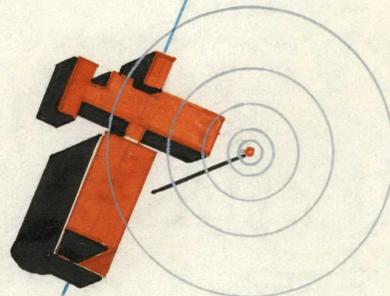


STANDARDIZED PROPAGANDA UNITS FOR  
WAR TIME AND PEACE TIME CHINA.....



Submitted As Partial Fulfillment Of The  
Requirements For The Degree of.....  
Bachelor of Architecture.....

Massachusetts Institute of Technology..  
School of Architecture.....

Ieoh Ming Pei  
June 1940.....

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May 10, 1940

Dean W. R. MacCornack  
Chairman, Thesis Committee  
School of Architecture  
Mass. Inst. of Technology  
Cambridge, Massachusetts

Dear Sir:

In partial fulfillment of the requirements  
for the degree of Bachelor of Architecture  
I hereby submit this thesis entitled,  
"Standardized Propaganda Units for War Time  
and Peace Time China".

Respectfully,



Ieoh Ming Pei

Y

(Copy)

M.I.T. Graduate House  
March 12, 1940

Dean W. R. MacCornack  
Chairman, Thesis Committee  
School of Architecture  
Mass. Inst. of Technology

Dear Sir:

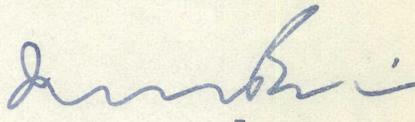
As partial fulfillment for the degree of Bachelor of Architecture, I submit herewith my proposed thesis entitled, "Propaganda Units for War Time and Peace Time China."

Inasmuch as little data is available in regard to such a program, this thesis will propose to use as much assumption as will be necessary and solve it from the standpoint of a logical use of local materials as applied to the local conditions.

I hope that this will meet with your approval.

Respectfully yours,

s/ I. M. Pei



(Copy)

March 14, 1940

Mr. Ieoh Ming Pei  
M.I.T. Graduate House  
Cambridge, Massachusetts

Dear Pei:

I have your letter of the twelfth of March in which you submit the title of your Thesis - "A Flexible System of Propaganda Units for War Time and Peace Time China" - which I am glad to approve.

You have a very interesting subject and, while propaganda as understood in the present day is a very disagreeable element of our international life, I am sure that the type of propaganda that would be housed in the units to be provided in your Thesis would be of the right sort.

I shall expect to receive your detailed program within a few days and I shall follow the development of your Thesis with great interest and look forward to seeing an outstanding piece of work.

Sincerely yours,

s/ Walter R. MacCornack

W. R. MacCornack, Dean  
School of Architecture

WRM/h

### ACKNOWLEDGMENT

The Author wishes to take this opportunity to express his appreciation to Dean Walter R. MacCormack, the Faculty of the School of Architecture, Mr. Albert G. Dietz of the Department of Building Construction for their valuable assistance and information which contributed to make this thesis possible.

The Author also wishes to thank Dr. William Emerson for his generous help and encouragement while he served as Dean of the School of Architecture at the Massachusetts Institute of Technology.

## INTRODUCTION

### What is propaganda?

According to Webster's Dictionary, the word propaganda means the scheme or plan for the propagation of a doctrine or a system of principles.

Therefore the word does not necessarily mean the propagation of falsities as has been commonly associated. It is the "system of principles" in back of it that determines its justification. In fact, the propagation of just and fundamental principles should be an important consideration in all far sighted minds of the present day.

Over eighty per cent of China today is still illiterate. Social minded educators have for the past two decades written innumerable words about this deplorable situation. Even with the active cooperation of the Chinese government the progress toward that betterment has been extremely slow. Careful examination shows that the methods employed have been too regimental and compulsory. In many cases voluntary support from the people has been eminently lacking. Far sighted educators are thus led to believe that a new, drastic program should be mapped out, one that will first instill into the masses the consciousness of the importance of edu-

cation -- and that is a program of progressive propaganda.

Then War broke out in 1937. Since then another problem has arisen. Uncertainty causes a tremendous migration of the Chinese population inland to the southwest. Important cities there were soon filled to capacity. Innumerable temporary villages and towns have been established overnight on heretofore sparsely inhabited areas. Faced with a situation unparalleled in scale in the modern times, the Chinese government has found it imperative to effect a sort of control over these temporary communities. Efforts have been directed toward education, sanitation, social, economic reorganization and last but not least as this is war time, the promotion of the nationalistic spirit of the people.

But so far most of the work has been taken up by spirited groups of students. Their efforts have not been well organized or coordinated and consequently not as effective as they might have been.

Then what about the program of educational propaganda that the government had been contemplating on adopting before the outbreak of the war? It should lend itself fittingly to a broadening of the program to envisage the promotion of education, sani-

tation, social, economic reorganization as well as nationalism. There is little doubt that such is practical.

But this program is broad and ambitious. It will not be one individual's undertaking; nor can it be accomplished by one type of specialist. It calls for a coordinated effort of scientists, economists, socialists, educationalists and architects.

Although for the purpose of this thesis the author has the rough outline of such a program in mind, it remains to be substantiated by experts of other fields in regarding its practicability. Many changes will undoubtedly have to be made. But for the present, the technical phase of planning a shelter for such tentatively determined activities is mainly investigated here in detail. Enough stress and consideration will be given to the social and economic phases to make it as nearly a realistic problem as possible. To this end this thesis is intended as a humble contribution.

SCOPE AND ORGANIZATION OF THE PROGRAM

Past history and present facts have revealed that the most effective means of spreading propaganda to the people is through some form of popular organ or recreation. Newspapers have always played a major role. But its effectiveness in China would necessarily be limited owing to its still prevalent illiteracy. On the other hand however, the Chinese are extravagantly fond of theatrical representations. It may be interesting to quote Dr. Arthur H. Smith on his description of a typical Village Theatre. "Strangely enough, except in a few large cities there are no theatres in the Western sense of the term provided with seats and enclosed walls and roof. The stage is a very simple affair. Sometimes it is built like a temple with an open front. But by far the larger part of the rural representation of theatrical companies take place on a temporary scaffolding which is put up for the purpose. The players resemble the Grecian prototypes in that they are a migratory band, going wherever they are able to find an engagement."

One reason for their passionate attachment to the theatre must be found in the fact that for the Chinese people there are very few available amusements, and for the mass of the country people there

is literally nothing to which they can look forward to as a public recreation except a few feast days, the large fairs with accompanying theatricals or theatricals without fairs. It is evident then that such a form of exhibition which is so much valued by the Chinese should become an important agency in educating as well as inflaming the minds of the people. In the light of the foregoing conclusions, the tentative propaganda program should best revolve around the theatre. Slogans, speeches, posters and other graphic materials can be effectively employed to play their parts as supplements. For clarity sake, the program is briefly represented in the following classification.

A. Visual

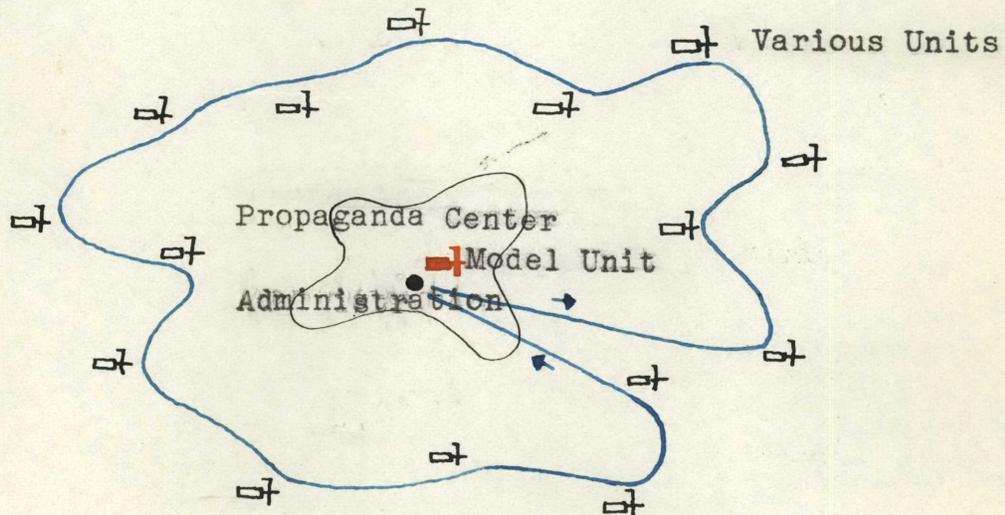
1. Theatrical Productions
2. Motion Pictures
3. The Still Pictures
4. Museum Materials
5. Graphic Materials

B. Auditory

1. Radio Broadcasts
2. Visiting Speakers and Lecturers

For this purpose a so-called propaganda unit will have to be erected in each village to house these various activities (though never simultaneously).

Inasmuch as there are innumerable villages in a country like China, the vastly complicated system of units resulted thereupon necessitates the standardization of such units from the standpoint of effective administration. It is proposed that a large propaganda center be planned and built in the capital where the Ministry of Propaganda maps out the policy and sends out theatrical groups, motion pictures, museum exhibits, speakers, graphical materials, etc. to the different units for presentation. These groups of people and exhibits will tour the country on a predetermined time schedule and will eventually return to the center. These tours will go on forever in cycles with new plays, new movies, new exhibits each time. A tremendously complex problem can thus be solved in a simple way under the proper control of the Ministry. The accompanying graph will serve to show its functioning in brief.



### TECHNICAL CONSIDERATIONS

Once the program has been determined, the student could proceed with the planning of these standardized propaganda units. Realizing that materials and methods of construction will have a controlling influence over the plan, no attempt was given to study plan elements prior to the choice of proper materials that are technically and economically satisfactory.

Traditionally adobe construction has been commonly used in construction throughout China. But its limitation in spanning makes it impractical for the construction of a necessarily large hall for activities such as these units will embody.

Preliminary research revealed possibilities only in wood, steel and reinforced concrete. But unfortunately wood has always been a scarcity and the latter two are much too expensive to be used for such none too permanent structures. Furthermore transportation should be considered here as an evil and the employment of unskilled village hands a wise and economic resort.

With the exception of a clay, rich in Kaolin, it is impossible to visualize a China without the bamboo. It enters into the nation's endless needs as a uni-

versal provider and pages might be filled with a mere list of the uses to which it is put. It is in construction alone that the possibilities of bamboo have not been sufficiently experimented. Perchance its gracefulness belies its great strength or perchance if it is put to too utilitarian a use, it might lose its gracefulness which for centuries has been a stimulus to poetic thought and feeling. It may be of interest to quote our twelfth century

poet, Su Tung-P'o: "It is tolerable to eat without meat, it is intolerable to live without bamboo. Having no meat causes people to be thin, having no bamboo causes them to be vulgar. When people get thin they may become fat again, when scholars become vulgar they are incurable. Other people may laugh at this saying, which seems lofty but still is silly. If in the presence of 'these gentlemen' you still eat heartily, where in the world will you find the crane of Yang chow?"

The author earnestly hopes that he will not be accused in his thesis of putting bamboo to too (vulgar) improper a use.

## An Investigation Into The Properties Of Bamboo

### Advantages

Rapid Growth - Bamboo canes attain their full growth in one season even though, as in some taller varieties, they may reach the height of more than one hundred feet with an eight to twelve inch diameter. The most common species available in China have a height of forty to fifty feet and a diameter of three to five inches.

Weather Resistant - The canes of bamboo do not readily decay, but become harder through the years, due to the abundance of silicates in the outer fibres.

Flame Resistant - The hard and smooth outside surface makes it extremely difficult to catch a flame.

Maximum Strength and Minimum Lightness - Its construction is based on the stressed skin principle, resulting in great tensile and compressive (when properly reinforced) strength.

Shock Resistant - Its suppleness makes it practically invulnerable to earthquake damage.

Adaptability to Dry Construction - Easy to erect and dismantle. Their parts are salvageable. Its extremely long fibres make possible its many uses.

#### Disadvantages

Lacking in Stiffness - In itself it is practically useless as rafters. It bends easily at a span.

Danger of Cracking and Low Shearing Strength - Vulnerable to change of climatic conditions. Its splitting quality excludes the use of many connectors.

Non-Fire and Termite Proof - Despite its flame resistance, bamboo once set on fire burns easily and quickly. It is not termite proof though as a rule

termites prefer wood to bamboo.

### Experiments

The above conclusions are based entirely on personal experience with the material. In years back, there are a few theses in the Institute written on bamboo used in reinforcing concrete. The author has chosen some of the results of experiments by himself, by Mr. S. D. Li '15, on "Investigation of strength of bamboo under cracked and weathered conditions" and by Mr. H. K. Chow '14, on "Bamboo for reinforcing concrete" to further substantiate his conclusions.

Its Weathering Quality - Test on a specimen which had been for a year immersed in dirty water in the pumping well under floor of the Pierre Laboratory in the Institute. The specimen was so soaked with water that when stressed under tension the water was squeezed out and trickled down the specimen. The curve presents the same general appearance as others. Although the ultimate strength was lower which was in all probability due to local weakness near the joint rather than the general decay caused by the immersion in dirty water. From this test it is justifiable to conclude that the weathering quality of bamboo is good. (H.K.Chow 1914)

Strength under Cracked and Weather Conditions - "Very seldom can bamboo be kept under normal conditions.

It usually cracks on account of weathering. Its fibres are bent when it is deformed. All these fibres modify its strength and other properties."

"Comparison with wood: Bamboo and wood are both used as columns in structural work in China. In most cases wood is preferred because of the ease of making joints. There were times when bamboo was rejected on account of its supposedly lesser strength than wood.

Tests: Bamboo  
Compressive strength, 5740 lbs. per sq. in.  
Obtained from specimen under cracked and weathered conditions.

Hard Pine  
Compressive strength, 5000 lbs. per sq. in.

Spruce  
Compressive strength, 3000 lbs. per sq. in.

So, even under severely weathered conditions the strength of bamboo as a column is still larger than hard pine and certainly than spruce.

Bamboo under ordinary conditions showed an ultimate compressive strength of 8800 lbs. per sq. in.

With regard to rigidity, bamboo is about the same as hard pine. The test showed a modulus of elasticity of 1,612,000 lbs. per sq. in.

For the relative merits from the point of view of strength, it may be said that for equal weights, bamboo is stronger than wood." (S. D. Li 1915)

"Comparison with Steel:

Tensile tests - ultimate strength of

Bamboo - average 31,660 lbs. per sq. in.  
Steel - 60,000 lbs. per sq. in.

However, if we use equal weights of bamboo and steel, the former can carry twenty times as much load as steel (steel being forty times heavier)."

(S. D. Li 1915)

Gluing Quality of Bamboo - Bamboo takes glue very well, perhaps not as good as wood whose structure is coarser than bamboo. The author glued together two pieces of bamboo with different surfaces (all unworked) of contact. They seemed to unite perfectly.

Carpenter's Tools on Bamboo - A neat hole, neater than one in mahogany can be easily drilled with an ordinary brace and bit. Bamboo seemed to take any carpenter tool of good quality. But pocket knives failed to make cuts. According to scale of hardness for wood, bamboo is certainly the hardest wood.

Bending of Bamboo - Bamboo can be bent to an appreciable extent by artificial means of steaming. The extent of bend depends on sizes and species of bamboo.

In the light of the above experiments, the author

further concludes that the main difficulty lies in its lack of rigidity for spanning. If a suitable scheme of construction could be devised, it should prove to be a most logical and appropriate material for the use.

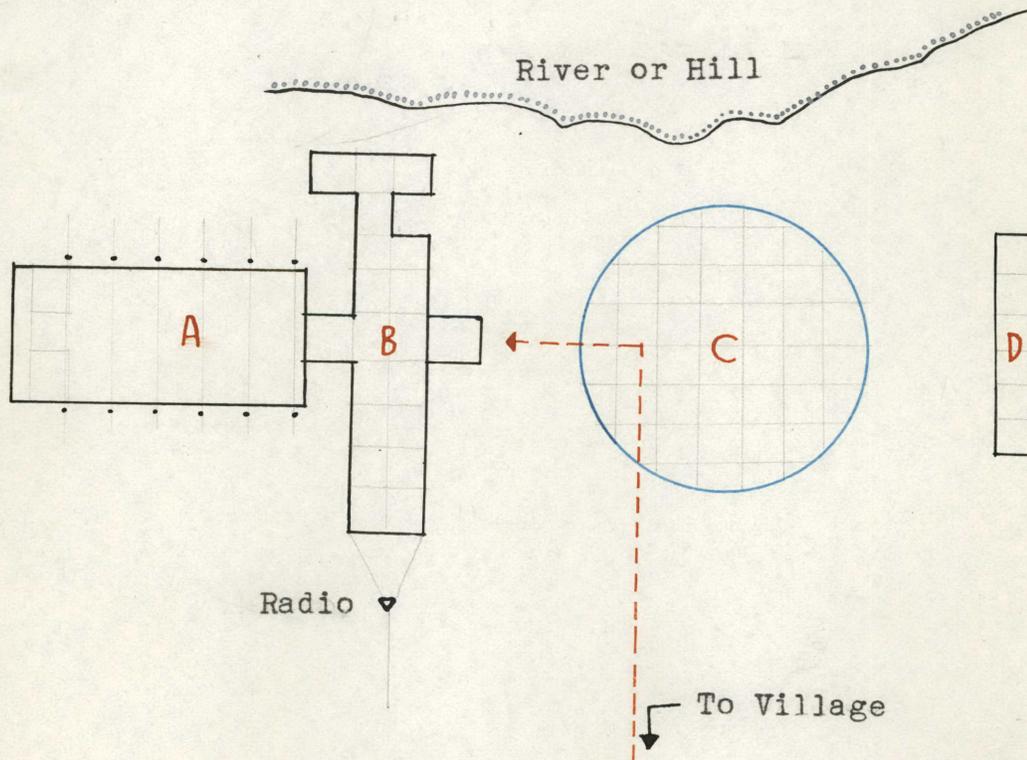
SOLUTION

I. Planning

Given the entire propaganda program, the problem now resolves to the design of the standardized unit to house all the outlined activities.

Inasmuch as few of these activities are to happen simultaneously, the ideal solution (being the most economical), is to provide a space or spaces designed with the maximum flexibility adaptable if possible to all required facilities.

Through a process of simplification, the elements resulting are diagrammatically represented in the following.



A. Main Hall, 40 ft. x 100 ft. with utility rooms adjacent. This part of the unit is designed with the maximum flexibility.

1. As a Theatre

Hall divides into audience (35) and stage.

Wall divides into three portions; the middle portion being flexible - can be lowered to admit light, drawn up to insure darkness.

Utility rooms here used as temporary dressing rooms.

2. As Motion Picture House

Relation of audience and stage remains.

Cyclorama of stage used here as screen.

Reversed projection from the utility area simplifies facilities.

Flexible middle portion of wall drawn up to insure complete darkness.

Utility rooms become storage and rest room for travelling technicians.

3. As Exhibition Hall

Flexible middle portion of wall lowered to let in light wherever desired.

Most seats stored in section under stage.

Rest scattered around for public use.

Exhibition Hall Continued

Acoustic panel drops down to separate stage from hall. Stage becomes storage room for boxes, space for packing and unpacking.

Utility rooms used here for dead storage and rest room for transportation group.

Flexible bamboo partition installed where needed for exhibition.

4. As Auditorium

Relation of stage and audience remains.

Utility rooms as rest rooms for travelling speakers.

5. As Instruction Rooms

Flexible temporary partitions here used to divide hall into small rooms for different types of instruction. Sound control difficult but not objectionable due to traditional habit in village schools.

Utility rooms used as rest rooms for teachers.

B. General Exhibition Space.

At its two extreme ends are located a unit power supply and radio control room, general information

and control desk where literature and other propaganda materials are distributed, and public rest rooms. This space is flexible in the sense that it is free from permanent partitions or enclosed spaces. It is shielded from the elements only by a roof as it is used mainly in good weather. Posters, exhibits, flags, photographs and other propaganda materials are here exhibited. It is intended to be very colorful and thus serve as the first attraction for the people.

C. Outdoor Forum.

An outdoor gathering place is very essential here as public speeches and demonstrations are frequently made out of doors. Loud speakers attached over the exhibition platform serve to broadcast important speeches, lectures and news from the central broadcasting station at the Propaganda Center in the Capitol. This network of radio also helps the Central Bureau of Propaganda to effect control and administration of these units however far away they may be located.

On days of festivities this forum will be bedecked with colorful flags and lanterns. It will undoubtedly prove to be a popular place when the traditional Chinese minstrel shows or wrestling exhibitions are to be held.

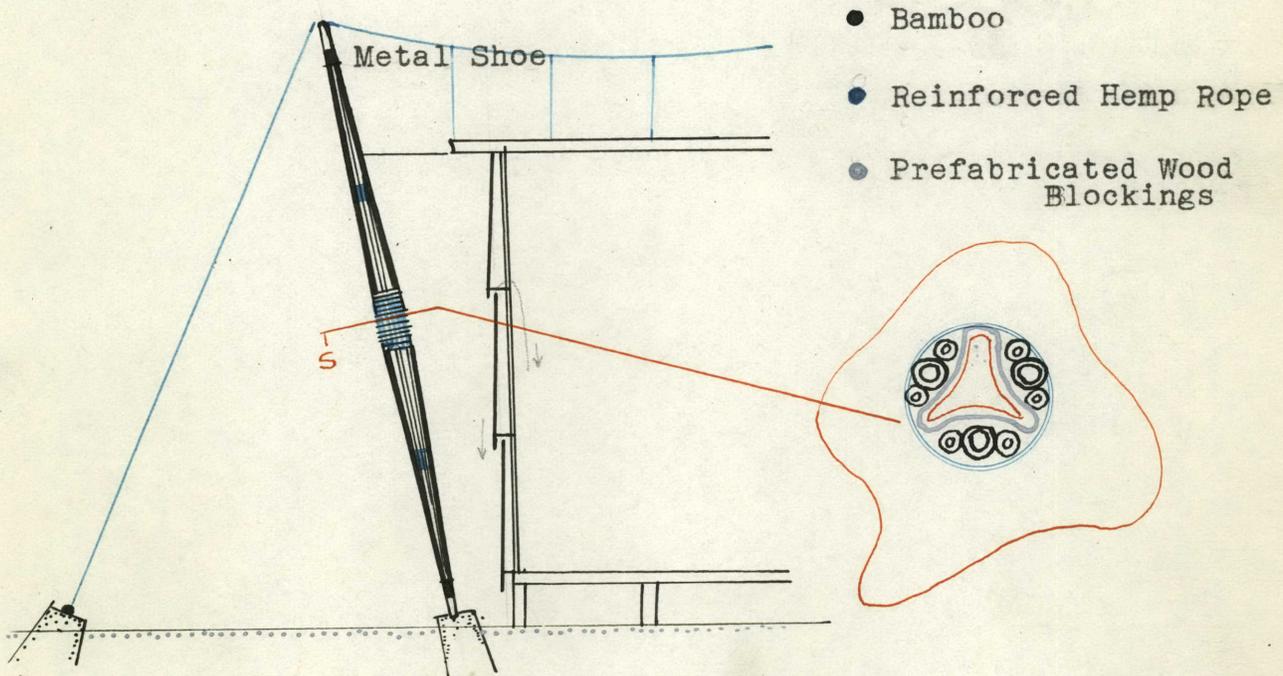
D. Animals' and Carts' Shed

It merely serves to provide shade for animals and carts belonging to the farmers. This can be located wherever the land is flat and convenient.

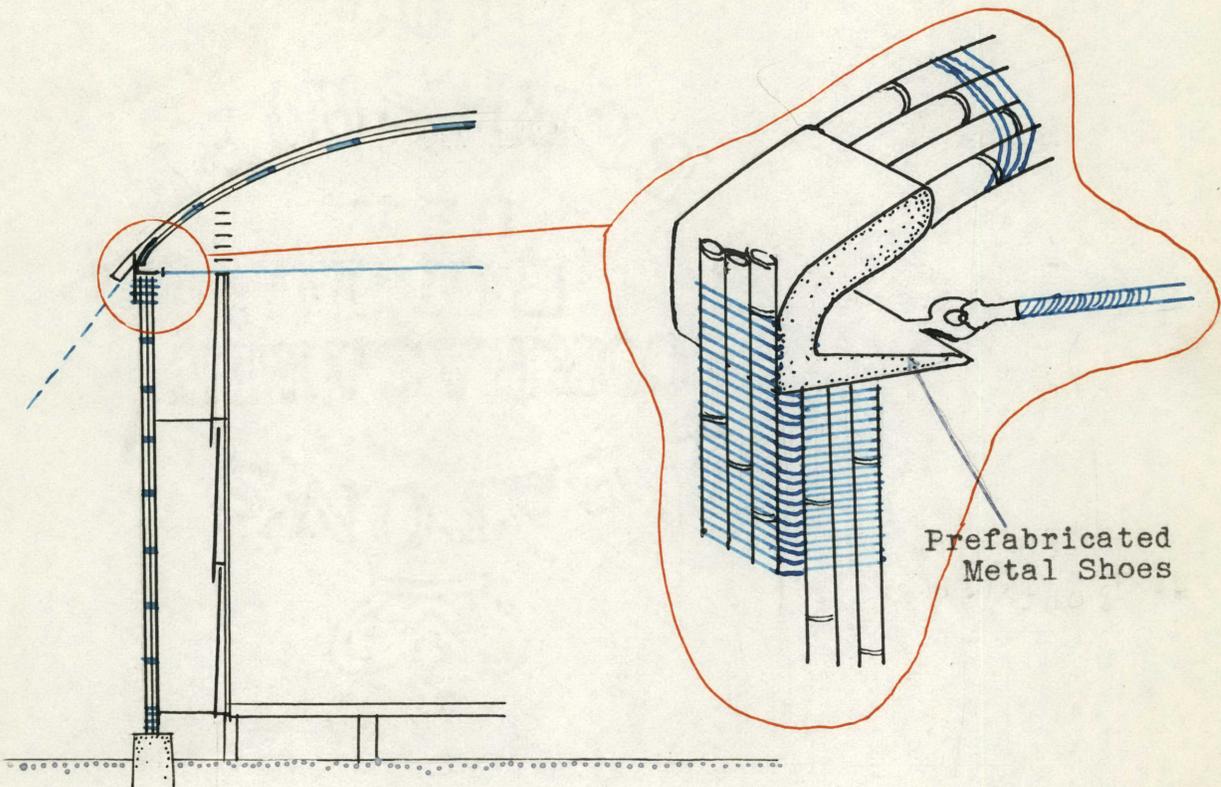
II. Construction.

In the previous pages, the various properties of bamboo as a construction material have already been carefully examined. Equipped with the data collected, the author proceeded with investigations into the possibility of using bamboo to span a distance of forty or more feet. The following will show the two acceptable solutions.

A. To Span By The Principle Of Suspension



B. To Span By The Principle Of A Bow String Arch

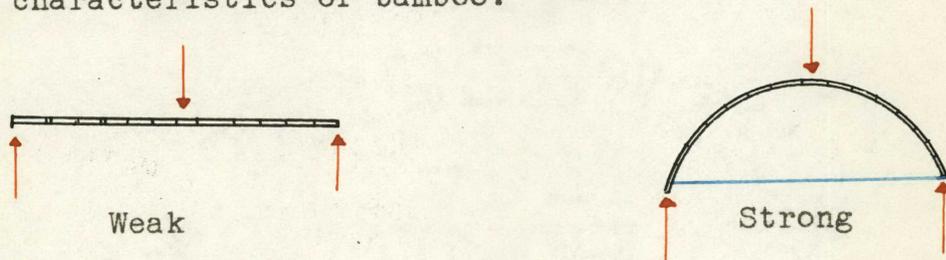


The following is a brief comparison of the two construction systems.

1. System B lends itself easily to cross bracing and therefore contributes greater rigidity to the entire structure.
2. System A involves a generous use of kemp rope which is somewhat vulnerable to weathering and severe changes in temperature.
3. System A may be easier to fabricate but System B gains in its ease of erection.

4. System B has simpler foundation work. It requires no anchorages as does System A.

In the light of the foregoing comparisons, the author concludes with the choice of System B, namely, the construction system that is based on the bow string arch principle, which will adapt beautifully with the characteristics of bamboo.



Of course there remains a plenty that would also be interesting to describe such as the fabrication of the self supporting curtain wall out of bamboo and reed, the floor and roof construction out of bamboo, bituminous asphalt, clay and hemp cloth, the design of flexible partitions and seats out of other available local materials. But all of these, with the exception of a few pre-cast concrete piles are in strict accordance with the traditional native usages and methods. The Author felt that because of the lack of applicable technical terms, a simple native process might entail too complicated a description. Since most of these will be represented in detail in the accompanying drawings, no such attempt is thus made here.

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