their structural behaviour is limited. Congregations responsible for the maintenance and management of churches are often not aware of the values of roof structures, many of which are early medieaval. The lack of published knowledge is an obstacle for high ambitions in preservation work as it prevents simple things as comparing structures and determining if an object is unique or common. Furthermore, there is a gap in our common understanding on how our oldest timber structures are best restored.

This article summarises experiences from the field of practical preservation. Methods used are all the everyday methods of a practitioner in the field of building conservation. Examples from ongoing work at Marka medieaval church and the spire of Skörstorp round church are presented.

## Values

Old timber structures can be said to have a large number of different cultural-historical values. But I would like to simplify and highlight three values (or properties) that are important to bear in mind.

## Historic church roofs:

- create rooms (attics) that are unique as historic settings. In (a decreasing number of) church attics, it is still possible to experience an environment that has been unchanged for centuries.
- are historic documents, sources for historical research.
- are load carrying structures - of exceptional sustainability. Their presence prove that load bearing structures built from renewable materials can function for at least 900 years.



a



b





Figure 1 Threats to historic church roof trusses. a) Insidious, successive changes that transform the attic as a historic setting. b) Structural problems (the picture shows a material failure in a rafter). The dominating problem is the one where the trusses have lost their horizontal support. This leads to large stresses in rafters. c) Rot. d) Trusses are covered in insulation and become difficult to inspect.

## Threats

The most important threats to the preservation of these values/properties are simple in theory, but continue to have major implications in practice:

- Successive, insidious transformations of the attics as historical settings. Gangways, lighting equipment, cables and alarm installations are frequently insensibly installed.
- Design-related structural problems. These are unusual but can have large consequences.
- Moisture and its extreme consequence rot. Rot often leads to structural problems. Choosing repair measures typically means that one has to choose between preserving the historic setting and the structural behavior and preserving the historic material.
- Insulation: structures are covered in a way that makes inspection impossible.

## Solutions

### “Museum-like” management

It seems reasonable that the care given to our very oldest timber heritage should have similarities with the care that objects obtain in museums. A strive for

control is desirable. The following might seem basic but is crucial in the management:

- Control and awareness over what’s there. Most congregations have a “care and maintenance plan” in which this information could be included. Inventories should be carried out by professionals (historians/antiquarians).
- Control over what happens in the attic. It might be a good idea to put up a sign: “You are entering a thousand year old building. Please consult the responsible manager before carrying out any arrangements.”
- Control over the climate in the attic.
- Control of the state of the structure by regular inspections.

Skara diocese has set an example and taken several steps towards this kind of controlled management. A handbook has been developed on how to take care of medieval roof trusses, historical research on medieval churches and their trusses has been sponsored and an inventory of all medieval roofs in the diocese has been carried out.

## Minimized damage in restoration

As preventive care is not always perfect historic roof trusses are often subjected to restoration measures. When it comes to restoration, the following should be considered:

- Professionals with expertise in the field of historic timber structures should be hired.
- All relevant professionals should be involved at an early stage.
- Craftsmen should document their work.
- Repair measures should be chosen with respect for the values of:
  - the attics as unique *historic settings*
  - roof constructions as *sources for historical research*
  - roof trusses as *load carrying structures* – with *exceptional sustainability*.

## Repair measures: two case studies

Two on-going cases will illustrate decisions that have to be taken when dealing with damage by rot.



a



b

Figure 2 a) Skörstorp church, exterior. b) The attic above the round nave and the 17th century spire. Photos: Carl Thelin.

Skörstorp is a Swedish round church built in the end of the 12th century or beginning of the 12th century with vaults from the 15th or 16th century and a spire from the 17th century. The spire over the round nave has three structural parts/systems. Firstly and lowermost, there is a system of beams stretching across the nave. Secondly and above, there is a central system of vertical posts. Thirdly, there is the system of radially placed rafters, with their lower ends standing on the system of beams and the other end meeting the central post system.

When inspecting the roof tiles, the property manager at the Swedish church became aware of the

existence of damage by rot. Some of the beam ends and wall plates were entirely destroyed by real-rot fungus as well as some of the lower rafter ends. The central beam in the beam system was rotten in the middle and was leaning against the vault. There was a system of partially inefficient repair measures. These were at least a few decades old, suggesting that some of the damages had been there for a long time



a



b



c



d

Figure 3 Skörstorp church. a) Rot damages. b) Some of the old repair measures. c) Wall plates were found to be more damaged than first assumed. d) Part of the beam system damaged by rot. Photo a, b and d: Carl Thelin. Photo c: author.



The system of beams have an important role in keeping the lower ends of rafters in place and preventing their slipping. When beams are severely damaged there is a risk that (larger) horizontal forces come to act on the walls of the church. The walls of Skörstorp church are cracked in a way that suggest that they might have been pushed outwards by the roof structure - or by the vault. The question was raised whether the spire had come to lean on vault.

A study of structural behavior showed that the central post structure is not standing on the vault, but hanging in the rafters. The beams are important as ties, but carries only their own weight in bending.

Repair measures were chosen with the ambition to leave the attic with high values as a historic room and high values as a load bearing structure of exceptional age.

Rafter ends were repaired with new timber of the same dimension as the original, using scarf joints. Two beams in the horizontal beam system were changed for new ones. The entire spire had to be carefully raised with a large number of jacks and lifting bags in order for the middle beam to be changed.

To obstruct the rot fungus from re-establishing, the detailed design of the top of the wall was changed. The wall plates were to have little or no contact with the masonry. As a consequence, the masonry between the wall plates was not restored in its original shape. The stones have been cleaned and treated with a fungicide and will be put back on the wall between wall plates without mortar.



Figure 4 a) Repair measures: a new part (in the foreground) and a spliced rafter. b) New wall plates and new rafter ends. The picture was taken when the whole structure was lifted by jacks in order for one of the beams to be replaced.



This change of design means that a possible load path for outward thrust from the rafters has been removed. To compensate for this, a new load path was created. It was made sure that the outer wall plate can function as a ring able to carry permanent tensile forces. This means using metal fasteners in the joints, as timber fasteners can slip when subjected to permanent tensile forces in combination with seasonal changes in humidity.

A follow-up study of crack widths in the walls has been initiated.

It is not known how the original roof was constructed. The beams in the system existing in the church today have empty notches that imply that they have been part of an older roof construction. These notches seem to be the only clues to the design of a former roof. These clues risked being destroyed as beams were replaced. In order to somewhat compensate for this, measures were taken. Firstly, it was decided that the craftsmen were to make a report on the process of the work. Removed (damaged) parts are now documented with sketches and photos and decisions taken during the work are documented and explained. Secondly, new beams have been marked with outlines of notches. Thirdly, healthy parts of removed beams will be stored in the attic.

The medieval church of Marka still has a large number of original roof trusses. Dendrochronological analysis has shown that the timbers in the roof trusses above the nave were felled in 1155/1156.<sup>1</sup> The roof trusses were originally visible from the church room but are now hidden by vaults. When these vaults were built (probably in the 15th century) some of the tie beams in the roof trusses above the nave, as well as all of the tie beams in the roof trusses above the chancel, were cut off. Additional parts have been built in at some point to compensate for the removed ones.



Figure 5 Marka church, roof trusses above the nave. Photo: Carl Thelin.

<sup>1</sup> Andrea Seim, Kristina Linscott, Karl-Uwe Heussner, Niels Bonde, Claudia Baittinger, Jan Michael Stornes, Thomas S. Bartholin, Hans W. Linderholm (2015): "Diverse construction types and local timber sources characterize early medieval church roofs in southwestern Sweden" *Dendrochronologia*, Volume 35.

Early medieval roof trusses of this type with tie beams and crossed struts are rare in Europe.<sup>2</sup> It seems like a large part of the preserved ones are found in Sweden. But the history of roof trusses is insufficiently explored. We do not know where all medieval roof trusses are and how they look. Not even the oldest early medieval ones have been systematically invented, yet less interpreted. Researcher Kristina Linscott believes that there might be as many as 250 medieval roof structures in Sweden.<sup>3</sup> Several inventory surveys have recently been started by dioceses around Sweden, so that we can soon expect to have better knowledge on this topic. The roofs of Marka church have, to some extent, been studied by scientists. They were included in an inventory of medieval roof structures carried out in 2015 in the diocese of Skara. Researchers Kristina Linscott, carpenter Mattias Hallgren and curator Robin Gullbrandsson have pointed out important characteristics in the attic in Marka church that can give clues as to how the trusses were constructed and assembled and how they looked originally. Among other things, there are traces of color, special markings, and uncommon types of joints, burn marks and high quality workmanship.

Today, a number of damages weaken the structures. Many of the roof trusses are partially damaged by rot. Large parts of the wall plates are rotten. A sample has shown that in at least one position there is real-rot fungus. Additional parts, tie beams and others, have been built in in order to strengthen the structure.

The scattered rot and the cut off parts have changed the load paths in the structure so that the structural behaviour is not the original one. Some of the trusses now carry a large amount of load and others only a small part. It is unclear where the largest stresses occur and how high they are.

Restoration measures have been discussed for several years and different actors have been involved. No decision has yet been reached.

Measures like the ones in Skörstorp could be prescribed, where rotted parts are cut off and the remaining parts repaired with new timber. As damages in Marka church are spread over the attic, repairs will probably be visible from almost every part of the room. Also, a large amount of medieval material will be removed.

Some stakeholders have expressed a wish to keep the structure as it is – with rot and added parts. The metaphor of an old building as an old person has been put forward, and the fact that there are values connected to the imperfections and the visible traces of old age.



<sup>2</sup> Linscott, K (2007): Medeltida tak: bevarade takkonstruktioner i svenska medeltidskyrkor, Göteborgs universitet. [In Swedish.]

<sup>3</sup> Ibid.





Figure 6 Marka church. a) and b) Rot damages. c) Tie beams have been cut off and struts removed where vaults are built in. Extra parts have been added to compensate for lost ones. Photos: Carl Thelin.

Restoration measures will lead to a choice as to which cultural-historical values to preserve and which to sacrifice. Either we restore the function of the different parts of the structure by cutting off damaged timber and joining the existing parts with new timber. Thereby we preserve the values of the roof truss as a load bearing structure that can carry load for almost 900 years. But we lose original material and diminish the value of the object as a source for historic research. Or we leave damaged material as it is and strengthen the structure with additional pieces in order to preserve as much historic material as possible and as much of its value for historic research as possible. But we lose the function of the parts and thereby the roof construction as a load bearing structure with exceptional age.

For Marka, we suggest further investigations. Firstly and most important, we suggest a careful cleaning of the attic and archaeological survey with a documentation of findings. Damages will be inventoried and visualised with great detail. The structural behaviour of the roof constructions will be studied in order to determine if rot and damages, in principle, could be kept. Hopefully, the approach chosen for Marka church will represent one step forward towards a museum-like care of our oldest timber structures.

# Finn Forest Smoke Cabins

**Kersti Berggren**

## Introduction

Who were the Forest Finns, and what built heritage have they left behind? How can we discover something about them?

The so-called "Forest Finns" came from Savolax, in the eastern part of Finland, to settle as slash-and-burn farmers in the vast forest areas of Sweden. They migrated to Sweden over a relatively short period of time – from the end of the 16th century to the middle of the 17th century. But they made a huge impact where they settled.

The Forest Finns' existence in the county of Värmland has been recorded by the authorities since the colonial era in the early 17th century. The civil, military, ecclesiastical and legal powers have followed them and recorded their lives through agreements, in church registers, court records, and the records of forest companies.

We therefore have a series of written archives about the Forest Finns. However, there is no witness from the Forest Finns themselves until the early 19th century. So all we know of them is seen through other people's lenses.

Thus, while the secular and ecclesiastical powers followed, mapped and recorded the presence of the Forest Finns, amongst the descendants themselves their history was almost entirely repressed. Sweden was a poor country, and Värmland a poor province, and the poorest of the poor were the Forest Finns. At least that was the general opinion. If one had Finnish origins, one kept quiet about it. The Finnish language - "Värmland Finnish" - also disappeared rapidly during the 19th century, though it survived on a very small scale until the middle the 20th century.

## Research area

The existing official archives thus give glimpses of the lives of the Forest Finns throughout the time that they can be identified as a distinct ethnic group with their own language and traditions for a period of about 300 years.

But it is far from a complete picture. Most aspects of everyday life were not documented and women's lives were not noticed nearly as much as men's, partly because women appeared so rarely in court records.

Documentation of the built heritage of the Forest Finns is almost completely absent from the 16th and 17th centuries, and is very limited from the 18th century. From the 19th century more sources appear: some actual buildings, written documents and, towards the end of the century, photographs. The widespread perception that Forest Finn culture was both archaic and primitive easily leads to the belief that their smoke cabins have such archaic traits that they probably looked the same in the 19th century as they had during the 17th century and earlier.

Finnish researchers became interested in the Forest Finns during the 1920s and 1930s. Finland had then had newly acquired its national independence. The principal work on the Forest Finns' building traditions and housing conditions was carried out by Albert Hämäläinen. Hämäläinen, who was professor of Finno-Ugric folklore at the University of Helsinki, made a field trip to Värmland in 1931 to study the farmsteads of the Forest Finns. His work was completed in 1941, but was not published in Swedish until 1945. This is still the main study for learning about the built heritage of the Forest Finns: how their farmsteads were organized, constructed and types of housing plans.

According to popular belief, the Forest Finns moved from Savolax to escape distress, war and oppres-

sive bailiffs. To Albert Hämäläinen it was obvious that the Forest Finns who migrated were poor and underprivileged peasants. And for Hämäläinen it followed that once settled on Swedish territory they built simple, almost hastily erected structures. Hämäläinen could see in the 1930s, the poor conditions of those who still lived in smoke cabins. But his assumption is problematic. Many of the slash-and-burn farmers had in fact moved from a well-off life (the profitable cultivation of rye) in order to maintain their standard of living – Sweden had the wooded areas that had disappeared in Finland which were necessary for their slash-and-burn type of agriculture.

A story constructed with both facts and the tall tale Each era makes its selections and cannot escape representing certain perspectives. Sometimes choices are obvious, sometimes more hidden. Most descriptions of the Forest Finns emphasize that they moved to virgin lands, to a desolate landscape. However, this is probably one of the biggest mistakes one can make when trying to gain a mental picture of the landscape the Forest Finns migrated to in the 17th century. In the 21th century Värmland is indeed a thinly populated area, with no industry, barely any agriculture and a lack of infrastructure. The population has decreased since the 1880s through emigration and moving to other parts of Sweden. But in the 17th century Sweden was a military power on the rise. Its territory was expanding continuously, and its borders were important.

Värmland, where the Forest Finns were encouraged to settle, was an important border region with Norway – then united with Denmark, and the competing regional power. As part of the Swedish king's defense strategy, it was important that the population in this area increased.

To improve government revenue through greater opportunities to tax land, the King and Crown encouraged land reclamation. The Forest Finns who, through their knowledge of advanced slash-and-burn technique could convert forests to farmland, were encouraged to move to Sweden's forested areas. The cultivation of rye was especially encouraged – it was a sought-after commodity in continental Europe. The Crown demanded tax in kind, which meant rye, which was then sold by the Crown at a good profit on the continent.

Stories of the Forest Finns also contain elements of heroism, of an ennobling hard life. Comparisons with others are made to the Forest Finns advantage. The Forest Finns were physically remarkable, their harvests magnificent and they are able to keep more animals than ordinary farmers. To this is added magical attributes, the ability to have a deep interaction with nature (meaning much deeper than everyone else).

## Log building tradition

The Forest Finns' buildings are dovetailed timber constructions, with the timber frame resting on foundation stones. The beams, and sometimes even the floor, may rest directly on the ground. A characteristic roof is covered with birch bark, kept in place with split poles.

The most distinctive characteristic of these traditional buildings is the use of a smoke oven. Hence the name "smoke cabin". In residential buildings the oven is constructed from natural stone and mortar. The oven has no chimney and the smoke is led into the room, collects under the ceiling and in time discharged through a channel placed on the side. The smoke heats the whole room. In the sauna and barn the oven vault is laid as a dry-stone construction, without mortar. The smoke leaves the room through openings in the walls or the door.

The Forest Finns' building stock does not represent excellence in terms of log construction. There are several explanations for this. They were not nomadic – on the contrary they aspired to become resident cultivators – but still they pursued a migratory existence that differed from established farmers. They did not follow each other generation after generation on a particular farm. Each new generation moved to a new place and established a new farm – at least for a period of time.

When the Forest Finns migrated to Sweden from eastern Finland, they came from a timber building tradition. In the landscape they moved to they met a quite similar timber building tradition. But what they had lost was the greater community; the settlers were at the mercy of themselves.

After a brief period of prosperity, perhaps as short as two generations, the initially good economic conditions for the Forest Finns were strangled. The King and Crown demanded that forest lands should be

exploited for more profitable uses: the mining and iron industries. The government put restrictions on all other uses. Opportunities for slash-and-burn agriculture were sharply curtailed. The Forest Finns had to struggle for access to forest lands, a fight that ended up to the disadvantage of the Forest Finns. They continued to work in the forest, but they did not own it.

The surviving Forest Finn buildings we can study today were erected over a 100 year period from the late 18th to the late 19th century. No buildings remain from the pioneer era of relative prosperity in the early 17th century. Most extant buildings are buildings constructed by people who lived on the margins. Only a few of the buildings that survive belonged to farmers with a good income, who had access to their own forests and the ability to hire good craftsmen.

In Värmland the farms are located high on ridges. On the top of hills there was plenty of space, with no competition between land for building and land for cultivation. Cultivated surfaces were spread between rocky areas. The farm buildings were strategically placed according to function and the risk of fire. At least four of the buildings contained one or two fireplaces: the dwelling house, the sauna, a drying barn and (sometimes) a separate cook-house. The residential building - the smoke cabin - had a central place, the farm's epicenter. For protection from fire buildings were placed at a certain distance from each other. There was one building for each function: dwelling house, cook-house, cowshed, stable, smithy, sauna, drying barn, storehouses. The buildings were placed in relation to which part of the farm's production they would serve, and how easy access was from the fields.

### **Why did the smoke cabins disappear?**

A conservative estimate is that there must have been at least 400 Forest Finn farms in use at the same time over a reasonable period of time. This means there were potentially at least 400 smoke cabins in the landscape. Only around 30 remain today in Värmland. A total of 62 remain in the wider area including Norway and the provinces bordering Värmland. Why did the smoke cabins disappear? The main reason was social in nature. The farmers abandoned the smoke cabin tradition voluntarily, and constructed residential build-

ings with stove and chimney instead. This was already happening in the 18th century. During the 19th century the abandoning of the smoke cabin went on even faster. It had become socially unacceptable to live in a smoke cabin. On the other hand, smoke cabins were still being built at the end of the 19th century. Some smoke cabins were torn down or perhaps burnt down by forestry companies who bought peasant forests in the late 19th century. A few of the smoke cabins that came under the ownership of forestry companies were donated to Homestead Associations or open-air museums.

### **Threats to surviving smoke cabins**

Inventories made in 1999 and 2011 show a clear and urgent need for the care and maintenance of the surviving buildings of the Forest Finns. A large number of the remaining structures are being abandoned due to the declining numbers of inhabitants and users. Homestead Associations who took care of a large part of the historically valuable buildings have a growing problem with a decreasing number of committed members, particularly those with the practical knowledge needed for the everyday care and maintenance of the buildings.

When people and animals no longer move across courtyards, vegetation is not worn away nor mechanically removed. Shrubs take root, and roots invade the buildings. It is inevitable that the ground shifts, under the influence of frost, rain and drought. Cornerstones drop, or move laterally so that the entire building is threatened with collapse.

A mull bench protects the house from drafts and small animals. The mull bench is often reinforced by a wall of stones. The stones may have fallen out of the wall, and must be replaced and wedged with stone chips.

In addition to the beams damaged by moisture from the ground, and the roof structures seriously battered by the harsh weather conditions, the collapsed ovens are the most difficult challenge when preserving the buildings to their authentic appearance. The huge and heavy oven can cover as much as 20% of the floor space. Besides being difficult to restore in themselves, when the ovens collapse, it causes damage to floors, walls and roofs.



Among the measures suggested to protect the structures of the Forest Finns and maintain the few survivals of their distinctive built heritage could be:

- lifting the timber frame and replacing the first log
- stabilizing cornerstones
- straightening the façade
- replacement of decayed and damaged timber
- replacement of damaged parts of the roof
- replacement of floors (moisture damage)
- stabilization of the great smoke oven

# Construction Techniques and Materials Of Traditional Wooden Mosques In Kavak - Samsun, The Middle Part Of The Blacksea Region, Turkey

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## Abstract

Rural architecture has been created by geographical characteristics (topography, climatic conditions etc.) of the region and accessible construction materials, with a long cultural background. Kavak district, which was chosen as study area, located in Samsun province, in the Middle Part of the Blacksea Region-Turkey, has wooden civil and religious architectural heritage due to existence of broad forested areas in the district. By this study, six wooden mosques in Kavak will be analyzed through their traditional construction techniques and materials. The reason of choosing Kavak district is that six mosques belong to different building periods and were built with various construction techniques in detail. At the beginning of the study, literature research in written - visual sources and documentation in archives of the related official institutions were completed, and then in the field construction detail drawings (1/50, 1/5, 1/1) and photographic documentation were done. The architectural documentation was supported by interviews with local masters and a French specialist of old carpentry as to understand the traditional construction technique in the region and compare it with the European timber architecture details. Kavak mosques are generally located out of the village centers, in forested areas and near water sources (spring, river, creek etc.) The main construction materials are stones from the river sides and woods (especially oak trees) from the forests due to the easy access and knowledge of wood material uses. First principle for the wooden mosques' construction technique is to lift the buildings from the ground by placing wooden walls on the footing stones to prevent wood materials' moisture deterioration and keep them always dried. The common construction technique for Kavak mosques' walls is block timber walls technique which is preferred to classify as walls with corner joints and post-plank in this research.

Previous researches for the mosques in Samsun which were studied only by art historians and theologians in the scope of the mosques' art history values. By this study, Kavak region mosques' construction techniques will be analyzed for the first time. Therefore, it is hoped that this study will be a basic academic research not only for Kavak mosques but also all Samsun region's wooden mosques which have different conservation problems.

*Keywords: Blacksea Region, Samsun, Kavak, wooden mosques, construction techniques, materials.*

## 1 Introduction

Wood has been one of the main construction material from past to present in the Middle Part of the Blacksea Region, where Samsun province is, due to the broad forested area of the district. It is proved by the archeological excavations in İkiztepe-Samsun, founded wooden structures dating to the Late Chalcolithic (BC. 4500-3500) and Early Bronze Age (BC. 3500-2000) [1] Samsun city center and rural areas had wooden architectural heritage which reflect the traditional wood construction technique and knowledge. Unlikely, most of the wooden buildings in Samsun city center could not survived today because of various disasters (fires, earthquakes, etc.) in the historical process. However, there are still lots of timber civil and religious buildings which show the region's wood construction techniques in rural area. Samsun is one of the richest cities of Turkey in terms of owned wooden religious architectural heritage. Among them there are wooden mosques, which have high historical value, as Gögceli Mosque (1206), Seyh Habil Mosque (1205-11) and Bekdemir Mosque (1596-99). [2]

Kavak mosques, known as ‘Cuma Mosques’ which provide congregating believers from different villages especially on Fridays, religious holidays and funeral days, are located out of the village centers, in forested areas and near water sources. All Kavak mosques have semi-open and closed spaces as harim (main closed prayer halls), mahfil (separated spaces from the harim), revaq (semi-open spaces) and son cemaat revağı (late coming people spaces) which reflect mosques’ plan organization. [Note1]

Until recently, the wooden mosques in Samsun have been studied by art historians and theologians. [3, 4, 5, 6] Yet, there is no sufficiently detailed research considering the construction techniques of Kavak mosques which will be analyzed in detail for the first time by this study.

## 2 Study Area and Research Methodology

Kavak, located in the south of the city, is one of the 17 towns of Samsun province. The district, where the altitude is between 600-700 meters, has rainy climatic conditions in every season. The forested areas of Kavak mostly consist of broad-leaved trees and two rivers called Mert and Kürtün Rivers pass through the district. [7]

Six wooden mosques have been documented in Kavak, until now. [8] They can be listed chronologically as Bekdemir Mosque (1596-99), Alagömlük Mosque (17th century), Tatarmuslu Mosque (1796? – 18th century), Dere – Degirmencili Mosque (1806? – 19th century) and Cakalli -Kasimzade Ahmed Sofi Mosque (1878? – 19th century), Koşaca Mosque (18th /19th century?). Among these mosques, dendrochronological analysis has been done only for Bekdemir Mosque. [2] Other dates, which have not been clarified yet, belong to the written marks on the wooden walls or forecasted in previous studies. [3, 4, 5, 6]

The reason of choosing Kavak as study area is that six mosques, which belong to different building periods, reflect various traditional construction techniques in detail. In the scope of this research [Note2], used material species, steps of construction techniques, joint details of vertical and horizontal architectural elements, assessment of conservation problems are aimed.







At the beginning of the study, literature research in written - visual sources and documentation in archives of the related official institutions were completed, and then in the field study construction detail drawings (1/50, 1/5, 1/1) and photographic documentation were done. For survey studies, tape measure, laser distance meter and GPS device were used. The architectural documentation was supported by interviews with local masters and a French specialist of old carpentry. The used stone materials’ species are analyzed by Ondokuz Mayıs University Geography Department. Istanbul University Faculty of Forestry will support the next phase of the research by determining genus of the all wooden materials and dendrochronological analyses.

## 3 Construction Techniques and Materials of The Mosques

The main construction materials of Kavak mosques are stones from the river sides and woods from the forests due to the easy access and knowledge of traditional material uses. Local masters used different kinds of hand tools like axe, adze, wood hand drill, chisel etc. In this part of the study, construction elements of the mosques will be analyzed in detail under five main topics as footing stones & subbase - floors, walls, posts, doors-windows-window shutters and roofs-eaves-ceilings.

### 3.1 Footing Stones & Subbase – Floors

Due to rainy climatic conditions of Kavak, solutions were created as to protect wood material from the humidity in time. The principle one is to lift the buildings from the ground by isolated footing stones or masonry walls, which has also subbase function, to prevent wood materials’ moisture deterioration. Stone material species used for the basis have been identified as conglomerate, agglomerate, sandstone, volcanic rocks and marble. [Table 1]

Table 1 :							
		BEKDEMİR M. (16 <sup>th</sup> century)	ALAGOMLEK M. (17 <sup>th</sup> century?)	TATARMUSLU M. (18 <sup>th</sup> century?)	DERE M. (19 <sup>th</sup> century?)	ÇAKALLI M. (19 <sup>th</sup> century?)	KOSACA M. (18/19 <sup>th</sup> century?)
DISTANCE G - F*	MIN (cm)	0	3	48	36	39	18
	MAX (cm)	120	106	45	90	81	51
	S.A. (%)	13**	9**	1	4	6	5
BASE STRUCTU RE		Subbase - Masonry Walls	Subbase - Half-timbered walls (filling by stone)	Subbase - Masonry Walls	Footing stones	Footing stones	Footing stones
USED MATERIAL		Stone (sandstone)	Wood + Stone	Stone (sandstone)	Stone (sandstone)	Stone (sandstone + marble)	Stone ***
BASIS' DETAIL PHOTOS							
							
BEKDEMİR MOSQUE		ALAGOMLEK KOYU MOSQUE		TATARMUSLU MOSQUE			
							
DERE MOSQUE		ÇAKALLI MOSQUE****		KOSACA MOSQUE			
<p>* Given measurements indicate distances between earth and ground beam where the slope angle is widest (north-south direction).</p> <p>** Most of the mosques located in the flat terrain. However, Bekdemir and Alagomlek mosques were documented as removed in the past.</p> <p>*** conglomerate, agglomerate, sandstone, volcanic rock – andesite</p>				<p>**** Footing stones were built without mortar by placing one or more stones according to the available materials to create the required height.</p> <p>- <b>Abbreviations:</b> M (Mosque) G (Ground) F (Floor) S.A (Slope Angle)</p>			

#### Construction steps of the footing stones:


1. Contours of the main prayer hall (harim) and portico (revaq) were marked on the ground. (Archive photos shows that lime was used.) [9]
2. Footing stones were placed under wooden posts and corner joints of the ground wooden beams.
3. A horizontal plane was created by footing stones, which consisted of one or more stones in their natural forms without mortar.
4. After placing floor joints, floor boards were placed on them without assembling.



### 3.2 Walls

Kavak mosques' load-bearing timber walls were preferred to classify as walls with corner joints and post-plank in this research. For both construction techniques, first step is to lay the ground beams on footing stones or subbase. It is observed that to choose the hardest and

straightest woods for the ground beams is important since the entire building would be built on these logs. Different joints connecting two beams were identified as half lap, cross lap (karabogaz) or 'jupiter' [10-11] techniques. (Table2)

<b>Table 2 : WALLS FEATURES</b>						
	<b>BEKDEMİR M.</b> (16 <sup>th</sup> century)	<b>ALAGOMLEK M.</b> (17 <sup>th</sup> century?)	<b>TATARMUSLU M.</b> (18 <sup>th</sup> century?)	<b>DERE M.</b> (19 <sup>th</sup> century?)	<b>CAKALLI M.</b> (19 <sup>th</sup> century?)	<b>KOSACA M.</b> (18/19 <sup>th</sup> century?)
<b>W (cm)</b>	5	5	10	6-8	7	6
<b>H (cm)*</b>	28-35	20-28	18-21	20-26	14-29	17-21
<b>L (cm)**</b>	748	830	780	790	730	885
<b>Joint T</b>	Cross lap joint	Cross lap joint	Cross lap joint ***	Cross lap joint	Block timber walls	Cross lap joint
<b>Joint L</b>	18-21 cm	15-18 cm	25-31 cm	21-22 cm	----	15-22 cm
<b>TIMBER BEAMS JOINTS</b>						
						
<p>Cross lap technique (Dere Mosque)</p> <p>Half Lap Technique (Cakalli Mosque)</p> <p>Jupiter Technique (Alagomlek Mosque) ****</p>						
<p>* min-max dimensions are taken on-site measurements and calculated on photos for inaccessible levels.  ** indicates the longest single wood element's length used in the mosque.  *** by using half-round logs  **** This technique was detected also in reconstruction work of Kutluca Mosque in Ordu. [9]  - <b>Abbreviations:</b> M (Mosque) W (Width of Timber) H (Height of Timber) L (Length of Timber)  <b>JOINT T</b> (Joint Technique) <b>JOINT L</b> (Joint Length)</p>						

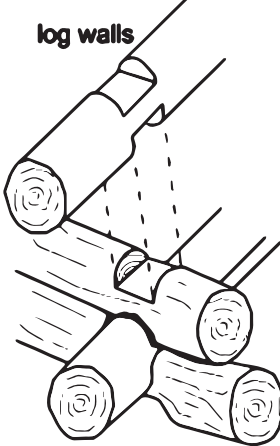
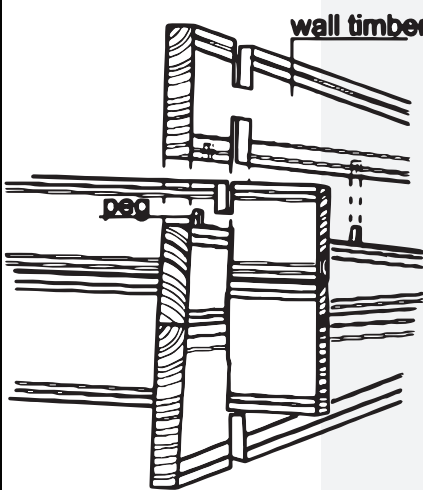
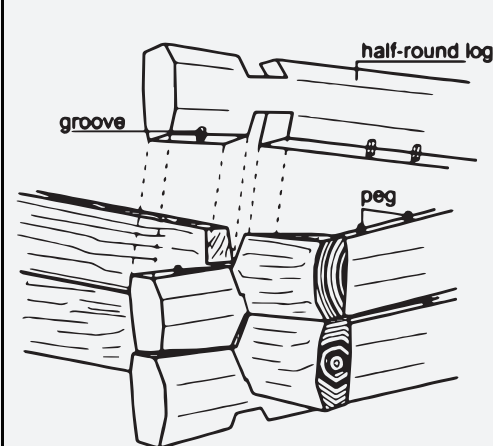


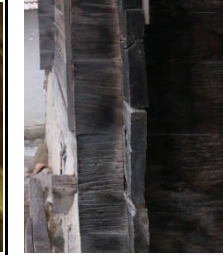



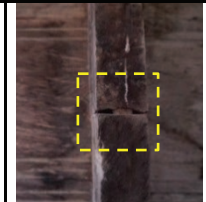
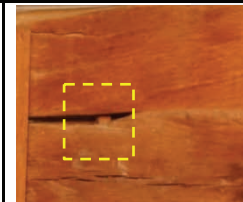
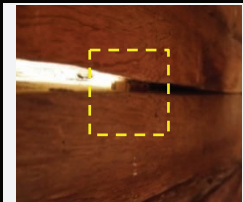
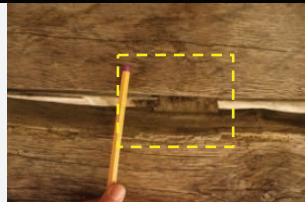
#### 3.2.1 Timber Load-Bearing Walls with Corner Joint:

Timber load-bearing walls, through their corner connection, can be classified as log walls (karabogaz) and timber (rectangular sawn) load-bearing walls (kurtbogaz), known as 'canti' (local term in Turkey) or 'catmabas' (local term in Kavak). Central Asia archeological excavations show that log walls (karabogaz) technique was known since BC.900-800. [12] All studied mosques except Cakalli Mosque were built by 'kurtbogaz' technique. Exceptionally Tatarmuslu Mosque's walls were built by a kind of different 'kurtbogaz' technique with half-round logs as an original construction technique for the district. (Table 3)

#### Construction steps of the timber load-bearing walls with corner joint:

1. Ground beams were laid on footing stones or subbase.
2. Floor joists and floor boards were placed without assembling.
3. Woods in log or rectangular shape were laid one on top of another and were jointed at corners by simple cross lap technique. The overlapped timbers were secured by pegs (wooden nail) which were in different forms and sizes.

**Table 3: TIMBER LOAD - BEARING WALLS WITH CORNER JOINT FEATURES**

 <p>log walls</p> <p>'karabogaz' joint technique</p>	 <p>wall timber</p> <p>peg</p> <p>'kurtbogaz' joint technique (Kosaca Mosque)</p>	 <p>half-round log</p> <p>groove</p> <p>peg</p> <p>'kurtboğaz' joint technique (rare type) (Tatarmuslu Mosque)</p>		
<p><b>DETAIL PHOTOS OF CORNER JOINTS</b></p>				
 <p>BEKDEMİR M.</p>	 <p>KOSACA M.</p>	 <p>ALAGOMLEK M.</p>	 <p>DERE M.</p>	 <p>TATARMUSLU M.</p>
<p><b>PEGS ON TIMBER LOAD-BEARING WALLS</b></p>				
				
<p>BEKDEMİR M. on the exterior walls</p>	<p>KOSACA M. on cross lap joints</p>	<p>ALAGOMLEK M. on the exterior walls</p>	<p>DERE MOSQUE on the exterior walls</p>	<p>TATARMUSLU MOSQUE two overlapped beams under eave</p>

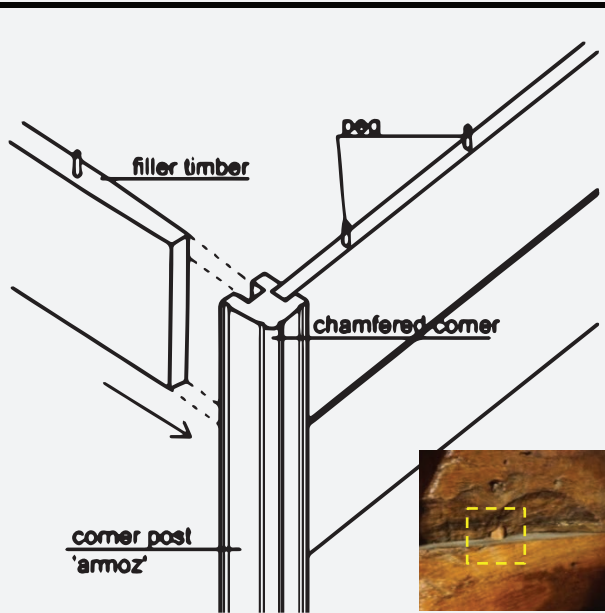


### 3.2.2 Post and Plank Walls:

This wall construction types consist of full-length grooved wooden posts (*armoz direği*) at the corners and overlapped planks. This construction technique was also presented in other academic studies as wood infilling system [13] or block timber fill walls [14]. Only Cakalli Mosque's walls were built by this technique among studied Kavak Mosques.

### Construction steps of the block timber fill walls:

1. Corner, central and door-window posts were placed on ground beams by mortice-tenon technique.
2. Timber ends are tapered by axe and timbers were laid horizontally by placing in the splines of the posts. (Table 4)
3. Corner posts were supported by wooden diagonals inside of the mosques' walls.

**Table 4: BLOCK TIMBER WALLS CONSTRUCTION TECHNIQUE – CAKALLI MOSQUE\***

			
Corner Wooden Post ( <i>armoz</i> ) Detail	Peg Detail**	Corner Post	Wooden Diagonals
<p>* This technique was only used for Cakalli Mosque.</p> <p>** Pegs used in Cakalli Mosque are in cylindrical shape while the other mosques' pegs are in rectangular shape.</p>			

### 3.3 Posts

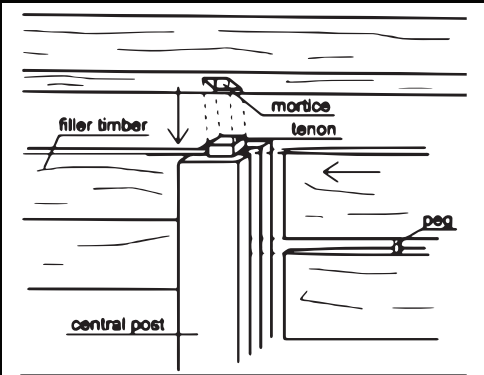
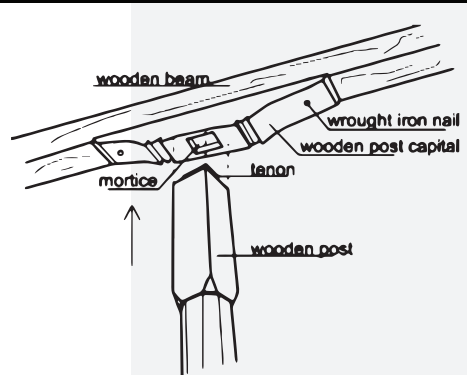
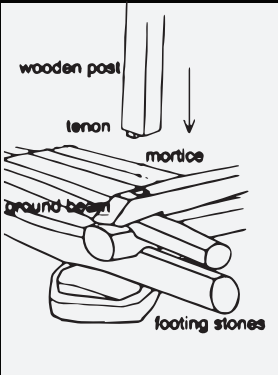
In six Kavak mosques, wooden posts were used as vertical load-bearing elements. It is observed that they were in three different places as load-bearing wall (roof loads), main prayer hall 'harim' (gallery, roof structure loads) and porch 'revak' (eave loads) constructions. Full length grooved posts used at the load-bearing walls can be classified as corner posts (*armoz*), window-door posts and central posts (used where timber length is not long enough).

Wooden posts in main prayer hall (*harim*) and porch (*revak*) are composed of two main parts: body and capital. Some of the post bodies and capitals were shaped roughly by axes and some capitals have geometrical ornaments created by wood carving. There is an extraordinary ornamented post capital which unites two wooden posts in Dere Mosque entrance.

**Table 5: POSTS FEATURES**

	BEKDEMIR M. (16 <sup>th</sup> century)		ALAGOMLEK M. (17 <sup>th</sup> century)		TATARMUSL U M. (18 <sup>th</sup> century)		DERE M. (19 <sup>th</sup> century)		CAKALLI M. (19 <sup>th</sup> century)		KOSACA M. (18/19 <sup>th</sup> century?)	
	Ins.	Outs.	Ins.	Outs.	Ins.	Outs.	Ins.	Outs.	Ins.	Outs.	Ins.	Outs.
PBH (cm)	180-215	460	190-210	205	-	114 - 238	189	245	280	287	242	215
PBS	circle		rectangular			rectangular	Chamfered square		circle	hexagon	Chamfered square	
PBM (cm)	2r: 13	2r: 15	11x14	9x12	-	13x16	13x14	14x15	2r: 13	13x13	13x13	13x15



POST DETAIL FEATURES		
		
Central Post - Beam Connection Detail Alagömlük Mosque	Post Capital – Beam Connection Dere Mosque	Ground Beam – Post Connection (Dere M.)
<p>- <b>Abbreviations:</b> <b>M</b> (Mosque) <b>PBH</b> (Post Body Height) <b>PBS</b> (Post Body Section) <b>PBM</b> (Post Body Measurements)</p> <p>* In this phase of the research, a typology study could not have done because post capitals' sizes and ornaments are changeable even in the same mosque.</p>		

All wooden posts used in Kavak Mosques are made from oak wood. Wooden posts and capitals were jointed by mortice-tenon technique and wrought iron nails were used for capitals and wooden beams' connection. (Table 5)

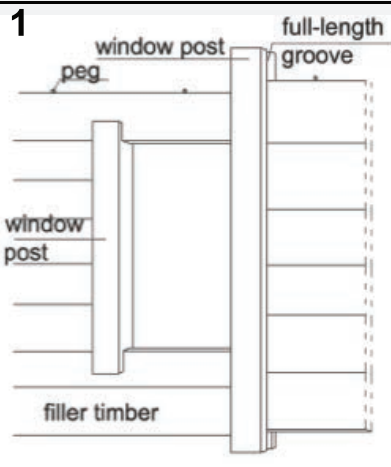
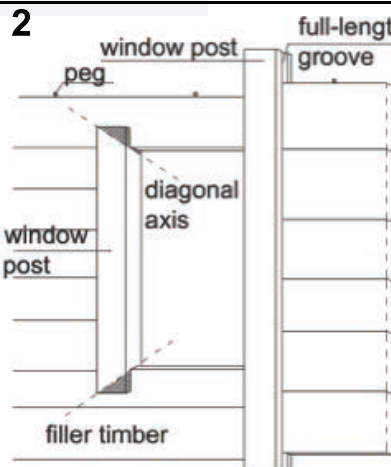
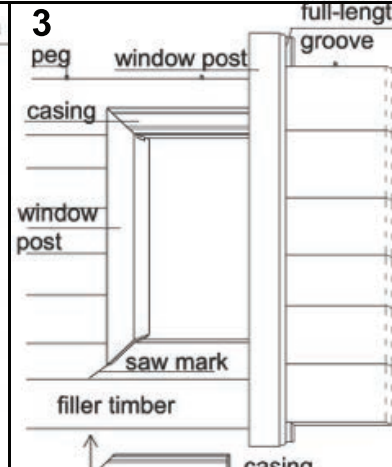

### 3.4 Doors – Windows – Window Shutters

There are few openings on the Kavak mosques' main prayer hall walls due to the architectural feature of the load-bearing walls. In the field study, it is observed that two different techniques were used for doors and windows openings: to cut the wall timbers or to place

wooden posts, which had vertical splines like 'armoz', in the wall construction. Batten doors, double rebated doors, sash windows, sliding windows, casement windows and window-shutters were used in Kavak mosques.

Table 6: DOORS-WINDOWS-WINDOW SHUTTERS PHOTOS				
				
Bekdemir M.	Alagömlük M.	Koşaca Mosque	Bekdemir Mosque	Cakalli Mosque






Table 7: WINDOW CONSTRUCTION STEPS		
<p><b>1</b></p> 	<p><b>2</b></p> 	<p><b>3</b></p> 
<p>Construction steps of the windows by placing wooden posts:</p> <ol style="list-style-type: none"> <li>1. Window posts were placed considering the opening width. Posts' height could be equal or longer than the windows'.</li> <li>2. Wood posts' upper and lower parts were cut with 45° angle by saw to place window casings diagonally. Remained marks of saws still exist on the timbers.</li> <li>3. Window casings were placed and nailed to the wall.</li> </ol>		
		 <p><b>Saw Mark / Bekdemir Mosque</b></p>

### 3.6 ROOFS – EAVES – CEILINGS

All Kavak mosques, except Tatarmuslu Mosque, have hipped roofs and the roof construction system, consisting ridge, purlins and rafters, could not be seen from *harim* because of ceilings. While Bekdemir, Kosaca and Cakalli Mosques have original ornamented wooden ceilings (Table 8); Dere and Alagomlek Mosques ceilings boards were placed afterwards. The eaves were

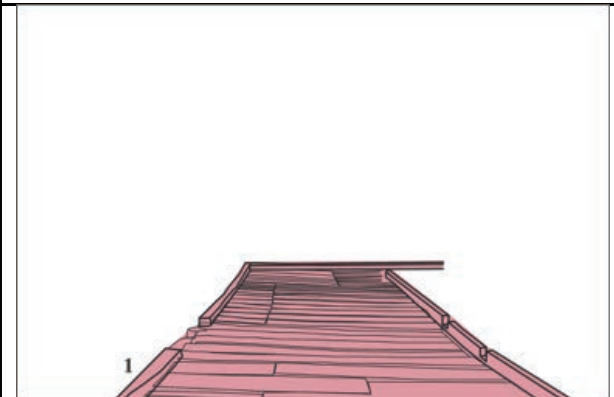
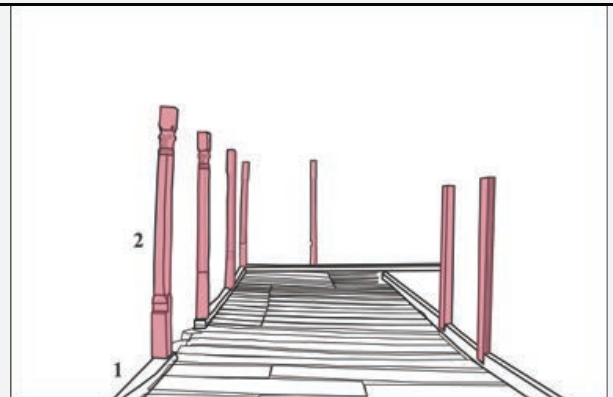
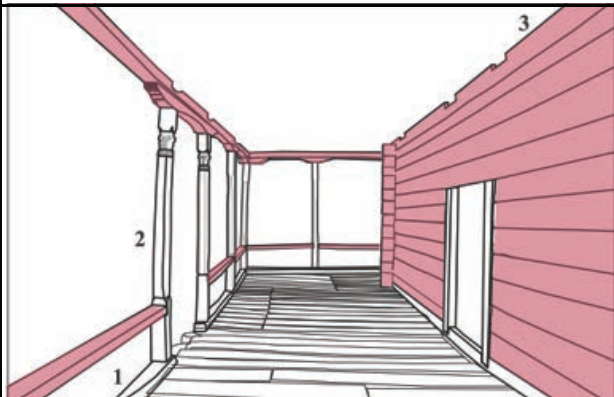
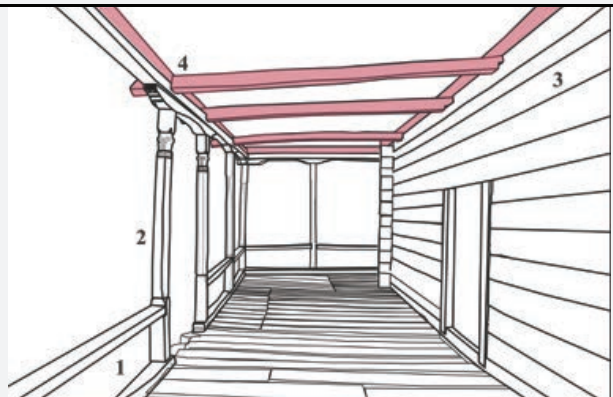
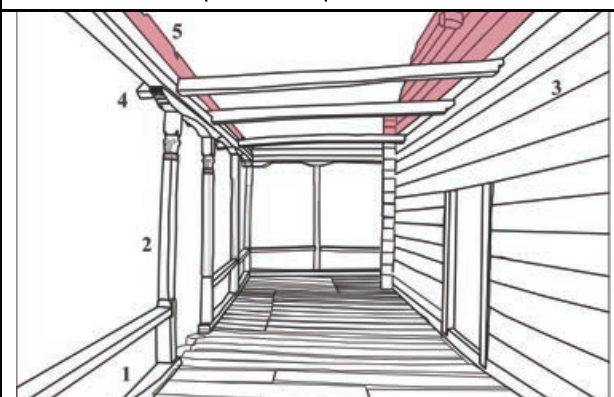
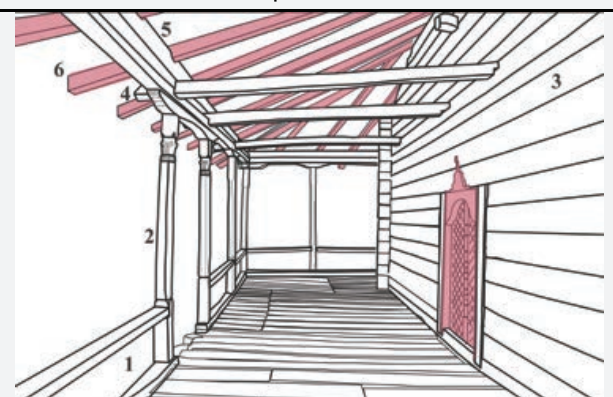
constructed wide as to avoid rainwater damage. It is observed in the field study Tatarmuslu mosques' original wooden rafters have drip edges (Table 8). For roof construction oak, pine and chestnut woods were used. As roof covers, mission (*alaturka*) and Marseilles (French) tiles exist today. However, in some previous studies, wood roof cover (*hartama*) usage was stated for these mosques.

Table 8: PHOTOS OF ROOFS – EAVES - CEILINGS		
 <p>Dere Mosque's Roof</p>	 <p>Rafter - Drip Edge Detail Tatarmuslu Mosque</p>	 <p>Original Ceiling Detail Bekdemir Mosque</p>

#### 4 EVALUATIONS: CONSTRUCTION TECHNIQUE STEPS

Kavak mosques' architectural details, which were studied in detail above, are evaluated, it is seen that they have a construction order which reflect the

traditional architecture characteristics of the district. In the table 7 given below, these main construction steps are presented on Dere mosque's Revaq part.

Table 7:	CONSTRUCTION STEPS OF DERE MOSQUE
	
<p>1. Floor boards are placed on floor joists after ground beams laid on the footing stones.</p>	<p>2. Wooden posts and door posts are placed on ground beams by mortice-tenon technique.</p>
	
<p>3. Timbers are built until wooden beam level. Balustrades are placed on posts.</p>	<p>4. Beams, connecting wooden posts to <i>harim</i> walls, and second beams on posts are laid.</p>
	
<p>5. Third beam as to place rafters is raised and <i>harim</i> walls' building is completed.</p>	<p>6. Rafters are placed on the third beam and door leaf is placed.</p>

## 5 Conclusions

Timber religious buildings existence is known in Japan to Sweden all over the world. [15] To document the extent and sustained construction details of Kavak mosques is very important for conservation of wooden religious architectural heritage, which has ecological and sustainable architectural features.

By this study it is observed that, Kavak mosques' construction techniques were based on natural and climatic conditions. The main principle construction is to lift the buildings from the ground as to protect wood material from the humidity. The other common architectural feature is that all these mosques have load-bearing timber walls constructions. Most preferred technique for the walls is cross lap (kurtboğaz) joint detail. This technique, which was also used for civil architecture widely in Eastern Blacksea Region, has not been documented in Kavak district yet. By this research, some original construction details of the openings were documented for the first time from the saw traces seen on the wall surfaces. During the study, it is observed that Kavak mosques' some construction details have similarities with European joint details as mortice – tenon, Jupiter, half lap, cross lap techniques.

Each Kavak mosques have some important conservation problems, which affect the constructions and materials, such as lack of users, deterioration of wood materials due to external climatic conditions and unqualified interventions, unreachable local wood materials to use restoration works, absence of qualified masters of old carpentry and damages related moved mosques (missed detail, painted numbers on walls, etc.). In addition to this, even they are restored, they are threatened by lack of users due to their location.

As it is stated in ICOMOS Principles for the Preservation of Historic Timber Structures (1999), proposed interventions for Kavak mosques' conservation problems should follow traditional means. In the scope of these principles, it is aimed to document in detail Kavak mosques' traditional construction techniques and materials by this study.

It is hoped that, this research will be a documentation database for conservation of the religious architectural heritage and the understanding of the other wooden mosques' traditional construction techniques in the area.

## References

- [1] **TUNA, C.** Orta Karadeniz Bölgesi Sahil Kesiminde Geleneksel Mimari, İstanbul, Arkeoloji ve Sanat Yayınları, 2008.
- [2] **Kuniholm, P.**, Dendrochronologically Dated Ottoman Monuments. <http://dendro.cornell.edu/articles/kuniholm2000a.pdf>. (date accessed: 23.03.2016)
- [3] **CAN Y.** Samsun Yöresinde Bulunan Ahşap Camiler , inceleme araştırma dizileri:11, 1.Basım, İstanbul, Etüt Yayınları, Mart 2004.
- [4] **DONMEZ E.N.** Wooden Mosques of the Samsun Region, Turkey From the Past to the Present, In the Light of Surveys Carried Out in the years 2001-2003. , BAR International Series 1820, Basım sayısı yok, England, ? , 2008.
- [5] **NEFES E.** Samsun Yöresindeki Son Dönem Ahşap Camiler, inceleme araştırma dizisi, 1.Basım, Samsun, Etüt Yayınları, Ekim 2009.
- [6] **BAYRAKTAR M.S.** 'Samsun'da Türk Mimarisinin Gelişimi', Samsun Araştırmaları. , ed. Cevdet Yılmaz, Genişletilmiş II. Basım, Cilt 3, Samsun, Samsun Büyükşehir Belediyesi Kültür ve Sosyal İşler Dairesi Başkanlığı, Ağustos 2013, p1-22.
- [7] **AKDAG K.** "Kavak(Samsun) Yöresi Kretase Flişlerinin Sedimentolojik İncelemesi", Unpublished PhD Thesis, Karadeniz Technical University, Trabzon, 1992.
- [8] *Archive documents of Samsun Regional Council of Conservation*
- [9] *Archive photos of Samsun Directorate of Foundations*
- [10] **VALENTINE J-L.** Le Colombage, Mode D'emploi. Groupe Eyrolles, Paris, 2007.
- [11] **VALENTINE J-L.** La Charpente, Mode D'emploi. Groupe Eyrolles, Paris, 2014.
- [12] **MYGLAN V.O. & others.** 'The Royal Tomb of Arjan-2, Tuva: A Dendrochronological Study', Archaeology, Ethnology & Anthropology of Eurasia. , 4(28), 2006, p.130-138.
- [13] **GULER K, BILGE A.C.** "Construction Techniques of the Vernacular Architecture of the Eastern Black Sea Region", Vernacular Heritage and Earthen Architecture Contributions for Sustainable Development. ,ed. Correia, Carlos & Rocha, Taylor & Francis Group, London, 2014, p.295-300.
- [14] **ARUN G.** 'Evolution of Timber Construction in Turkey', Archi-Cultural Translations through the Silk Road -2nd International Conference, Mukogawa Women's Univ, Nishinomiya, Japan, July 14-16, 2012 Proceedings, p.225-230.

[15]bDOLU Y.B.. “Kocaeli ve Çevresinde Çandı (Ahşap Yığma) Teknikle Yapılmış Camiler” Gazi Akçakoca, Kocaeli Belediyesi, s1685-1701.

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#### NOTES:

- 1 An unpublished paper with title ‘Space Analysis of the Wooden Mosques in Kavak-Samsun, Central Blacksea Region of Turkey’ will be presented in Islamic Heritage Conference - Valencia, Spain in May 2016.
- 2 This research is an ongoing study as master thesis in Yıldız Technical University, Department of Architecture – Units of Architectural Conservation conducted by Aynur Çiftçi as advisor.
- 3 Preferred English wood structure terminology is based on mostly used terms in scientific studies. The other preferred terms are also given in the parenthesis. Local terms are stated in inverted commas and italic.
- 4 All photographs and drawings in the article, unless stated otherwise, belong to Zeynep Uzun.



# Records of The 19th IIWC Symposium and General Assembly

The 19th Symposium and General Assembly of the ICOMOS International Scientific Wood Committee IIWC were developed with great success in the city of Himeji, Japan, from September 17 to 20 of 2013.

The 19th Symposium and General Assembly of the committee were summoned by Nobuo Ito Honorary Member of the ICOMOS International Scientific Wood Committee and by Gennaro Tampone current president. Nobuo Ito and Gennaro Tampone performed as co-chairmen and María de Guadalupe Zepeda Martínez and Yasuhiro Watanabe as secretaries of the 19th General Assembly of the ICOMOS International Scientific Wood Committee IIWC celebrated in Himeji. The Japanese organizing committee was formed by Yasuhiro Watanabe, president, María de Guadalupe Zepeda Martínez, honorary member, Toshikazu Tsuchimoto, Erika Koshi and Ayako Horiuchi as secretaries.

The headquarters of the symposium was the Himeji Center for Research into Castles and Fortifications that is located in the historic center of the city of Himeji. In December of 1993 the Himeji-Jo Castle with Horyji was inscribed in the World Heritage List of the UNESCO. This palace also called White Heron Castle, functioned as fortress, combining the graceful and elegant architecture. It was built in the period of 1601-1609 by Terumasa Ikeda. As any battle was held in this fortress, the site was preserved along the time, basically intact.

Additionally the architectural complex called "Coalition Style Donjon" is the only one in the country, and hence a very rare cultural asset. Only 12 donjons remain in Japan, with just four of them appointed National Treasures: Himeji Castle, Matsumoto Castle, Inuyama Castle, and Hikone Castle. As castles representative of the Japanese history and culture, these certainly need to be transmitted to the future generations.

The participants to the symposium were the following:

## Members of the ICOMOS International Scientific Wood Committee

Tampone Gennaro	President	Italy
Zepeda Guadalupe	Secretary General	México
Grendinning Mary		Canada
Mc. Gillivray Ianada	Board member IIWC	Canada
Kaila Panuand		Finland
Wik TinaSweden		Sweden
Ito Nobuoapan	Honorary Member	Japan
Nishi Kazuhiko		Japan
Tsuchimoto Toshikazu	Organizing Committee	Japan
Watanabe Yasuhiro	Board Member,	Japan
	Organizing Committee	

## Coordinators

Inaba Nobuko	ICOMOS Japan	Japan
Naito Akieda Yumi Isabelle	ICOMOS Japan	Japan

## Cooperators and support

Yamato Satoshi	ICOMOS Japan	
Nishimura Yukio	President	ICOMOS Japan
Yano Kazuyuki	Secretary General	ICOMOS Japan
Murakami Yasumichi		ICOMOS Japan
Nishi Kazuhiko		Japan
Nishimura Yasushi		Japan
Tanaka Yasuhiro	Hyogo Prefecture	Japan
Katoh Shuji	Chief of Himeji-Jo Castle	
	Conservation project on	
	site office, the Japanese	
	Association for Conservation	
	of Architectural Monuments	Japan
Fukunaga Akihko	Himeji City	Japan
Ootani Akihko	Himeji City	Japan
Fukuda Takeshi	Himeji City	Japan
Koshi Erika	Organizing Committee	Japan
Horiuchi Ayako	Organizing Committee	Japan
Senpukiji Kohel	Organizing Committee	Japan
Kim Seonghoon	Organizing Committee	Japan

The topic of the symposium was **Technical Advances and Updating the Principles for the Preservation of Timber Historic Structures** (1999). These Principles were presented by the first time in the Meeting of Morelia in 1999; later on, these began to be updated in the 18th IIWC Symposium and General Conference held in Guadalajara Mexico (2012) and in the

present 19th Symposium and General Assembly developed the formal conclusion of this task. In this occasion were also included Reports of the Countries concerning their Heritage with the objective of forming a database of the highest usefulness for the timber heritage management and preservation.

During the symposium seven master conferences were presented by experts from these countries: Italy, Canada, Japan, Mexico, Sweden and Finland. Other 21 people attended to different parts of the event, and the staff of the organizing committee was constituted by five persons working permanently.

The symposium was developed from September 17 to 22 according to the following agenda:

On September 17 began the registration of participants and the Opening Ceremony, with the master conference “Works of conservation of the Himeji-Jo Castle since the beginning to the present”; technical visit to the restoration works of the Himeji Castle, presentations, presentation of the book *Updating the Principles of Conservation of Historic Timber Structures*, with the works of the 18<sup>o</sup> Symposium and general Assembly of the Scientific Wood Committee that was celebrated in Guadalajara, Mexico in November of 2012. This publication was coordinated by Gennaro Tampone and María de Guadalupe Zepeda Martínez. At the end of the day was presented an interesting practical exhibition on technologies of Japanese traditional carpentry following with the inaugural dinner for the participants.

On September 18 was developed an intense session of reports, where the participants presented the Reports of the timber cultural heritage of their respective country and their comments for updating the Principles. In the afternoon began the session to examine the 1999 Principles, coordinated by experts and academics of ICOMOS Japan. The General Assembly of the ICOMOS International Wood Scientific Committee was developed before concluding the works of this day.

On the 19th was presented the master conference “Conservation of the Japanese Cultural heritage” and in the afternoon continued with the discussion for updating the 1999 Principles until the final conclusion. At night was celebrated a closing dinner for the participants. On the 20th was carried out the technical visit to

the Shoshazan Engyou-ji Sanctuary. On September 22 we made an interesting visit to the conservation works of the Higashi Honganji Temple that is the largest timber heritage structure in the world; it is located in Kyoto, where an interdisciplinary discussion was developed about the exposed topics.

## Background

In November of 2012, in the framework of the **18th Symposium and General Assembly of the ICOMOS International Scientific Wood Committee** organized by Dra. María de Guadalupe Zepeda Martínez and **Professor Gennaro Tampone** at the Regional Museum of Guadalajara, Mexico, the Japanese delegation headed by Nobuo Ito proposed their country, Japan, as official headquarters for the celebration of the 19th Symposium and General Assembly of the ICOMOS International Scientific Wood Committee IIWC for the following year 2013, motion that was accepted immediately with enthusiasm by the assistants.

## 19th Symposium of The Icomos International Scientific Wood Committee

The symposium was held from September 17 to 22 in the city of Himeji, Japan.

It began on **September 17** having as headquarters the Himeji Center for Research into Castles and Fortifications, with the registration of 28 people registered between speakers and participants to the symposium.

The Symposium officially began in the Auditorium of the Research Center with the presence of the following personalities in the **presidium**:

1. **Gennaro Tampone**. President of the ICOMOS International Scientific Wood Committee.
2. **Nobuo Ito**. Honorary member of the ICOMOS International Scientific Wood Committee.
3. **María de Guadalupe Zepeda Martínez**. Holder investigator C of INAH-Mexico and Secretary General of the ICOMOS International Scientific Wood Committee.
4. **Yasuhiro Watanabe**. President of the organizing committee of the 19th Symposium.

5. Yukio Nishimura, President of ICOMOS Japan.
6. Kazuyuki Yano, Secretary General of ICOMOS Japan.
7. Satoshi Yamato, member of ICOMOS Japan.
8. Yasumichi Murakami, member of ICOMOS Japan.
9. Nobuko Inaba, member of ICOMOS Japan.

The first speaker was **Gennaro Tampone**, President of the ICOMOS International Scientific Wood Committee (IIWC) who thanked the hosts for the organization of the 19th symposium. He explained the importance of this symposium and its objectives given the urgency to prepare the updated official document of the Principles for the Preservation of Historic Timber Structures so that it can be presented during the next international encounter in Florence Italy in 2014.

The Secretary General of the Committee (IIWC) **María de Guadalupe Zepeda Martínez**, gave a brief message in Japanese in which she thanked the attentions received from the Japanese organizing committee, and she invited the assistants to the Symposium to put all their effort and attention in the tasks of updating the Principles of 1999. She also gave (in English) a brief summary of the previous symposium held in Guadalajara Mexico in 2012, in which highlighted the agreements and conclusions of the participants. Zepeda Martínez expressed that there was a strong bond of the activities carried out in Mexico in 2012 with those that were about to begin in the city of Himeji, Japan.

Following, **Nobuo Ito** Honorary Member of the International Scientific Wood Committee, co-chairman of the 19th IIWC Symposium and General Assembly and main host, thanked the presence of the participants coming from Italy, Canada, Mexico, Finland and Sweden as well as to the Japanese participants and the collaborators of the symposium.

Afterwards, **Nobuko Inaba** member of ICOMOS manifested that updating the Principles (1999) was of the highest importance so she would participate as coordinator of the working sessions in order to develop this task with an enriching and smooth writing.

## Development of master conference and technical visit to the conservation site of Himeji Castle.

After the inauguration was presented the Master Conference of Shuji Katoh called “Conservation Works of Himeji - Jo Castle; from its birth to present”, in which talked about the cultural and architectural values of Himeji Castle starting from the following points:

1. Importance of the town of Himeji in the history of Japan.
2. First foundation of Himeji-Jo Castle.
3. Geographic surface of the castle settlement.
4. Major renovation works to the castle.
5. History of the maintenance and preservation of the castle.
6. Transmission of the castle from private property to property of the government of Japan.
7. Major repairs to the castle.
8. Current repairs (Current restoration project).
9. Conclusions about the installation to repair the building and the importance of this monument as symbol of the city of Himeji.

This report was like a wide introduction to the visit that was made to the Himeji Castle in the afternoon.

## Technical visit to the Conservation Site of Himeji Castle.

This visit was in charge of **Shuji Katoh** who showed the different intervention levels that the building is having simultaneously: he began with the consolidation works of the stone base of the building. Then showed the works developed in the wooden plank walls and opening frames; in another floor could see the works performed on the roof tiles, plaster and painting. We could observe that the restoration works can be seen by the public interested from a room with a large window. The participants of the symposium could make questions and request additional information to the director of the project.

As final activity of this day was offered a welcome dinner to the participants where Gennaro Tampone and María de Guadalupe Zepeda Martínez thanked the attentions received and exposed the expect-

tations of the symposium in the subsequent working days.

On September 18 was opened the session of reports with a message of **Nobuo Ito**, honorary member of the ICOMOS International Scientific Wood Committee (IIWC).

Nobuo Ito manifested the importance of the Country Reports because they allow us knowing the elements forming that heritage and the state of those elements; the strategies of each country to assist and to preserve the elements of the cultural heritage and the instruments, personnel and technical capacity with which interventions in monuments are carried out. Likewise, he invited the participants to comment the Principles (1999) and to present proposals for their updating.

Following, **Gennaro Tampone** presented the Country Report: Italy, commenting the current state that keeps the timber cultural heritage, making emphasis in the importance of the database to be formed starting from the information gathered in the country reports. In his report he commented that the Principles established in 1999 were contradictory in some of their postulates; it seems that these do not considered “the diversity” existent in the different cultures and it does not define accurately the values of historic structures to be conserved. He proposes to know if in the participant countries there are laboratories and operators qualified to carry out the fundamental analyses like the determination of the species present in the structures, surveys of wood deterioration and dating.

**Ian McGillivray** of Canada presented the Country Report: Canada, the following examples of timber architecture in the country: St. John's Temple in Lunenburg Nova Scotia, Gage House in Stoney Creek Battlefield Park, Erchless Coach House in Oakville, Ontario, 1860; Train Station in King City, Ontario 1852, Barns of a Farm of 1860 in Churchville, Uncle Tom's Cabin Henson House in Ontario, Arowhon Pines 1938, Library of Parliament in Ottawa, 1876, Her Majesty's Royal Chapel of the Mohawks 1785, Sharon Temple 1832, Scadding Log Cabin 1874 The oldest House in Toronto, Misener House, in the Westfield Pioneer Village, Le Château Montebello 1939, in its interior and exterior, indicating that the intervention levels were equivalent to those that were expressed

in the Principles (1999). He proposes that the Principles should be enough flexible to recognize the cultural and regional practices used in the maintenance and renovation of the historic structures. The rigid interpretations about the original finishing of the structures that have been renewed for a long time are not adequate to evaluate the materials that although have been there for a long time, they are not the original.

**Yasuhiro Watanabe**, presented the Country Report: Japan, and referred to the following monuments: Horyuji Kondou Temple and five-storied Pagoda of the 7th century, Toshodaiji Temple of the 8th century, Todaiji Daibutsuden of the 17th century in Kyoto, the largest of the world, Itsukushima Jinja of the 16th century, Nijojo Ninomaru-Goten of the 17th century, Nikkou Toshougū Youmeimon of the 17th century, Katsurua Rikyu of the 17th century, Wadake Residence of the 19th century. He commented that the Principles for the case of Japan are very satisfactory, but recognizes that these do not respond fully to the necessities of some countries, so he recommends discussing them.

**María de Guadalupe Zepeda Martínez** presented the lecture *Technical Advances and Updating the Principles for the preservation of historic timber structures of 1999; case of the timber architecture in the mountain area of the occident of Mexico*. She explained the historic importance of these settlements with monuments in use that are indigenous communities; the wixariatari, whose manufacturing techniques are registered in historic primary sources of the 16th century. She showed how the Principles of 1999 are insufficient to protect these monuments, as well as the omissions of the Federal Law on Archaeological, Artistic and Historic Monuments and Areas reformed in 2012 and the lagoons of the Venice Charter reformed in 2012, regarding the protection of this cultural heritage. She proposed the following for Updating the Principles of 1999: 1) to include in the Principles the *anthropological value* that gives foundation and guarantees the preservation of timber traditional architecture: the protection of the indigenous traditions and rituals associated to these testimonies. 2) To include the protection of forests with timber species of cultural value. 3) To enlarge the vision of the preservation of timber monuments from a holistic and integral perspective that contemplates nature and social aspects associated to the preservation of these structures. 4) To integrate the items of cooperation and



collaboration between the member countries and generate commitments of the scientific committee for the exchange of experiences and interventions. 5) To create a committee of economic promotion to assist urgent cases of preservation of timber monuments in developing countries.

She presented briefly the Country Report: Mexico, and referred to the following monuments: La petatera of Villa de Álvarez, in Colima, the Artesón (wooden coffered ceiling) of Zacán in Michoacán, the trojes of San Lorenzo and San Antonio Aguas Blancas, the Wixaritari Temples: the Tukis of San Andrés Cohamiata, in Jalisco, the civil architecture of Tapalpa in Jalisco. Where she also proposed that; the Principles should include aspects like constructive traditional systems, associated to human rituals and local woods. Especially in the Latin American countries where monuments are inhabited by indigenous communities that require assistance, local woods of cultural value and basic services.

Tina Wik from Sweden, presented the Country Report: Sweden, referring to the following monuments: Eldhus Farm House in Mora (1237), Härbre House-Cellar in Älvdalen (1285), Ornässtugan Farm House in Falun (16th century), the interior of Ornässtugan, the roof structures of Örebro 1690, the roof structures of Örebro 1898, the Örebro Castle 1570-1623, Drottningholm Castle, Interior of the Drottningholm Castle of the 16th century, interior of the Drottningholm Castle Theater of the 18th century. She commented that the Principles of 1999 were well. The single objection was that these followed the Venice Charter too close without considering the modern conservation of timber buildings. She referred to the importance of conserving the traditional trade of carpenter and of not integrating unaware materials to the wood in actions of reinforcement or reinstatement of lacks. She proposes for the Principles to add **aesthetic value** in the postulates.

Panu Kaila, presented the Country Report: Finland, and proposed that the Principles should consider the differences between traditions and they should not propose global postulates or general standards.

In the afternoon began the first session for the review of the Principles of 1999 coordinated by Nobuko Inaba and Yumi Isabelle Naito Akieda, where Gennaro

Tampone presented a preliminary review to revise them. The assistants accepted to work with this document for updating the content, adding definitions, and values, and repeated or not appropriate parts were eliminated. The updating of the text was also made, clarifying and refining the points.

Then was celebrated the General Assembly of Members of the International Scientific Wood Committee IIWC, where the President Gennaro Tampone, commented that he would attend the Meeting of the Scientific Committee in San José de Costa Rica in October, meeting in which would present the results of the meeting in Himeji Japan, and the participants accepted the announcement. He invited to all those present to participate in the International Symposium and General Assembly of the Wood Committee in Florence Italy in November of 2014.

In the morning session of **September 19** was presented the master conference of **Mr. Santoshi Yamato**, Counselor of Cultural Property of the Agency for Cultural Affairs of Japan, “Conservation of the Japanese Cultural Heritage”, where he presented a chronological and historical sequence of the formation of the Japanese architectural cultural heritage; then explained the different interventions to safeguard this heritage.

In the afternoon session continued the second part to **review the Principles**, concluding the whole text with the following updating.

1. It was considered pertinent to add of a section of definitions of timber heritage at the beginning of the document since the original lacks this section.
2. It was agreed to add a glossary of specific terms in order to avoid confusions in their interpretation.
3. It was suggested to substitute the term “consolidation” for “reinforcement” of timber structures, in order to define more faithfully the treatment of weakened timber structures.
4. It was agreed to restrict the application of actions of disassembly and dismantlement of timber structures to the cases of urgent necessity in the intervention of the monument.
5. It was agreed to carry out the study for the knowledge of the traditions and rituals associated to timber architecture.

6. It was considered pertinent to edit a text of Preliminary Considerations to the principles. The Preliminary Considerations will express the new focuses that the Principles will have. The Anthropological Values and Aesthetic Value were added in the assessment of timber monuments so that in the first be considered examples of timber architecture of indigenous communities that have vernacular architecture of cultural value; and in the second so that ornamental elements of the image are conserved and the new elements are integrated to the rest of the monumental unit. The participants of the assembly agreed.

The review of the whole document and all the articles of the Principles was finished with the support of the coordinators. The participants finished the session of review of the 1999 Principles to be presented in the Meeting of the International Committee in November of 2014 in Florence, Italy.

**Nobuo Ito** invited all the assistants to participate in the Tea Ceremony in a Cultural Center, Downtown of Himeji. After the ceremony we had a Closing dinner with all the participants in a traditional restaurant of the city.

On September 20, thanks to managements of Yasumichi Murakami, member of ICOMOS Japan was carried out the technical visit to the monumental complex of the Buddhist Monastery of Shoshazan Engyou-ji. This site has 18 monumental elements of interest built on the top of the mountains near the city of Himeji. The convent is visited by pilgrims and tourists during the whole year and at present time some of the temples of the ensemble are undergoing a restoration process. To consent, it is necessary to travel on a highway from Himeji and then to take the funicular in a service station to ascend to the mountain.

**Yasumichi Murakami**, requested a brief interview with the abbot of this Buddhist monastery for all the participants. The monk offered tea while the restoring architects explained the restoration works that were carried out in that moment in the different monuments that shape the complex. They gave us an envelope with printed information (external elevation surveys, of the four sides, and floor plan of the interior stores, besides a catalog of the traditional constructive

systems) of the following buildings: Engyji Daikodo (Great Auditorium), Engyoji Jikido (Dining room) and the Engyoji Jyogyodo (Temple).

We visited the different temples of the complex, especially those in process of restoration, where a guided visit was made to the works of reinforcement of the weakened structures. The participants could make observations and discussed the characteristics of the traditional constructive systems. An explanation was made of the arboreal species Japanese Cypress from which are extracted the thin and fine wooden sheets that form the cover of these enclosures.

The participants enjoyed the lunch offered by the Buddhist community as sample of hospitality and support to the activities of the 19th IIWC Symposium 2013.

Thanks to the invitation and managements of **Nobuo Ito**, on September 22 in a morning session, some of the participants visited the Restoration of Higashi Honganji Temple, in the city of Kyoto.

**Goeido (Founder's Hall)** is one of the largest timber structures in the world. Destroyed by the fire four times since its original construction in 1602, the current structure was reconstructed in 1895 by **Heizae-mon Ito**, architect and carpenter who was director of the restoration project.

The **Goeido** restoration project represents the first time in which a company like **Nikken Sekkei** has been called to carry out the restoration of a monument of high cultural value in Japan. The technical interview and the guided visit were conducted by **Akira Ninomiya**, Design Director of the Restoration Project of Higashi Honganji and Supervisor of Design and Construction, **Shigezo Furui** advisor, vice-president and construction administrator, both of the **Nikken Sekkei** company. **Nobuo Ito** is advisor member of the **Goeido** restoration project.

A session was held in a room with projection to explain the works that are carried out in the large covers of the temple. The main conservation problems were mentioned, the types of tiles and wooden supports that should be substituted were shown; also was explained the decision of eliminating an earthen substrate that

was traditional part of the structure of the temple's cover.

Then we had a guided visit to the place where works are being developed to reinforce the cover and replace missing tiles and substitute damaged tiles; likewise was presented the system to place tiles on the wooden support structure of the cover using copper wire fasteners. Other traditional constructive elements of interest were shown during the visit given their great structural importance.

Once the visit was finished, documents with surveys of the monument in restoration were delivered: elevations and plan as well as historic reviews of the building. The assistants left and this way concluded the 19th Symposium and General Assembly of the ICOMOS International Scientific Wood Committee IIWC 2013.

**Reported: Dra. María de Guadalupe Zepeda Martínez**  
Secretary General of the IIWC





# Record of the General Assembly of the ICOMOS International Wood Committee celebrated on November 13th of 2014 at the Faculty of Architecture of the University of Florence, Italy

In the framework of the 18th ICOMOS General Assembly and Scientific Symposium celebrated from November 10th to 14th of 2014, in Florence, Italy with the theme “Heritage and Landscape as Human Values”, according to five sub-themes: Theme 1: Sharing and experiencing the identity of communities through tourism and interpretation Theme 2: Landscape as cultural habitat Theme 3: Sustainability through traditional knowledge Theme 4: Community-driven conservation and local empowerment Theme 5: Emerging tools for conservation practice.

The General Assembly of the ICOMOS International Wood Committee was held on November 13th of 2014 at the Auditorium of the Faculty of Architecture of the University of Florence, Italy, at 15:00 hr.

## Participants

Professor Gennaro Tampone Clary. Italy. President  
Dr. Arch. María de Guadalupe Zepeda Martínez. Mexico. General Secretary  
Dr. Eng. Eleftheria Tsakanika. Greece. Board Member  
Arch. Yasuhiro Watanabe. Japan. Board Member  
Arch. Tina Wik. Sweden. Active Member  
Dr. Mikel Landa Esparza. Spain. Active Member  
Arch. Alazne Ochandiano Uriarte. Spain. Active Member  
M. Arch. Alejandro Martínez de Arbuló Honda. Japan. Active Member  
Arch. Tania L. Park. Tasmania. Active Member  
Arch. Pier Paolo.  
Arch. Paolo Uzelli

Professor Gennaro Tampone welcomed the assistants and submitted the following agenda to their consideration:

1. Projects to be developed by the ICOMOS International Wood Committee
  - A) Project on Security and Risk Prevention in conservation processes of historic timber structures

- B) Glossary Project
  - C) Country Report Project
  - D) Updating the Principles for the Preservation of Timber Structures
2. Support Programs for the members of the ICOMOS International Wood Committee.
  - A) COST Program
3. Presentation of the publication Who is Who of the ICOMOS International Wood Committee
4. Presentation of new members.
5. Agreements
6. General affairs

## The attendants approved the agenda.

a) Professor Gennaro Tampone spoke about the Project de Security and Prevention in conservation processes of timber structures in monuments, he presented the project's program of activities and invited the attendants to get involved and participate in its development.

Safety in the conservation workplace of a historic building includes respect and preservation of the aforesaid values and of those concerning the health of the people working on the building, combined with the stability of the construction, not only for its own sake but also for the safety of users.

The main themes of the Project were: Human Values of the Conservation Activity, Safety at the Conservation Workplace, and Specific Causes of Accident in the Conservation Worksite.

b) Likewise, Professor Gennaro Tampone invited the attendants to join the Glossary Project. In such project is intended to gather the technical vocabulary of Historic timber structures, the processes of wood conservation, and the tools. This project has as objective gathering these technical terms in the languages of the members of the committee, that to the date are English, Spanish, Italian, Greek,

Polish, among others.

Dr. Mikel Landa from Spain intended to include in this glossary a series of technical vocabularies of the Spanish carpentry with the aim of enriching this project.

c) Arch. Yasuhiro Watanabe presented to the attendants the Country Report project which consists on filling a format that requires information on the main built monuments in the countries of the committee's members. This project began in 2013, at the meeting of Himeji Japan, where the participants worked in updating the Principles for the Preservation of Historic Timber Structures and in the presentation of the country reports of the countries of the assisting members.

Arch. Watanabe invited all the members to contribute with this project filling the formats that include graphic and descriptive information of the monuments.

d) Updating the Principles for the Preservation of Historic Timber Structures. Professor Gennaro Tampone announced that he submitted officially the Principles for the Preservation of Historic Timber Structures that were reviewed in the General Assemblies of the Wood Committee in the city of Guadalajara, Mexico in 2012 and in the city of Himeji, Japan in 2013, to the Scientific Committee of the 18th Symposium of ICOMOS International for their approval. The scientific committee, through Pamela Gerome, informed Professor Gennaro Tampone that the approval of the submitted Principles should be only after their universal review by the members of the Wood Committee and by the committees involved with wood and between the members of the interested national committees. The scientific committee received the Principles with the promise of our committee to follow the revision and to deliver the final text by consensus in the following international symposium to be celebrated in 2017.

Arch. Tina Wik commented on this that few days after the 18th Symposium she received through internet the final version of the text of the Principles for the Preservation of Historic Timber Structures, but that the same as many members of the committee, she had not revised thoroughly the text, and that she also had suggestions and questions for some parts.

2. Eng. Eleftheria Tsakanika vocal of the Wood Committee referred to the European Cooperation in Science and Technology (COST) International Program.

COST was created in 1971 becoming since then the widest European net of research and collaboration and its main objective is to foster the internationalization of the science and to favor the integration of the 35 European countries plus Israel -that is cooperating state-forming the net.

The COST trust does not finance the projects, but the expenses of researchers' coordination between different countries.

COST embraces a wide range of science and technological fields, contained in:

- Biomedicine y Molecular Biosciences (BMBS)
- Food and Agriculture (FA)
- Forests, their Products and Services (FPS)
- Materials, Physics and Nanosciences (MPNS)
- Chemistry and Molecular Sciences and Technologies (CMST)
- Earth System Science & Environmental Management (ESSEM)
- Information and Communication Technologies (ICT)
- Transport and Urban Development (TUD)
- Individuals, Societies, Cultures and Health (ISCH)

Dr. Eleftheria invited all the members of the committee to propose coordination liaisons between researchers of different countries in Europe that may wish to develop projects of conservation and research of Cultural Heritage with the COST Program. She offered more information to be send by internet to all those interested.

3. Dr. María de Guadalupe Zepeda Martínez, General Secretary of the Wood Committee, presented the publication Who is Who of the members of the International Wood Committee, publication she is in charge of since the call, including the collection of the materials, the edition and finally the publication, so she thanked to all those who submitted their curricula and photo to integrate their information card.

Dr. Zepeda explained that it is necessary to strengthen the relationships between the members, to publicize the CV of each one in order to structure

projects and to know the group's potential. She mentioned that of the 57 members, 28 curricula were collected so it is still necessary to have the 29 missing curricula to integrate them. She commented that she will work in a new edition of Who is Who with the collaboration of all the members of the committee.

She gave copies of Who is Who to all the attendants and especially gave to the new members a number in which these appear.

4. Presentation of the new members. As part of the protocol for the incorporation of new members, Dr. María de Guadalupe Zepeda Martínez, read the curricula of the following new members: Dr. Mikel Landa Esparza from Spain, Arch. Alazne Ochandiano Uriarte from Spain, M. Alejandro Martínez de Arbuló Honda from Tokio, Arch. Tanya Park from Tasmania, which were present in the meeting. Following the reading of the CV they received their publication Who is Who from the IIWC Managing Group.

#### 5. Agreements

- a) It was agreed to incorporate the Vocabularies of specific terms of the Spanish carpentry in the Glossary that is being prepared by the IIWC, Dr. Mikel Landa Esparza offered to provide that information.
- b) The new members will fill the formats of the Country Report to integrate the information to the database of the committee, project that is being coordinated by Arq. Yasuhiro Watanabe in Tokyo Japan.
- c) To revise thoroughly the Principles for the Preservation of Historic Timber Structures, in order to have a text approved by all the members of the Wood Committee. To promote meetings to discuss the principles in different countries organized by the members of the committee, and the contact for gathering the suggestions and comments would be via internet to facilitate their diffusion. To design a plan of universal review of the principles in the short term in order to deliver them at the International ICOMOS meeting of 2017, according to the proposal of Arch. Tina Wik.
- d) To spread the information about the COST Program so that the members of the Wood Committee can request it and be benefited.
- e) To request the authorization of the participant members, to put in the Web the Who is Who publica-

tion and to diffuse the information in internet. It was agreed to continue with the second edition of Who is Who with the members that do not appear in the first one. Dr. Zepeda will coordinate the works related with the publication.

f) To define the headquarters for the meeting of the International Wood Committee 2015, the possibility opens up for making proposals and suggestions to celebrate it in the countries of the committee's members. Proposals can be received by internet. It was also agreed to improve the communication between the members in order to involve them in the projects and activities informed to be developed in 2015.

#### Various issues

- 1) Arch. Tina Wik proposed tentatively that the IIWC 2015 meeting be celebrated in Sweden, but she will confirm.
  - 2) Professor Gennaro Tampone proposed to have the IIWC 2015 meeting with the SICARSAH committee that will hold its session in Wroclaw, Poland on September of 2015. This will be confirmed.
- The working session ended at 18:00 hr., and the activities concluded with a group dinner.





# Principles for The Preservation of Historic Timber Structures (1999)

*Adopted by ICOMOS at the 12th General Assembly in Mexico, October 1999.*

The aim of this document is to define basic and universally applicable principles and practices for the protection and preservation of historic timber structures with due respect to their cultural significance. Historic timber structures refer here to all types of buildings or constructions wholly or partially in timber that have cultural significance or that are parts of a historic area.

For the purpose of the preservation of such structures, the Principles:

- recognise the importance of timber structures from all periods as part of the cultural heritage of the world;
- take into account the great diversity of historic timber structures;
- take into account the various species and qualities of wood used to build them;
- recognise the vulnerability of structures wholly or partially in timber due to material decay and degradation in varying environmental and climatic conditions, caused by humidity fluctuations, light, fungal and insect attacks, wear and tear, fire and other disasters;
- recognise the increasing scarcity of historic timber structures due to vulnerability, misuse and the loss of skills and knowledge of traditional design and construction technology;
- take into account the great variety of actions and treatments required for the preservation and conservation of these heritage resources;
- note the Venice Charter, the Burra Charter and related UNESCO and ICOMOS doctrine, and seek to apply these general principles to the protection and preservation of historic timber structures;

And make the following recommendations:

## Inspection, Recording and Documentation

1. The condition of the structure and its components should be carefully recorded before any intervention, as well as all materials used in treatments, in accordance with Article 16 of the Venice Charter and the ICOMOS Principles for the Recording of Monuments, Groups of Buildings and Sites. All pertinent documentation, including characteristic samples of redundant materials or members removed from the structure, and information about relevant traditional skills and technologies, should be collected, catalogued, securely stored and made accessible as appropriate. The documentation should also include the specific reasons given for choice of materials and methods in the preservation work.

2. A thorough and accurate diagnosis of the condition and the causes of decay and structural failure of the timber structure should precede any intervention. The diagnosis should be based on documentary evidence, physical inspection and analysis, and, if necessary, measurements of physical conditions and non-destructive testing methods. This should not prevent necessary minor interventions and emergency measures.

## Monitoring and Maintenance

3. A coherent strategy of regular monitoring and maintenance is crucial for the protection of historic timber structures and their cultural significance.

## Interventions

4. The primary aim of preservation and conservation is to maintain the historical authenticity and integrity of the cultural heritage. Each intervention should therefore be based on proper studies and assessments. Problems should be solved according to relevant conditions and needs with due respect for the aesthetic and historical values, and the physical integrity of the historic structure or site.

5. Any proposed intervention should for preference:

- a) follow traditional means;
- b) be reversible, if technically possible; or
- c) at least not prejudice or impede future preservation work whenever this may become necessary; and
- d) not hinder the possibility of later access to evidence incorporated in the structure.

6. The minimum intervention in the fabric of a historic timber structure is an ideal. In certain circumstances, minimum intervention can mean that their preservation and conservation may require the complete or partial dismantling and subsequent reassembly in order to allow for the repair of timber structures.

7. In the case of interventions, the historic structure should be considered as a whole; all material, including structural members, in-fill panels, weather-boarding, roofs, floors, doors and windows, etc., should be given equal attention. In principle, as much as possible of the existing material should be retained. The protection should also include surface finishes such as plaster, paint, coating, wall-paper, etc. If it is necessary to renew or replace surface finishes, the original materials, techniques and textures should be duplicated as far as possible.

8. The aim of restoration is to conserve the historic structure and its loadbearing function and to reveal its cultural values by improving the legibility of its historical integrity, its earlier state and design within the limits of existing historic material evidence, as indicated in articles 9 - 13 of the Venice Charter. Removed members and other components of the historic structure should be catalogued, and characteristic samples kept in permanent storage as part of the documentation.

## **Repair and Replacement**

9. In the repair of a historic structure, replacement timber can be used with due respect to relevant historical and aesthetical values, and where it is an appropriate response to the need to replace decayed or damaged members or their parts, or to the requirements of restoration.

New members or parts of members should be made of the same species of wood with the same, or, if appropriate, with better, grading as in the members

being replaced. Where possible, this should also include similar natural characteristics. The moisture content and other physical characteristics of the replacement timber should be compatible with the existing structure.

Craftsmanship and construction technology, including the use of dressing tools or machinery, should, where possible, correspond with those used originally. Nails and other secondary materials should, where appropriate, duplicate the originals.

If a part of a member is replaced, traditional woodwork joints should, if appropriate and compatible with structural requirements, be used to splice the new and the existing part.

10. It should be accepted that new members or parts of members will be distinguishable from the existing ones. To copy the natural decay or deformation of the replaced members or parts is not desirable. Appropriate traditional or well-tested modern methods may be used to match the colouring of the old and the new with due regard that this will not harm or degrade the surface of the wooden member.

11. New members or parts of members should be discretely marked, by carving, by marks burnt into the wood or by other methods, so that they can be identified later.

## **Historic Forest Reserves**

12. The establishment and protection of forest or woodland reserves where appropriate timber can be obtained for the preservation and repair of historic timber structures should be encouraged.

Institutions responsible for the preservation and conservation of historic structures and sites should establish or encourage the establishment of stores of timber appropriate for such work.

## **Contemporary Materials and Technologies**

13. Contemporary materials, such as epoxy resins, and techniques, such as structural steel reinforcement, should be chosen and used with the greatest caution, and only in cases where the durability and structural behaviour of the materials and construction techniques

have been satisfactorily proven over a sufficiently long period of time. Utilities, such as heating, and fire detection and prevention systems, should be installed with due recognition of the historic and aesthetic significance of the structure or site.

14. The use of chemical preservatives should be carefully controlled and monitored, and should be used only where there is an assured benefit, where public and environmental safety will not be affected and where the likelihood of success over the long term is significant.

### **Education and Training**

15. Regeneration of values related to the cultural significance of historic timber structures through educational programmes is an essential requisite of a sustainable preservation and development policy. The establishment and further development of training programmes on the protection, preservation and conservation of historic timber structures are encouraged. Such training should be based on a comprehensive strategy integrated within the needs of sustainable production and consumption, and include programmes at the local, national, regional and international levels. The programmes should address all relevant professions and trades involved in such work, and, in particular, architects, conservators, engineers, craftspeople and site managers.





# Principles for The Conservation of Historic Timber Structures

*Final text as result of the updating process regarding the PRINCIPLES FOR THE PRESERVATION OF HISTORIC TIMBER STRUCTURES (approved by ICOMOS at the 12th General Assembly in Morelia, Mexico, October 1999).*

*The text and the proposed amendments were discussed in the Scientific Symposium of the ICOMOS IIWC in Guadalajara, 2012, and discussed and approved in the Scientific Symposium of the IIWC in Himeji, 2013.*

## A) Preamble

### Object of the Principles

The load bearing structures are the mechanism that allows the buildings or some essential parts of them to stand up and to support the designed service loads, allowing the building to perform the planned use; they are the product of intuition, invention, empirical, mathematical and experimental approach.

They are as well the result of traditional skills, the outcome of long experimentation and of practice generally lasted over centuries. In this respect one could speak of applied science and of engineering, attributing them specific technical values.

They also carry aesthetic values since they have an own form (shape, colour, pattern, working, decoration, patina etc.) and are able to articulate and shape the space they are placed in. Each structure represents a stage in the development of the structural systems, being an expression of the period in which it was conceived, a condition that allows it to assume deep historic values.

The respect of the traditions regarding not only the technical approaches to the timber construction as it is held by distinct groups but also the way of life and the form of communitarian existence, is often expressed in the timber constructions that assume, in these cases, anthropological values as well.

The timber structural systems are generally composed by structural units (frames, trusses and similar, for instance) connected and stabilized by auxiliary members. The units in their turn are composed by timber members which are connected by joints. They are built with the aim of allowing the buildings to stand up, also supporting themselves, the accidental and the service loads, in a condition of safety. The single structures are characterized by the choice of the material (genus and species), working, size, kind of connections that determine the type of constraints, decoration. Due to the deformability of the wood, the timber structures are designed with a kind of configuration – shape, articulation, material, sizing and constraints - based on the aim to achieve the strength necessary to support the acting loads but also suitable to prevent severe deformations that could be detrimental to stability.

The load bearing structures of the buildings deserve the same care of an historic site of industrial or architectural or naturalistic interest, or of the whole building that they keep up. Their principal values are the original configuration, as human invention, the originality of the materials and their peculiar assembly, fruit of skilled craftsmanship of the operators.

Preliminary conservation approach to them includes the investigations directed to identify the structure – species and characteristics of the constituting materials, geometry, span and bay, size of the elements, nature of the constraints, own weight and accidental loads, designed service loads, peaks of loading in particular circumstances such as earthquakes – and to detect decay of the material as well structural failures if any. The present failures should be investigated and classified, the primary and concurrent causes and predisposition have to be assessed.

A dossier containing the available documentation and the history of the structure including that of failures and past interventions on it, should be put up.

Once the anamnesis has been settled down and the diagnosis formulated the repairs and the strengthening works can be designed trying to make the most out of the residual strength that the structure still belongs and lending additional strength and stiffness by means of new members or strengthening devices. The interventions should respect the original values and pursue the integrity of the structure.

## **B) The Principles**

The aim of this document is to define basic principles and practices applicable in the widest variety of cases for the protection and conservation (preservation) of historic timber structures with respect to their cultural significance.

Historic timber structures refer here to all types of buildings or constructions and load bearing structures wholly or partially in timber that have cultural significance or that are parts of a historic area. The word “values” in this document refers to aesthetic, artistic, historical, anthropological, cultural, scientific and technical meaning (values).

For the purpose of the conservation (preservation) of such structures, the Principles:

- recognize the importance of timber structures from all periods as part of the cultural heritage of the world;
- take into account the great diversity of historic timber structures;
- recognize the necessity to respect local traditions and practices;
- take into account the various species and qualities of wood used to build them;
- recognize that, due to the present-day possibility of accurate dating of every single component, a timber structure is a precious record of chronological data concerning the whole building;
- take into account the excellent properties of timber structures in withstanding seismic actions;
- recognize the vulnerability of structures wholly or partially in timber due to material decay and degradation in varying environmental and climatic conditions, caused by humidity fluctuations, light, fungal and insect attacks, wear and tear, fire, earthquakes and other natural disasters, destructive alterations made by humans;

- recognize the increasing loss of historic timber structures due to vulnerability, misuse and loss of skills and knowledge of traditional design and construction technology, lack of understanding of spiritual and historic needs of living communities;
- take into account the great variety of actions and treatments required for the preservation and conservation of these heritage resources;
- note the Venice Charter, the Amsterdam Declaration, the Burra Charter, the Nara Document on Authenticity and related UNESCO and ICOMOS doctrine, and seek to apply these general principles to the protection and conservation of historic timber structures

And make the following recommendations:

## **Inspection, Recording And Documentation**

1. The condition of the structure and its components including previous strengthening works, should be carefully recorded before any intervention, as well as all materials used in treatments, in accordance with Article 16 of the Venice Charter and the ICOMOS Principles for the Recording of Monuments, Groups of Buildings and Sites. All pertinent documentation, including characteristic samples of redundant materials or members removed from the structure, and information about relevant traditional skills and technologies, should be collected, catalogued, securely stored and made accessible as appropriate. The documentation should also include the specific reasons given for choice of materials and methodologies in the conservation (preservation) work.
2. A thorough and accurate diagnosis of the structure, and of its condition and the causes of decay and structural failure of the timber structure, elaborated on the basis of the results of the investigations and assessments, should precede any intervention, as mentioned in the Venice Charter. The diagnosis should be based on documentary evidence, physical inspection and analysis and, if necessary, measurements of physical conditions using (and) non-destructive investigation methods. This should not prevent necessary minor interventions and emergency measures.

## Interventions

3. The primary aim of preservation and conservation is to maintain the authenticity of configuration, materials, assembly and the integrity of historic timber structures and cultural heritage, respecting and putting in evidence their values. Each intervention should therefore be based on the proper studies and assessments that have been made.

4. Any proposed intervention should for preference:

- a) follow traditional means;
- b) be reversible, if technically possible; or
- c) at least not prejudice or impede future preservation work whenever this may become necessary; and
- d) not hinder the possibility of later access to evidence incorporated in the structure.

5. Repair operations on the historic timber structures, including dismantling and reassembly, should follow the criteria of minimum intervention capable of ensuring the survival of the structure, saving as much as possible their (the) authenticity and integrity, and allowing them (it) to continue to perform their function in a condition of safety.

Replacement of damaged members or parts of them with new timber is a practice to be used only when repair of the original parts is not possible or when this is to be considered unfeasible or futile. In any case replacements should be made with respect to relevant and inherent values.

6. In the case of interventions, the historic structure should be considered as a whole; all material materials?, including structural members, in-fill panels, weather-boarding, roofs, floors, doors and windows, etc., should be given equal attention. In principle, as much as possible of the existing material as well as preceding repair works, if not prejudicial for stability, should be retained. The protection should also include surface finishes such as plaster, paint, coating, wall-paper, etc. The original materials, techniques and textures should be respected.

7. The aim of conservation (restoration) is to preserve (conserve) the historic structure and its load-bearing function as well to reveal its cultural values by improving the legibility of its historical integrity, its earlier state and design within the limits of existing historic

material evidence, as indicated in articles 9 - 13 of the Venice Charter. Recording the present condition of the structure and leaving the signs of failure unconcealed allows those responsible to maintain a database of defects, lesions and strengthening works. Removed members and other components of the historic structure should be kept if possible and catalogued, and representative samples kept in permanent storage as part of the documentation.

## Repair

8. In the repair of a historic structure, it is preferable that work is made directly in situ. Where replacement is necessary, replacement timber should be used with respect to relevant values.

Replacement of pieces or members should preferably be made of the same species of wood with the same, or, if appropriate, with better, grading as in the members being replaced. Where possible, this should also include similar natural characteristics. The moisture content and other physical characteristics of the replacement timber should be compatible with the existing structure.

Craftsmanship and construction technology, including the use of dressing tools or machinery and other elements, should agree with those used originally.

9. To copy the natural decay or deformation of the replaced members or parts is not desirable.

10. New members or parts of members may be discretely marked, so that they can be identified later.

## Contemporary Materials And Technologies

11. Contemporary materials, such as epoxy resins, and techniques, such as structural steel reinforcement, should be chosen and used with the greatest caution, and only in cases where the durability and structural behaviour of the materials and construction techniques have been satisfactorily proven over a sufficiently long period of time.

Utilities, such as heating, fire detection and prevention systems, should be installed with respect for tangible and intangible significance of the structure or site. The installations should be designed so as not to

cause variations to the significant environmental factors, such as temperature and moisture, nor alterations of color and other properties of the timber structures.

12. The use of chemical preservatives should be carefully controlled and monitored, and should be used only where there is an assured benefit, where public and environmental safety will not be affected and where the likelihood of success over the long term is significant.

### **Monitoring and Maintenance**

13. A coherent strategy of regular monitoring and maintenance is crucial for the protection of historic timber structures and their cultural significance.

### **Historic Forest Reserves**

14. The establishment and protection of forest or woodland reserves where appropriate timber can be obtained for the preservation and repair of historic timber structures should be encouraged.

Institutions responsible for the preservation and conservation of historic structures and sites should establish or encourage the establishment of stores of timber appropriate for such work.

### **Education and Training**

15. Recognition, explanation and dissemination of values related to the cultural significance of historic timber structures through educational programs is an essential requisite of a sustainable preservation and development policy. Since conservation has wide educational significance, the establishment and further development of ( training, capacity building and social) programs on the protection, preservation and conservation of historic timber structures are encouraged. Such programs should be based on a comprehensive strategy integrated within the needs of sustainable production and consumption, and include (programmes) theoretic and practical didactic activities at the local, national, regional and international levels. The programs should address all relevant professions and trades involved in such work, and, in particular, architects, conservators, engineers, crafts persons and site managers.

Regional research programmes to identify regional characteristics, social and anthropological aspects of conservation of timber structures, buildings and sites in the area should be encouraged.



# Principles for The Conservation of Historic Timber Structures

## Comments on The Principles

David Yeomans and Tina Wik

The purpose of this document is to define basic principles and practices applicable in the widest variety of cases for the protection and conservation of historic timber structures with respect to their cultural significance.

Historic timber structures refer here to all types of buildings and other load-bearing structures, and includes the wooden elements of constructions that have cultural significance or that are parts of an historic area. The word “values” in this document refers to aesthetic, artistic, historical, anthropological, cultural, scientific and technical values. These Principles apply to wooden architecture and structures with historic value. No building is made entirely of timber and due regard should be paid to its interaction with other materials of construction.

The Principles are that those concerned with the conservation of such structures should:

- recognize the importance of timber architecture, its details and structures from all periods as part of the cultural heritage of the world;<sup>1</sup>
- take into account the great diversity of historic timber structures;<sup>2</sup>

<sup>1</sup> In some cultures masonry buildings predominate. Nevertheless the timber elements will often be of historical significance.

<sup>2</sup> While timber has almost ubiquitous use for construction that means that a wide variety of carpentry traditions have developed. It is important that the traditional techniques used for each structure be understood, which includes both the history of its development as well as the tools and methods used. [We need more than this but that will do for the time being.]

<sup>3</sup> There are two aspects to this:

a) Repairs are best carried out using traditional carpentry techniques. These both ensure sensitive repairs and help the continuation of those craft methods.

b) Different cultures place different values upon the methods of repair. In some cultures it is considered best to replace as little of the original fabric as possible, simply patching a member to replace decayed timber. In other cultures the integrity of an entire member is esteemed and total replacement rather than patching is considered more appropriate.

<sup>4</sup> The species of timber used is part of the local carpentry tradition and should be matched in any replacement work for that reason alone. However it is also sensible to match replacement timber with the original so that it behaves in the same way.

- recognize the necessity to respect local traditions and practices;<sup>3</sup>
- take into account the various species and qualities of wood used to build them;<sup>4</sup>
- recognize that a timber structure is a valuable record of chronological data concerning the whole building;<sup>5</sup>(5)
- take into account the excellent properties of timber structures in withstanding seismic actions;<sup>6</sup>(6)
- recognize the vulnerability of structures wholly or partially in timber due to material decay and degradation.<sup>7</sup>

Note: We have cut out the motherhood statement and the clause that says the person should be competent.

- Apply the general principles of the Venice Charter, the Amsterdam Declaration, the Burra Charter, the Nara Document on Authenticity and related UNESCO and ICOMOS doctrines to the protection and conservation of historic timber structures

## Inspection

1. The condition of the structure and its components including previous strengthening works, should be carefully recorded and analysed before considering any intervention.

<sup>5</sup> Masonry buildings will usually have roofs of timber, which may have survived extensive alterations to the structure below, carried out as the building has been adapted to changing needs. For that reason the roof is often evidence of the original form and possibly use of the building. It may even indicate different phases of construction, which are no evident in the fabric below.

<sup>6</sup> While some traditional timber structures have been developed to provide good earthquake resistance it is important to recognize that timber is also used to reinforce masonry structures to improve their seismic performance and that in other cases the timber elements are transmitting forces between masonry elements. Examples of the former may be the simple addition of horizontal lacing timbers within masonry walls but may be as extensive as timber ‘cages’ to contain the masonry. The latter are principally timber floors or possibly wall and roof structures that act as diaphragms within the masonry.

<sup>7</sup> Where there has been biological attack of timber construction it is important to remove the cause of that attack. That usually means protecting the timber from moisture and hence identifying and remedying causes of water ingress.

2. A thorough and accurate diagnosis, should precede any intervention (as mentioned in the Venice Charter).<sup>\*</sup> This should be accompanied by a presentation and analysis of the structure, of its condition and the causes of any decay and structural failure. The diagnosis must be based on documentary evidence, physical inspection and analysis and, if necessary, measurements of physical conditions using non-destructive investigation methods.

Note: This does not preclude the carrying out of necessary minor interventions and emergency measures where these are necessary

3. Recording of 'invisible' signs on old timber parts must be recorded and analysed.

4. As much information as possible should be obtained by visual inspection. This may be insufficient to assess the condition of the structure adequately because they are often concealed by other elements of the fabric. Where the significance of the covering material allows, consideration may be given to its local removal to facilitate the investigation.

## Evaluation

5. The primary aim of preservation and conservation is to maintain the authenticity. To do so one should preserve as far as possible all its character defining features.

Character defining features may comprise one or more of the following:

- I) The overall structural scheme, i.e. the means by which loads are transmitted to the ground.
- II) Surface features showing the way in which the timber was originally worked and the marks made by carpenters in carrying out the framing.
- III) Decorative treatment of the carpentry such as aris mouldings.
- IV) Painted decoration where that has been applied.

6. The relative value of these must be determined in order to appraise any intervention plan.

## Intervention

7. Intervention should preferably:

- a) follow traditional means;
- b) be reversible, if technically possible;

- c) not prejudice or impede future preservation work should become necessary; and
- d) not hinder the possibility of access to evidence exposed in the structure.
- e) take into account the environmental conditions.

8. Repairs to historic timber structures, which might include dismantling and reassembly, should follow the criteria of minimum intervention capable of ensuring the survival of the structure.

Replacement of damaged members or parts of them with new timber is a practice to be used only when repair of the original parts is not possible or when it is unfeasible or futile. Where replacement is necessary it In any case replacements should be done in a manner that respects the character of the original.

9. Historic joinery and carpentry may not meet modern requirements for thermal performance, fire resistance or other aspects of safety. Where changes to meet such requirements would adversely affect their cultural significance, alternative means for meeting these requirements should be sought first.

10. Any remedial work should be kept to a minimum. For example, loss of member profile does not warrant remedial work unless it impairs performance or aesthetic understanding to an unacceptable degree.

11. Deformation of a member, unless indicating potential instability, should be accepted unless it renders some element of the building unserviceable.

12. When considering structural members it should be noted that:

- a) if a building has a satisfactory performance, and if the use and loading regime are unchanged, the structure can be made adequately strong by simply by repairing recent strength-reducing defects.
- b) If recent alterations have been made, or any change of use would impose a more onerous loading, the potential strength should be estimated by either analysis or load testing.

13. In the case of interventions, the historic structure should be considered as a whole. All materials, including structural members, in-fill panels, weather-boarding, roofs, floors, doors and windows, etc., should be given

equal attention. In principle, as much as possible of the existing material as well as earlier repair works, if not prejudicial for stability, should be retained. Protection should also include surface finishes such as plaster, paint, coating, wall-paper, etc. The original materials, techniques and textures should be respected.

14. Removed members and other components of the historic structure should be kept if possible and catalogued, and representative samples kept in permanent storage as part of the documentation. The result of the survey, and the conclusions of the evaluation should be recorded as a basis for any necessary remedial work, and retained both for future maintenance of the building and as an historical record.

### **Repair Policies**

15. Whenever possible repairs should be made in-situ to avoid the risk of damage associated with dismantling.

Any replacement timber should:

- a) be of the same species as the original
- b) match the original in moisture content
- c) where it is visible have similar characteristics of grain
- d) use similar craft methods as the original.

16. No attempt should be made to artificially age the timber.

17. New members or parts of members may be discretely marked, so that they can be identified later.

### **Present-day Materials and Technologies**

18. Present-day materials, such as epoxy resins, and present day techniques, such as structural steel reinforcement, should be chosen and used with the greatest caution and only in cases where the durability and structural behaviour of the materials and construction techniques have been satisfactorily proven over a sufficiently long period of time.

Utilities, such as heating, fire detection and prevention systems, should be installed with respect for tangible and intangible significance of the structure or site. The installations should be designed so as not to cause changes to the significant environmental conditions, such as temperature and moisture, nor alterations of colour and other properties of the timber structures.

19. The use of chemical preservatives should be carefully controlled and monitored, and should be used only where there is an assured benefit, where public and environmental safety will not be affected and where the long-term improvement is significant.

### **Recording and Documentation**

20. A record should be made of all materials used in treatments, in accordance with Article 16 of the Venice Charter and the ICOMOS Principles for the Recording of Monuments, Groups of Buildings and Sites. All pertinent documentation, including characteristic samples of redundant materials or members removed from the structure, and information about relevant traditional skills and technologies, should be collected, catalogued, securely stored and made accessible as appropriate. The documentation should also include the specific reasons given for choice of materials and methodologies in the conservation work.

### **Monitoring and Maintenance**

21. A coherent strategy of regular monitoring and maintenance must be established to ensure the continuing protection of an historic timber structure and its cultural significance.

22. Monitoring should be carried out both during and after any intervention to ascertain the efficacy of the methods used and to ensure the long-term performance of the timber.

23. Records should be kept of the work as part of the documented history of the structure.

### **Historic Forest Reserves**

24. The establishment and protection of forest or woodland reserves where appropriate timber can be obtained for the preservation and repair of historic timber structures should be encouraged.

Institutions responsible for the preservation and conservation of historic structures and sites should establish or encourage the establishment of stores of timber appropriate for such work.

### **Education And Training**

25. Recognition, explanation and dissemination of values related to the cultural significance of historic timber structures through educational programs is an essential requisite of a sustainable preservation and

development policy. Since conservation has wide educational significance, the establishment and further development of training, capacity building and social programs discussing the protection, preservation and conservation of historic timber structures are encouraged. Such programs should be based on a comprehensive strategy integrated within the needs of sustainable production and consumption, and include programmes at the local, national, regional and international levels. The programs should address all relevant professions and trades involved in such work, in particular, architects, conservators, engineers, craftsmen and site managers.

Regional research programmes to identify regional characteristics, social and anthropological aspects of conservation of timber structures, buildings and sites in the area should be encouraged.



# General considerations and statement of reasons for updating the document: “Principles for the Preservation of Historic Timber Structures”

Considerations concerning the present document (approved by the ICOMOS General Assembly in Morelia, Mexico, 1999)

The *Principles for the Preservation of Historic Timber Structures*, articulated in a document issued by the ICOMOS International Scientific Committee on Wood, were officially approved in Morelia, Mexico by the ICOMOS General Assembly in 1999. The text of the document, that is to be regarded as a true “Charter”, is available today in several languages and constitutes, all over the world, an authoritative theoretical reference in the field of architectural conservation.

However, 14 years after its approval and following application in practice, a few questions arose:

- Did the Principles prove to be applicable? Are they currently applied?
- Are they still valid and in line with modern advancements in conservation theory, technical developments and codes of practice?
- Are they still in line with the ICOMOS’ general conservation methodologies, as developed during the last years and approved in various institutional meetings?
- Were they followed correctly?
- In other words, to what extent can they be applied? Do they suit the various criteria of the cultures and traditions in conservation of different countries?
- Are there, consequently, any amendments to be made to the original text of the document?

The Document represents a very important achievement, in the first instance because it is general and complete, and therefore it constitutes a useful reference for conservators, owners and contractors. Secondly, because of its precociousness, since other ICOMOS Scientific Committees did not yet have, at the time of its approval, such a comprehensive statement.

The Document is a historic text that reflects the ideals and thoughts of the time (the last years of the past millennium) concerning the very concept of a

highly specialized category of cultural goods, the timber structures. It testifies the consideration of them by part of cultural operators and indicates the kind of conservation interventions that can be operated on them and the way to do the interventions.

Its importance also comes from the collegial participation of the community of the members of the International Wood Committee who contributed, according to their personal knowledge and experience, to its elaboration. It assumes a value comparable to that of the Charters on conservation, notably those of Athens and Venice and the Amsterdam declaration.

Nevertheless, there is the need to make a few changes inspired by the requirement of more strict consistency with the doctrine of conservation as it has been developed in the last years, when a major attention has been attached to the problems of conservation of the material witnesses of the monumental buildings.

As a matter of fact it is necessary to summon up the conservation of the authenticity of the structural systems, recognizing that their real value is to be found in the same concept of the configuration, getting free, doing so, from a few relicts of the past practice and theories, still present in the document, related to the concept of restoration. This in fact is generally interpreted as imitation and duplication of the lost parts, replacement of the decayed members, exceeding concern for the visual aspects both of the general parts and of the single components.

For all the cited reasons and because the Document is, in general, consistent, not completely far from the present views on the topics, it seems not advisable to change it drastically; on the contrary little additions or modifications should be allowed so as to update it to the most advanced theories but avoiding substantial alterations not even in its internal organization and structure. Probably it is also possible to complete it with glosses, notes and comments, and maybe with a glossary.

## Structural Conservation, today

The load bearing structures of the buildings deserve the same care of a historic site of architectural or industrial or naturalistic interest, or of the whole building that they keep up. Their principal values are the original configuration, as human invention, the originality of the materials and their peculiar assembly, fruit of skilled craftsmanship of the operators.

Timber cultural heritage is defined as those human products designed with this material for the satisfaction of material and spiritual needs of the human beings. As such are considered works of architecture, engineering and sculptural works of art that are technological, archaeological, historical, anthropological testimonies, expressing the ideology of the different groups and regional materials.

The importance of the timber structural systems comes from the fact that they have been, till the beginning of the XIX century, the only kind of mechanical device belonging to the field of the discrete. This is due to the excellent mechanical characteristics of the timber that has been the only material resistant to both compression and traction available until the half of the XIX c., when steel became cheap enough to be progressively introduced in the building industry. The period was characterized by research on possible ways of cooperation of iron with timber (the Polonceau truss or Belgian truss, the reinforced timber beams, just to quote a few examples). Anyway timber structures didn't ever become obsolete but remained still in use and re-flourished again with the introduction of the laminated products; on this point it should be recalled that the first experimental applications of composite members were made in the cited historical period.

The timber constructions last almost forever, as far as they are well kept. One outstanding example is that of the trusses, the most ancient known so far, of the roof of the Santa Catharina Church, in the Sinai Region, Egypt, built in the half of the VI century; still they are in good condition and perform their function.

It is clear to everybody operating in the field of conservation that both the humanistic and the technological fields of education are necessary to understand the meaning of the historic timber structures, interpreting their conception, in order to take the most appro-

priate measures for the preservation of their authenticity as well of their function. Therefore the humanistic disciplines together with the scientific and technological ones delimit the dominion of the Historic Timber Structures as cultural goods; it is in that ideal territory that their definition should be elaborated and continuously revised.

The reasons as well the means for their conservation are to be looked for in this philosophical field.

## The Timber Load Bearing Structural Systems

A methodological comment on the Document is that it does not propose a definition of Historic Timber Structures, which are the very subject of the text, nor of their role. The insertion, or at least the addition, in the Document of such definitions together with the material and philosophical conservation reasons, seems to be a must.

The timber structural systems are generally composed by structural units (frames, trusses and similar, for instance) connected and stabilized by auxiliary members. The units in turn are composed by timber members that are connected by joints. They are built with the aim of allowing the buildings to stand up, also supporting their weight, the accidental and the service loads, in a condition of stability and safety. Other structural systems have been conceived and used to give a framework to works of art, such as big retablos, triptychs and similar, in order to give them solidity and stiffness.

On the theme of the importance and significance of the Timber Structures, subject of the Document, first it should be recognized that the history of the buildings is recorded mainly in the timber structures: it can be decoded thanks to methodologies that allow for absolute dating of the material with the methods of dendrochronology and radio carbon dating.

About the term "preservation" used in the Document, one should note that it includes the meaning and concept of conservation, but is also used for prevention, protection: in fact, one typical English expression is preservation order. It ought to be recalled that the term "conservation" belongs to the culture of

the concern and care of the cultural goods, and is the main objective of the Amsterdam declaration (1975) that introduces the concept of integrated conservation. Furthermore, conservation is understood all over the world as an alternative way to restoration and interpreted as the complex of operations to carry on the monuments, that can be resumed as classification and cataloguing, survey and documentation, tutelage actions, propping, restoration, repair, strengthening. All these terms certainly belong to the culture of the care of the monuments.

Therefore it is probably more appropriate, for linguistic and practical reasons, to use the word “conservation”.

### Diversity

In the Introduction of the Document, the expression “universally applicable” seems too ambitious, especially if we take into account that a few people prefer the cultural interpretation of the human realizations instead of the musealization of their material remains, as said when discussing on diversity (see below). Furthermore it should be noted that in some cases the conservation of the material expression of architecture and engineering is an impossible task.

One should be concerned about the concept of diversity, to be intended here as a dissimilar philosophical approach to history, society and religion, culture of the past, made by different cultural human groups. Diversity is to be considered a richness, in terms of value of distinction.

However since in some countries there is an intellectual approach that is more interested to conserve the culture of the antique, i.e. the ideal essence of the past building traditions, more than the material witnesses of the ancient buildings, also this attitude should be respected at an intellectual level. But everybody should be aware that this position, brought into practice, could lead, step by step, to the destruction of the specimens and to their continuous renovation, in other words to the creation of a replica. There are several examples of situations of this kind that did already happen in the past.

About the diverse concept of conservation, it is on the contrary necessary to recall the must, when

applied to material “monuments”, that the material witnesses have to be left without alteration and never destroyed. The point of view concerning the monument seen as the most important document of itself are well known and widely accepted.

Therefore, for all these reasons, the word “universally” could be changed to the expression “in the widest possible generality of the cases”.

This vision of the problems regarding the material conservation meets as well the concern for the original assembly of the members that is one of the values that should be object of preservation. To this effect one should also note that the assembly of a structure was operated by the carpenters of the time, it is the issue of their concept of construction of a timber structure, it is the expression of their skill in handling timbers and operating their connection; it is, in other words, a precious material testimony, an essential component of the authenticity meant in a wide sense.

Moreover, one should remember that the way of assembling the members of a structure determines the nature of the internal constraints therefore it influences the general behaviour of the system.

Dismantling and reassembling carpentries, furthermore, means to lose considerable quantities of fragmented wood that need therefore replacement. Generally speaking, hence, dismantling, even with the sincere purpose of a following careful reassembling, is a practice to avoid because destructive of some essential features of the system and, in any case, expensive.

The original Document recommends to recognize the vulnerability of the timber structures due to material decay and degradation in varying environmental and climatic conditions, caused by humidity fluctuations, light, fungal and insect attacks; but other decay and failure causes as wear and tear, changes in temperature (for instance caused by modern heating systems), fire, flood and other disasters, overloading should be added, as well the destructions operated by man, the replacements of pieces that can lead, if reiterated, to a brand new structure.

About the recommendation “not to hinder the possibility of later access to evidence incorporated in

the structure”, a few specifications should be introduced concerning, for instance, the traces of the lesions and failures. In fact the manifestations of the failures – lesions as permanent deformations and cracks, displacements, partial collapse – are other essential values of the structural systems because they can teach important lessons and their presence justifies the strengthening interventions that were carried out on it or just designed. Hence their sign must be left on the spot, in close connection with the wounded member, or at least documented.

When speaking of failures, an essential datum is their course.

Therefore two insertions are proposed: “A thorough and accurate diagnosis of the condition and the causes of decay and structural failure as well of their progression of the timber structure should precede any intervention.

*The diagnosis should be based on documentary evidence, physical inspection and analysis, and, if necessary, measurements of physical conditions and assessments by means of non-destructive testing methods. This should not prevent necessary minor interventions and emergency measures.”*

## New Materials and Technologies

The Document tells: “Contemporary materials, such as epoxy resins, and techniques, such as structural steel reinforcement, should be chosen and used with the greatest caution, and only in cases where the durability and structural behaviour of the materials and construction techniques have been satisfactorily proven over a sufficiently long period of time”. The statement, though in a way consistent with the Venice Charter that recommends the use of the most modern means as far as they have been proved compatible with the ancient system, suitable, long-lasting, needs comments.

Today Resins as sealants and adhesives, steel, stainless steel, structural glass, Glue Laminated Timber are available, as well smart materials as for instance epoxy resins, titanium, FRP (Fibre Reinforced Polymers), Carbon and Glass Fibres.

Several successful applications of these materials have been made though some problems of compati-

bility still have to be solved. One of the essential deduction from the current practice is that the operation consisting in wrapping completely the damaged timber members with FRP sheets, steel foils and similar in order to confer additional strength is a damaging practice and should not be allowed.

The right way seems to face decay problems of the materials with chemistry, structural problems of the systems with mechanical devices. In this respect, the use of timber and steel, a traditional mate of the timber, are preferably to be used in place of concrete. It should be recalled the trend “Timber to Timber”.

Some abuses were probably made especially with the use of reinforced concrete as structural reinforcements and the related theories. These positions need to be deeply revised.

It is possible to conclude that the concept of Structural Conservation, as we mean it at the light of both the theoretical advancements on conservation and a wide number, available today, of interventions made with sincere attitude of respect for the ancient system and the way it was conceived, should rely more on repair of the damaged original pieces as well connections than on their transformation and replacement. The practice of local repair of the original pieces, whenever possible, is the only way to ensure, up to a reasonable extent, authenticity and integrity.

Critical comments are to be proposed for the following statement: “Craftsmanship and construction technology, including the use of dressing tools or machinery, should, where possible, correspond with those used originally”. Furthermore: “if it is necessary to renew or replace surface finishes, the original materials, techniques and textures should be duplicated as far as possible”. The mentioned rules refer to a kind of imitative antiquarian practice.

A crucial point of the document is about “repair” and “replacement”. “In the repair of an historic structure, replacement timber can be used with due respect to relevant historical and aesthetical values, and where it is an appropriate response to the need to replace decayed or damaged members or their parts, or to the requirements of restoration”. It should be said that the two terms, in the field of conservation of cultural goods, are antithetical and that the practice of replacement intended for taking off original deteriorat-



ed pieces and putting new ones with similar characteristics in their place, is to be considered as a ultimate measure when repairs are no longer possible or advisable since it does not ensure **minimum intervention** and **minimum disturbance** of the structure. It should be noted that in any case replacement is also in contrast with the requirement of not destroying the past consolidation or strengthening works.

*“Craftsmanship and construction technology, including the use of dressing tools or machinery, should, where possible, correspond with those used originally. Nails and other secondary materials should, where appropriate, duplicate the originals”.* Also this rule seems to have been dictated by a kind of a diffused antiquarian imitative practice.

The repair work should not alter the configuration of the structural unit and of the structural system to which the repaired member belongs. Furthermore it should not affect the visual fruition of the structural system but, at the same time, be distinguishable at the eye of an expert and put in relation with the manifestations of the failure. The intervention measures taken on a given structural system and the devices installed on it should, considering that conservation has also a pedagogic valence, be both visible, at least at short distance, and put in a close connection with the failure manifestations. Only in this way it is possible to start a dialectic connection between the failure and the strengthening measure.

## Education

Education and training in institutional bodies and in the worksite, mainly showing the example of outstanding value given with personal behaviour by authoritative figures in charge of interventions, should be encouraged inviting to discover the values of each structure.

## Installations

“Utilities, such as heating should be installed with due recognition of the historic and aesthetic significance of the structure or site”. The concept needs to be widened taking into account the damage brought to the wood by thermal excursions. The Document should recommend the installation of smoke detectors and fire extinguisher systems; today, for ancient timber structures, the putting out of a fire is made safely with installations of water spray systems that need very limited amounts of water because this is under considerable pressure.

## Monitoring

A consistent strategy of regular monitoring and maintenance is crucial for the protection of historic timber structures and their cultural significance. An important role in the monitoring is played, between other elements, by extensive documentation and survey, recording the evolution of decay of the material and the progression of structural failure. The latter has not only an intrinsic value but it is fundamental to interpret the structure and its behaviour.

## Conclusions

The present theoretical positions show fine but substantial distinctions with those of the end of the past millennium. It is the duty of the scholars and of the practitioners informed of the most advanced techniques to make a common effort to translate them from the intellectual acquisitions to the application disciplines. This fundamental step is certainly possible with positive outcome.

The problem is in fact to assess the residual strength of the structural system affected with failures and to make the best out of the ultimate strength introducing additional devices.

## References

- Foramitti, H., 1981, Un aspect théorique de la documentation en vue de la préservation de l'authenticité des œuvres) après des interventions de conservation, ICOMOS. Rome, ICOMOS, 1981.
- Martin E., Ovre E., Alvheim E., 1983, Introduction à une discussion et à une étude sur “l'Authenticité” dans le processus de conservation des structures et constructions en bois, Colloque International, comité Bois. 5th session. Bergen, 1983.
- Jokilehto J., 1984, Authenticity in restoration principles and practices, in Annual conference of the Association for Preservation Technology. Toronto, Ottawa, 1985. p. 5-11, illus. (Bulletin APT. 17, 3-4) (eng). Double issue ‘Principles in practice’.
- Tschudi-Madsen, S., 1985, Principles in practice: reflecting on the conservation of wooden architecture, Naples: Edizioni Scientifiche Italiane
- Larsen K. E., 1992, The authenticity of historic timber buildings with particular reference to Japan, Icomos International Wood Committee International Symposium, 8. Nepal, Oslo, Tapir publishers, 1994.

– Larsen K. E., 1992, A note on the authenticity of historic timber buildings with particular reference to Japan., ICOMOS. Paris, ICOMOS Occasional Papers for the World Heritage Convention

– Barthélemy J., 1994, La notion d'authenticité dans son contexte et dans sa perspective Symposium autenticità e patrimonio monumentale. Napoli, Edizioni scientifiche italiane

– Borsi G., 1994, Riflessioni sul concetto di autenticità, in: Symposium autenticità e patrimonio monumentale. Napoli, Edizioni scientifiche italiane

– Carbonara G., 1994, Autenticità e patrimonio monumentale: riflessioni sul saggio di R.Lemaire Symposium autenticità e patrimonio monumentale, Napoli, Edizioni scientifiche italiane

– Di Stefano R., 1994, L'Autenticità dei valori, in: Symposium autenticità e patrimonio monumentale. Napoli, Edizioni scientifiche italiane

– Lemaire R. 1994, Authenticité et patrimoine monumental. Symposium autenticità e patrimonio monumentale, Napoli, Edizioni scientifiche italiane

– Marconi P., 1994, Symposium autenticità a patrimonio monumentale. Napoli, Edizioni scientifiche italiane.

– Autenticità formale o autenticità materiale?, in Symposium autenticità e patrimonio monumentale. Napoli, Edizioni scientifiche italiane

– Parent, M., 1994, Un nouvel élan pour la réflexion sur le patrimoine, in Symposium autenticità e patrimonio monumentale. Napoli, Edizioni scientifiche italiane

– The Nara Document on Authenticity, 1994, in Proceedings of the "Nara conference on authenticity in relation to the World Heritage Convention", Trondheim: Tapir Publisher, 1995

– Cleere H., 1995, The evaluation of authenticity in the context of the World Heritage Convention in: "Nara conference on authenticity in relation to the World Heritage Convention. Proceedings". Trondheim, Tapir Publisher, 1995

– Di Stefano R., 1995, L'authenticité des valeurs, in: "Nara conference on authenticity in relation to the World Heritage Convention. Proceedings". Trondheim, Tapir Publisher, 1995

– Domicelj J., 1995, A question of authenticity: cultural diversity, in "Nara conference on authenticity in relation to the World Heritage Convention. Proceedings". Trondheim, Tapir Publisher, 1995

– Fejérdy T., 1995, Authenticité dans la restauration des monuments historiques, in "Nara conference on authenticity in relation to the World Heritage Convention.

Proceedings". Trondheim, Tapir Publisher, 1995

– Krestev T., 1995, Cultural diversity and the concept of authenticity, in: "Nara conference on authenticity in relation to the World Heritage Convention. Proceedings". Trondheim, Tapir Publisher, 1995

– Ito N., 1995, Authenticity" inherent in cultural heritage in Asia and Japan, in Proceedings of the "Nara conference on authenticity in relation to the World Heritage Convention", Trondheim: Tapir Publisher, 1995. p. 35-45.

– Mujica, E. 1995, Authenticity and heritage diversity: archaeological sites and cultural landscapes in the Andean countries, in Proceedings "Nara conference on authenticity in relation to the World Heritage Convention", Trondheim, Tapir Publisher

– Stovel H., 1995, Considerations in framing the authenticity question for conservation, in: "Nara conference on authenticity in relation to the World Heritage Convention. Proceedings". Trondheim, Tapir Publisher, 1995

– Tampone G., 1996, Il restauro delle strutture di legno, Milano: Hoepli

– Gasparini G., Marini C.F., Cliver B., Arias Incollá M. de las Nieves, Buggey, S., Muñoz, M., Langenbach R., MacLean M. Mitchell N., Shull C., Taylor M.R., 1996, Icomos interamerican symposium on authenticity in the conservation and management of the cultural heritage. US ICOMOS. Washington, US Icomos, San Antonio (Texas), 1996.

– de Jonge W., 1998, Concrete repair and material authenticity: non-destructive repair techniques, Eindhoven, DOCOMOMO, 1998. p. 74-82, illus. (Preservation Technology. Dossier 2) In: "The fair face of concrete: conservation and repair of exposed concrete"

– Tomaszewski A., 1999, Vers une philosophie pluraliste de la conservation pour le XXI siècle, Varsovie, Centre pour la Protection du Paysage Culturel, XII ICOMOS General Assembly, Mexico 1999.

– Tampone G., 2002, Istanze ideologiche e avanzamenti tecnologici nel restauro delle strutture di legno antiche, 2002, in Restauro, Napoli, E.S.I., 2002

– Messeri B., Tampone G., Tempesta G., 2006, Past Repairs and Modern Conservation Views for Stabilization of Sakyamuni Tower, China, in Proceedings of Structural Analysis of Historical Constructions, New Delhi, 2006,

– Tampone G., Messeri B., 2006, Compliance of the Practice of Strengthening Ancient Timber Structures is Seismic areas with the Official Documents on Conservation, 15th IWC International Symposium and Confer-

ence (18th to 23rd September 2006, Istanbul): Why Save Historic Timber Structures ?, in Proceedings of the Symposium, 2006.

– Tampone G., 2008, Evoluzione dei criteri di consolidamento dei monumenti di carattere archeologico, in “RESTAURO”, Napoli: E.S.I., 2008

– Schmückle-Mollard C., Desmoulins C., 2002, Utilisation, réutilisation et authenticité (Madrid 2002) Paris, Section Française de l’Icomos, 2002. Bulletin de liaison. 50-51

– Fu C., 2005, The validity of The Venice Charter and authenticity in cultural heritage conservation. A discourse on the values differences between Eastern and Western Cultures. Budapest, Hungarian National Committee of ICOMOS, 2005. p. 53-62, illus. (Monuments and Sites. XI) In: “The Venice Charter/ La Charte de Venise: 1964-2004-2044?” La validité de la Charte de Venise et l’authenticité dans la conservation du patrimoine culturel.

– Prats M., 2006, La question de l’authenticité, in «Vivre dans un grand site: le pari du développement durable» , ICOMOS France, Paris, Les Cahiers de la Section Française de l’ICOMOS. 22)

– Casiello S., 2008, Authenticity and restoration: the role of the “Scuola Napoletana in “Values and criteria in heritage conservation, Proceedings of the International Conference of ICOMOS “, Firenze, Edizioni Polistampa

– Dezzi Bardeschi M., 2008, The discriminating value of the authenticity in the debate on the restoration. Before and after Nara, in “Values and criteria in heritage conservation” Firenze, Edizioni Polistampa

– Tampone G., 2008, Valori semiologici delle opere di consolidamento negli edifici monumentali, in Proceedings (ed. by A. Tomaszewsky) of the International Conference of ICOMOS, ICCROM, Fondazione Romualdo del Bianco: “Values and Criteria in Heritage Conservation”, Firenze: Edizioni Polistampa

– Tampone G., 2009, La cultura umanistica e tecnica per la conservazione degli edifici antichi, in La cultura umanistica e tecnica per la conservazione degli edifici monumentali, in Bollettino Ingegneri, Firenze, Collegio degli Ingegneri della Toscana

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# Review of the Principles of Conservation of Timber Structures

presented by ICOMOS Mexico's National Committee on Wood,  
**Dr. María de Guadalupe Zepeda Martínez**

For Latin American countries such as Mexico, these Principles are lacking in fundamental parts, from the socio-anthropological perspective. The principles should include the recognition and conservation of the ritual practices of producer societies associated to the production of timber architecture and their traditions, since these are part of the safeguarding and reproduction of this timber heritage, just as it was expressed in the previous symposium in Guadalajara, Mexico from November 14 to 19 of 2012. In that meeting, several Mexican experts expressed the importance of the traditions of indigenous communities in the preservation of traditional architecture. For instance, the “trojes” that are unique monuments built with wood in the town of Angahuan, in the “Purépecha sierra” of Michoacán.

The Principles for the preservation of historic timber structures of 1999, is the other document that rules on this matter.<sup>1</sup> This document is inspired by the Venice Charter and its structure has a series of general considerations to frame its field and then develops general aspects such as: diagnostics and documentation, monitoring and maintenance, interventions, repair and replacement, historic forest reserves, contemporary materials and techniques of construction and education. It establishes that the inspection, and storing of data and documentation should be the first approach to the timber built heritage, without referring to aspects of authenticity. In this part the concept of

timber species of cultural value<sup>2</sup>, should be integrated for its specific investigation and to support the value of authenticity of the property that is recorded. The Nara Document on Authenticity establishes that “conservation of cultural heritage in all its forms and historical periods is rooted in the values attributed to the heritage. Our ability to understand these values depends, in part, on the degree to which information sources about these values may be understood as credible or truthful.”<sup>3</sup> This is the support to study the species of cultural value based on studies of historic documental sources and on the field. The sources may be physical, written, oral, and figurative, enabling the knowledge of the nature, specificities, meaning and history of this cultural heritage.<sup>4</sup>

Monitoring and maintenance; in the case of a timber town, periodic monitoring to evaluate the state of conservation of the monuments should be an obligation in defined periods of time and the necessities of the community. In point four, on Interventions, it should be made clear that they have to be made in coordination with the inhabitants of the settlement.

Repair and replacement in the same way, should be preceded by the elaboration of projects approved by both parts and be in accordance with the municipal partial plans and whose objective should be at the same time the improvement of the conditions of life of the users and the preservation of the monuments

<sup>1</sup> Idem, p. 353

<sup>2</sup> On the basis of a study made by the author as part of her doctoral thesis, from historical sources about timber species and traditional manufacturing techniques used in the architectural construction in the New Galicia as they are for the 16th century the *Historia General de las Cosas de la Nueva España* or the Florentine Codex of Brother Bernardino de Sahagún, the *Relaciones Geográficas de la Nueva Galicia* translated by Acuña, the *Relaciones Geográficas de la Nueva España*. Later on, other sources were revised for the 17th to the 19th centuries from which a registration of 104 useful species was obtained for the construction of temples, palaces, bridges and town halls and the carpentries; floors, doors windows, mezzanines and covers. A registration of the main

species present in the monuments preserved to the date was made. With both registrations a crossed study was made to know those species registered by the historic sources and the species present in the monuments that date from the 18th, 19th and 20th centuries conserved at present. 10 species were obtained that fulfilled these demands which were denominated Wooden Species of Cultural Value and they are the following: *Prosopis* sp. (mezquite), *Taxodium mucronatum* (sabinos), *Pinus* (pine), *Abies Religiosa* (oyamel), *Swietenia macrophylla* (mahogany), *Quercus* (oak), *Cedrella* (cedar), *Tabebuia Smithii* (spring), *Frasinus* sp. (ash-tree), *Enterolobium Cyclocarpum* (parotta).

<sup>3</sup> Gómez Consuegra, op. cit pp. 154

<sup>4</sup> Idem, p. 155

where they inhabit; in a sustainable and respectful way with the immediate natural setting.

Consequently in the item of historic forest reserves, the previous study of *Especies maderables de valor cultural* (timber species of cultural value) should be considered on the base and foundation of the study of historic sources. An agreement between authorities and research institutes should be enabled to guarantee that the information is reliable, especially because reserves of timber species with cultural value vary in relation to the geo-climatic regions and each one should know their own species in order to integrate materials suitable for interventions that preserve their authenticity.

As for the materials and techniques of contemporary construction where modern and synthetic materials are used for the restoration of timber monuments, it is necessary to say that for indigenous towns built with this material, the selection of innocuous products, non-toxic for the human contact is indispensable. Consequently for these cases, some fumigants, varnishes and preservers from insect' attacks should be discarded given their high toxicity to the human being.

In the case of Mexico, the last point on education and training should go beyond "a plan that integrates durable necessities of production and consumption", it should be an interdisciplinary work for the study, registration and reproduction of the traditional construction techniques, which is still empiric knowledge in the memory of the user community.

For the section on inspection, recording and documentation, the anthropological value associated or related to the production of timber architecture heritage, should be included. In this same part, the formation of a database with the characteristics of the architecture and the wood used in their construction is desirable. In the part of the repair and the substitution, we insist in the mechanisms to promote the reforestation with timber species of cultural value for each country, as well as the training in the trade of traditional carpentry for groups of technicians that develop actions of wood conservation and restoration.

I consider that one of the most important topics in the Principles is the cooperation and collaboration between the countries that form part of this Committee, the feedback with the experiences in restoration between the member countries. Cooperation and management of economic support as a main topic for the operation of the Committee, with technical advising, special projects, training of specialized personnel, publications, dissemination and exhibitions, communication networks between the experts and the countries with timber built heritage that is urgent to implement.

## Proposals

To add the following concepts:

### General considerations

1. Timber cultural heritage is the human product with cultural values, associated not only to the natural resources of the geographical setting, but rather it is bearer of anthropological and social values coming from the social groups who built it.

2. Timber cultural heritage is constituted by an outstanding monument of unique and extraordinary features, as well as the modest works of a group with common daily life characteristics, that transmit cultural values founded on their history and giving their cultural identity to the society.

3. The main factors of deterioration of this cultural heritage in the current 21st Century are a consequence of the global effects of pollution, of human negligence, of the massive exploitation of the timber resources, the extinction of wood species of cultural value, the loss of the empiric wisdom on the traditional constructive techniques of wood and by the lack of opportunities for the population that live or work the timber traditional architecture to copy constructive models of high cultural value.

4. For the above-mentioned, the safeguarding of the timber heritage requires to expand the vision with which it is recognized, registered, studied, preserved and if it is the case, repaired for its transmission to the future.

5. Under the new framework of recognition and preservation of this heritage, the multi and interdisciplinary

participation of engineering, architecture, biology, sociology, anthropology and other sciences, must be promoted.

### Definition

1. Timber cultural heritage is defined as the human products built with this material for the satisfaction of material and spiritual needs of the human beings. As such, works of architecture, engineering and sculptural works of art that are technological, archaeological, historical, anthropological, ideological testimonies, of the different groups and regional materials, are considered.

2. Timber cultural heritage can be an integral architectural element or a part of that architecture, as roofs, floors, walls or carpentry. Likewise in engineering, the machines built totally with wood, as well as the parts built with this material are considered as a part of this heritage.

3. It is considered as heritage the public works that have been destined to the delight of the community, in temples, museums and common areas; as well as those works that are intimately associated to the human life like housing and cult.

- To include in the principles: the anthropological aspects that give foundation and guarantee the preservation of timber traditional architecture: indigenous traditions and rituals associated to these testimonies.
- To include in the protection: the forest natural areas with timber species of cultural value that are historically associated.
- To enlarge the vision of the preservation of the timber monument and to include in a holistic way all the aspects of the natural and social environment that are associated and affect its conservation.
- To integrate the item of cooperation and collaboration between member countries as a commitment of the international scientific committee to foster the exchange of experiences and to raise the quality and quantity of the interventions.
- To integrate a committee of management of economic supports in order to have real possibilities of activating urgent, important and necessary actions for safeguarding timber cultural heritage.
- To include as a principle, the dissemination of monuments' inventories, timber species of cultural

value, interventions and restoration of monuments, education and training.

### Conclusions

The current international and national documents on principles, criteria and norms for the protection of timber heritage are directed to monumental, unique or isolated works of architecture that in most cases are not inhabited spaces, and insufficient for the wood architecture used by communities.

The conservation of the cultural heritage product of indigenous communities in the mid-21st century, poses a challenge that can be assisted, if we expand the vision of the intervention and the heritage management to multifactorial aspects of anthropological order and of sustainability in the natural context.

The technical aspects of the conservation of this type of architecture should be guided to satisfy housing as such, and as a part of the socially valid tangible cultural heritage in its natural environment.

The study of the wooden architecture in mountainous regions of western Mexico built by indigenous groups, has served to observe, analyze and propose viable ways for its safeguard and conservation, and is applicable to other regions of the country as well as other countries.





# Guidelines for The Conservation of Timber in Historic Buildings

## 1. Preamble

1.1 There have been a number of charters following the Venice Charter of 1964 which set out the guiding principles for the preservation and restoration of historic buildings. These now include the international Wood Committee's Principles for the Preservation of Historic Timber Structures ratified at the ICOMOS General Assembly in 1999.<sup>1</sup> This present document sets out to apply these principles to the conservation of buildings in the United Kingdom, indicating the relationship between general conservation principles and specific techniques that may be used when applied to timber.

1.2 Timber is a potentially durable material, given a favourable environment. However, under certain conditions it is vulnerable to fungal or insect attack and possible chemical degradation. These guidelines outline a procedure for the conservation of timber in building, presenting a possible sequence of appraisal and alternative forms of remedial work where necessary.

1.3 No building is made entirely of timber and due regard should be paid to its interaction with the other materials of construction.

## 2 Inspection and recording

2.1 The first stage of conservation should be to evaluate and where appropriate record the present form and condition of the building<sup>2</sup> and review any documentary evidence that provides information on its original state and the nature of any subsequent changes. The aims of an inspection should be to determine where appropriate:

- the extent to which the work remains substantially as originally built,
- the nature and extent of later interventions.
- the cultural and historic significance of the timber work within the present structure, and in relation to others of a similar period and status,
- its present form, condition and structural behaviour

(see 2.3),

- the causes of any deterioration and/or structural distress in the timber,

It should also record any associated features and materials, e.g. attached hardware.

2.2 In general four kinds of source material may be used:

I) the building itself, whose survey will be discussed in detail below (2.3),

II) any documentary evidence relating to the particular building, which may provide information on its original state and the nature of any changes that have been made,

III) secondary material contemporary with the building (or with any period of significant change) such as historic drawings and paintings, craft manuals or pattern books,

IV) published research on buildings of a similar type which may assist in assessing its cultural and historic significance.

2.3 An inspection should provide evidence of the original features of the building as well as its present condition. Where an inspection is appropriate, it should include:

- a dimensional survey, to the appropriate degree of detail. This might record the original setting out of the structure as well as its present deformed state.
- an outline of the structural form and mode of stability, again noting the original structural design as well as the present mode of behaviour.
- a survey of the original form of individual elements and joints and their present condition.
- a note of the species and evidence for the origin of the timber used (see 2.5).
- a survey of surfaces to establish: the method of conversion of the timbers, any tools used in the subsequent working of the timber, any integral decoration - e.g. mouldings, turned, carved and punched work.  
Surface decoration - e.g. paint, veneer, inlay - their

condition and significance.

usage deposits such as soot.

- a note of the environmental conditions - relative humidity, sources of moisture, light levels, ventilation and temperature.
- the grade of structural timbers.
- the period(s) of work (possibly requiring specialist survey techniques).

Note: any survey will naturally include the supporting structures and/or the foundations.

2.4 In addition the cultural significance of the timber, elements should be assessed under appropriate headings such as:

- aesthetic and iconographic
- historic
- technical, with reference to innovation and tradition.
- social status both within the given structure and in relation to other buildings.

The relative importance of the parts to the total cultural significance of the whole should be set out in any Conservation Plan<sup>3</sup> for the building.

2.5 As much information as possible should be obtained by a visual inspection. This may be insufficient to assess adequately the condition of timbers, which are often concealed in part by other elements of the fabric. Where the significance of the covering material allows, consideration may then be given to investigative work involving the local removal of small areas of these other materials or finishes.

### 3. Evaluation

3.1 From the results of the inspection, an evaluation should be made of the condition of the fabric, in order to determine the form and scope of any necessary remedial work. The remedial work (see 4) should ensure

- the continued strength and serviceability of all joinery and carpentry
- that there is ideally no reduction in the cultural significance of the building.

These proposed remedial works should be incorporated into any Conservation Plan.

<sup>1</sup> Principles for the Presentation of Historic Timber Structures, ICOMOS 1999

<sup>2</sup> The recording of buildings is dealt with in Principles for the Recording of Monuments, Groups of Buildings and Sites, ICOMOS 1996

3.2 The evaluation should note the environmental conditions within which the timber is located and the implications of these on its service life. This should extend to a requirement for continuing inspections and maintenance work where appropriate.

3.3 Historic joinery and carpentry may not meet modern requirements for thermal performance, fire resistance or other aspects of safety. Where changes to meet such requirements would adversely affect their cultural significance, alternative means for meeting these requirements should be sought first.

3.4 Any remedial work proposed should be kept to the minimum. For example, loss of member profile by itself does not warrant remedial work unless it impairs performance or aesthetic understanding to an unacceptable degree. Fissures in large members that are due to drying rarely need repair. Deformation of an element (unless indicating potential instability), should be accepted unless it renders some element of the building unserviceable.

3.5 Specialist advice should be sought for the treatment of finishes or surface decoration.

Restoration of lost surface decoration should only be attempted where specific evidence exists of the surface before losses occurred.

3.6 Where modifications which would be required for a proposed change of use are incompatible with the preservation of the cultural significance of the fabric, then a change in the conditions, or an alternative use should be sought.

3.7 When considering structural timbers it should be noted that:

- a) If a building has a history of satisfactory performance, and if the use and loading regime are unchanged, the structure can be made adequately strong simply by repairing recent strength-reducing defects.
- b) If recent alterations have been made, or any proposed change of use would impose a more onerous loading, the potential strength should be estimated by means of
  - analysis (but see 3.6.1) or
  - load testing (see 3.6.2)

<sup>3</sup> Conservation plans are dealt with by Kerr, J.S.. The Conservation Plan: a guide to the preparation of Conservation Plans for places of European cultural significance, The National Trust of Australia, 4th ed. 1996

3.7.1 Present-day codes of practice should be used with caution bearing in mind that these give lower bound strength values for the design of new structures. Because existing structures can be inspected, more accurate estimates of strength (in terms of, e.g., member density or grading) may be possible.

3.7.2 If a load test is applied, the test load should be limited so that no permanent damage is sustained. The load test should be carried out under specialist supervision.<sup>4</sup>

3.8 The results of the survey, and the conclusions of the evaluation should be recorded as a basis for any necessary remedial work, and retained both for the future maintenance of the building and as an historical record.

#### 4. Remedial policies

Withing the aims set out in the Conservation Plan (if any) the following aspects need to be considered:

4.1 The selection of species, grade and moisture content of any replacement or reinforcing timber.

In general it is thought appropriate to use the same species as the original material for repairs or replacements. However there may be circumstances in which the performance of the material takes precedence over this consideration. It is also important to note that growth conditions can be as important as species in determining the properties of the timber.

4.2 It is necessary to ensure adequate strength, stability and serviceability of the fabric. The methods of dealing with this are:

accepting the present structural behaviour and simply, repairing where necessary reinstating the original structural behaviour.

Introducing supplementary structures that might include materials other than timber.

Any of these may be acceptable depending upon the circumstances. These apply to the structure of joinery elements as much as the main structure of the building.

4.3 It may be possible to restore the strength of an element by reinforcing the existing timber.

This is normally the least destructive method of repair.

4.4 Where the strength of an element or joint is inadequate and repair is required, repair methods should be

considered which use:

I) only timber joints.

II) metal fasteners.

III) epoxy resin.

or a combination of two or more of the above.

Selection of these should be guided by the maximum retention of cultural significance. In using either II or III the very different properties of metals, resin and timber should be borne in mind.

4.5 Surface features, whether integral or applied, should be preserved. If a surface feature forms part of a structural member that has become structurally inadequate then this should be given priority in the selection of the repair method.

4.6 In view of the particular susceptibility of timber to the effects of moisture, remedial work should generally include any necessary work of environmental protection, such as:

- repairs to the weather envelope (roofs, gutters, etc.)

- ensuring adequate ventilation

- isolation of the timber from potential moisture.

In cases where the structure still has sufficient residual strength and joinery is still in good condition, no further work may be needed.

#### 4.1 Workmanship

Where timber matching the original is used as a repair or replacement material, consideration should be given to the possibility and desirability of using historic tools and methods of production and working (e.g. riven, rather than sawn shingles, the use of moulding planes rather than spindle milled work, pit sawing rather than band sawing) to avoid modern tool marks that might adversely affect the appearance of the finished timber.

#### 5. Monitoring

Monitoring should be carried out both during and after any intervention to ascertain the efficacy of the methods used and the long-term performance of the timber. However, the methods used for monitoring should be designed to gather only such data as may be necessary.

Records should be kept of the work as part of the documented history of the structure.

<sup>4</sup> Load tests are dealt with by BS EN 380:1983, Timber structures - Test methods - General principles for static load testing, British Standards Institution.





# Procedure for the adoption of ICOMOS Doctrinal Texts

Adopted by the Executive Committee  
in November 1984 and amended  
in March 2011

## Definition

1 ICOMOS, at the international level, develops a corpus of 'Doctrinal Texts' as a necessary basis for conservation policies. A doctrinal text is a group of ideas which one affirms to be true and by which one claims to furnish an interpretation of facts in order to direct action.

## Characteristics

2 ICOMOS Doctrinal Texts, at the international level, comprise four types: Charters, Principles, Guidelines and Documents. Their characteristics and requirements are outlined in the attached table.

3 New doctrinal texts shall follow the characteristics and requirements set out within the attached table.

4 When appropriate, ICOMOS doctrinal texts shall contain a mechanism to observe, monitor and evaluate the text over time.

## Procedure

5 The need for a new ICOMOS doctrinal text shall be carefully assessed by the Advisory Committee and the Executive Committee, taking into account the characteristics and requirements of the four types of ICOMOS doctrinal texts.

6 The assessment of the need for a new ICOMOS Doctrinal Text shall be initiated through the presentation of a very brief summary of what is to be covered by the doctrinal text, a motivation of the need for and precise purpose thereof and discussion of the category/ies for which it might be considered by the Advisory and Executive Committees. This step must take place before the presentation of any substantial text to the Advisory and Executive Committees and, other than in very exceptional circumstances, before the drafting of such a text commences.

7 A doctrinal text shall be either prepared or studied by an International Committee or by an ad hoc committee designated for this purpose by the Executive Committee. The Executive Committee decides if and to what extent partner organisations shall be associated to develop new ICOMOS doctrinal texts.

8 The Secretariat shall inform the ICOMOS National and International Committees and the ICOMOS membership, that a new doctrinal text is being prepared.

9 A new doctrinal text and any report concerning such texts shall be prepared simultaneously in all working languages and, whenever possible, in additional languages such as Spanish.

10 The draft of a new doctrinal text shall be distributed to all the ICOMOS National and International Committees and the ICOMOS membership for comment and review.

11 The revised draft, with a report explaining how the comments on the earlier draft have been incorporated and a compilation of the comments received, shall be distributed to all the ICOMOS National and International Committees and the ICOMOS membership.

12 The revised draft of a new doctrinal text must be put on the agendas of the meeting of the Advisory and Executive Committee and must be discussed at least one year preceding that of the General Assembly.

13 The Advisory Committee shall assess the substance and structure of the revised draft of a new doctrinal text and recommend action to the Executive Committee; it shall make a specific recommendation concerning its title.

14 The revised draft of a new doctrinal text must have received the approval of the Executive Committee at least six months prior to the General Assembly.

15 If necessary, the consultation process with the ICOMOS National and International Committees [and the ICOMOS membership] shall be repeated until a final draft text has received a positive recommendation by the Advisory Committee and the approval of the Executive Committee.

16 The draft new doctrinal text shall be redistributed in its final revised form to all the National and International Committees and the ICOMOS membership, at least four months before the General Assembly, with a view to its adoption via a resolution.

## Characteristics of ICOMOS International Doctrinal Texts

Document Type	Charters	Principles	Guidelines	Documents
<b>Subject covered</b>	Heritage and conservation as a discipline A specific type of heritage/ typology	A specific type of heritage/ typology A specific activity related to heritage and conservation	A specific type of heritage/ typology A specific activity related to heritage and conservation	A specific type of heritage/ typology A specific activity related to heritage and conservation Good practice Important issues
<b>Adopted by</b>	ICOMOS General Assembly	ICOMOS General Assembly ICOMOS International Scientific Committees Various regional ICOMOS meetings	ICOMOS General Assembly ICOMOS International Scientific Committees Various regional ICOMOS meetings	ICOMOS General Assembly ICOMOS International Scientific Committees Various regional ICOMOS meetings
<b>Length</b>	Variable, usually 5 to 7 pages	A few pages, up to a dozen	A rather detailed text, flexible according to needs	Flexible according to needs, and may number up to a dozen pages
<b>Structure</b>	Should have a formal structure with preamble, aims, rules and methods	Should have a formal structure	Should have a formal structure	Flexible according to needs
<b>Aim</b>	Standard setting texts formulating policy and practices relevant to heritage and conservation in general or a specific type of heritage	Texts formulating principles for policy and practices regarding a specific type of heritage or activity related to heritage and conservation	Operational texts formulating: Approaches contained in Charters, Detailed information which concerns procedures Good practice Requirements for implementation	The aims have to be specified in the texts themselves Information texts formulating explanatory notes Illustration and presentation of good practice
<b>Ongoing relevance</b>	Charters containing place names remain unaltered A Charter which is deemed to be out of date should carry a new name after revision	Principles containing place names remain unaltered Others can be amended, updated, replaced etc. Revised Principles will carry a new name	Guidelines containing place names remain unaltered Others can be amended and updated	Documents containing place names remain unaltered; Others can be amended, updated, replaced etc
<b>Hierarchy / importance</b>	***	**	**	*