

CHAPTER III

EXPERIMENT INVESTIGATED MECHANICAL PROPERTIES
OF BAMBOO AND MORTAR3.1 Quality of Bamboo and Mortar Used for Tests.

The Pai Ruak variety of bamboo which is cheap and abundant in Thailand, was used in all tests. Pai Ruak, known scientifically as *Thyrsostachys Oliveri* Gamble, has a yellow slightly greenish colour with smooth and less thicker nodal sections. The internodal distance, mean external diameter and the thickness of bamboo culms used for tests varied from 30 cm. to 40 cm., 2.5 cm. to 5.0 cm. and 0.5 cm. to 1.0 cm. respectively. The age of the bamboo culms was about 2 years and had a uniform yellowish brown colour. The bamboo culms were seasoned for a period varying from 6 to 8 weeks before being subjected to tests. Care must be taken in selecting bamboo culms without deformations and signs of decay.

Rapid Hardening Portland Cement (Type III) and natural coarse sand of gradation shown in Fig. (9) were used throughout the investigation. The mortar used for all the test samples had a cement-sand ratio of 1 : 2 by weight with a water cement ratio of 0.45

3.2 Tension Test on Bamboo Specimens.

In the first series of test, a total of four specimens, were prepared according to the dimensions shown in Fig.(10a). The specimens were fitted with electrical resistance strain gauges which had gauge length 30 m.m., gauge width 2 m.m., Base 43 m.m. x 8 m.m., nominal resistance 120 ± 0.3 ohm. and gauge factor 2.06 by CN. adhesive. Strain reading from strain indicator were taken at every load interval of 100 kg, until the specimen failed. The testing results were recorded in Table (10) and stress-strain curves were plotted in Fig. (11) for determining the modulus of elasticity of bamboo. The tension specimens of bamboo were tested as shown in Fig. (12)

3.3 Bond Test

The bond between bamboo skins and mortar was determined by pull out tests. A total of nine specimens were prepared according to the dimensions shown in Fig. (10b). A special formwork was prepared for making 20 cm. mortar cube. The vertical wall of the formwork was provided with suitable holes at the proper places and then the smaller end of the specimen were inserted through one of the hole until this end of the specimen was visible on the other wall of the formwork.

This arrangement was made for the proper alignment of the bamboo skin inside the mortar cube. The mortar block was then casted. The embedment length of bamboo skin was approximately 20 cm. The nodal part of the bamboo skin was placed inside the mortar cube. Rapid hardening portland cement (Type III) was used in casting the mortar cube. On the seventh day after casting, the specimens were tested. The cube was placed in the upper jaw of the testing machine and the other end of the specimen was pulled by means of the lower jaw. The specimens were loaded until it failed to carry any further load and this load was recorded. The failure patterns of all the nine specimens were also recorded in Table (11). The bond specimen was tested as shown in Fig. (13).

3.4 Compression Test on Mortar Specimens.

The Compressive strength of mortars was determined by the use of 5 cm. cube twelve specimens from ASTM C109-64. Rapid hardening portland cement (Type III) and natural coarse sand of gradation shown in Fig. (9) were used throughout the investigation. The mortar used for all the test samples had a cement-sand ratio of 1 : 2 by weight with a water cement ratio of 0.45. The mortar was casted into the molds which should be thinly covered with mineral oil

before. All test specimens were kept in the moist room about 24 hr. before being removed from the molds and immersed in the clean water in storage tanks. On the seventh day after casting, the specimens were weighed and tested on the testing machine. The specimens were loaded until it failed, this load and the failure patterns of all the twelve specimens were also recorded in Table (12). The cube specimen was tested as shown in Fig. (16).

The compressive strength and modulus of elasticity of mortar were determined by the using of ϕ 15 cm. x 30 cm. cylinder five specimens. The mortar specimens used the proportion of materials and system of curing as described above. The cylinder specimens were weighed and capped with capping compound (Sulphur). The compressometer was fixed to the specimen and then the dial gage was attached to the compressometer in order to measure the deformation of the mortar cylinder. After the specimen had been set up in the testing machine, a slight initial load was applied and the dial gage was set to zero. Apply load continuously at slow speed. Read load increments at 4000 kgs. intervals and also record the corresponding dial reading. Take care to remove the compressometer when the specimen starts to crack. Recorded data all testing specimens in Table (13) and plot the stress-strain curve to a suitable scale and draw a smooth

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curve through the points shown in Fig. (14). The ultimate compressive strength and the initial tangent modulus of elasticity were calculated from the curve. The cylinder specimen was tested as shown in Fig. (15).