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RURAL BULIDINGS ON YAP ISLAND

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Abstract

Rigorous investigations on rural houses (*Tabinaw*), community houses (*Peebay*), unmarried men's houses (*Faluw*) and a women's house in a village on Yap Island were carried out in 1999. Research on their architectural features and on sustainable development technologies for them was done thereafter.

As a result of the investigation, it is obvious that the Yap people are inheriting traditional building techniques and handing them down to the next generation. It is very important that Yap people are able to live harmoniously with nature and not destructively "confront" natural phenomena.

Keywords: Community House (*Peebay*), Men's House (*Faluw*), Rural House (*Tabinaw*) Sustainable Development Technology, Traditional Techniques, Women's House

Introduction

In order to investigate fifteen houses, including four rural houses (*Tabinaw*), four community houses (*Peebay*), six unmarried men's houses (*Faluw*), and one women's house, our three-person research team stayed on Yap Island for 13 days from October 21 to November 2 in 1999. The purpose of our investigation was to do research on the materials, beam, joints and wooden flooring used in these houses, as well as the building methods chosen.

While reinforced concrete buildings are now being built all over the world, traditional materials and techniques are still being actively applied to vernacular architecture on the island of Yap. The traditional autonomy of this small island seems to be a factor here.

In this paper, we would like to point out the unique features of vernacular architecture on Yap Island. And later we hope to compare them with those of other Asian vernacular architectures.

Unique Architectural Features

Rural houses (*Tabinaw*)

The forms of rural houses on the island vary due to the influence of modern architecture. Among the four we investigated, one is in what we call the "old" traditional style, two are in traditional style and the fourth, built with reinforced concrete, is in modern style.

The one in old traditional style was built in Bechiel Village (Fig. 1-4) and is very large in scale. It consists of two parts: two open spaces, one in front of and one in the rear of the main building (Fig.4), and a closed space in the middle, i.e., the main building. The two traditional houses, built in Rumuuq Village (Fig.5-7) and Runuw Village (Fig.10-12) respectively, consist of an open space in front and a closed space in the rear (Fig.8). The kitchen (Fig.6, 7) and toilet (Fig. 12) are separated from the main building, whereas in recently built reinforced concrete houses the kitchen is usually placed within the main building, and, thus, open space disappears

before closed space (Fig. 13-15).

Since local people are used to drinking rainwater, galvanized iron is used as roof material and rainwater flows down to a tank below.

Traditional community houses (*Peebay*)

We investigated four traditional community houses, one each in Kaday Village (Fig. 16-21), Tomor Village (Fig. 22-25), Bechiel Village (Fig. 26-30) and Anoth Village (Fig. 31-35).

Table 1. Data on community houses (Peebay)

unit: mm

Place	Width	Depth	Height of the platform	Height of the core column	Number of the columns and span	Width of the main building: Width of eaves	Direction of ridge beam
Kaday	4358	13254	850	4070	5 (from north to south : 3323,2883,2883,3385)	4358 933	north-south
Tomor	7076	19956	625	(7155)	7 (from east to west : 3750,2900,2735,2795,3025,3183)	5814 631	east-west
Bechiel	6680	18388	440	(6075)	7 (from north to south : 3750,2900,2735,2795,3025,3183)	5220 730	north-south
Anoth	3595	10528	395	(4250)	2 (10528)	3595 0	north-south
Runuw	4594	8965	210		4 (from north to south : 2100,2487,4378)	4595 0	north-south

A large traditional community house, 7.076 meters in width and 19.956 meters in length (Table 1), was built in Tomor Village in 1999 as a venue for people from several villages around. Although detailed investigation could not be carried out, we can say that this *Peebay*, which was built with modern reinforced concrete also widely used in other areas, is still similar in form to the traditional wooden one. Able to hold 250 to 300 people, the *Peebay* is the biggest building in Tomor Village.

We found the following common characteristics among these four *Peebays* :

a. They were all built on a platform. Since there is no exterior wall on any of their four sides, people can enter them from anywhere.
b. They are open, and thus a continuation of exterior spaces. Moreover, narrow passages beside the *Peebays* can function as dancing places (*Malals*).
c. With plain thresholds between them, columns standing directly in the earth in the middle of the buildings are used to support the ridge beams. Split bamboo or wood slivers are laid out, and people seat themselves in different places on the floor according to their age, sex and status.

Men's houses (*Faluw*)

We investigated six men's houses situated in Balabat Village (Fig.36-40), Runuw Village (Fig.41-46), Amun Village (Fig. 47-51), Maaq Village (Fig. 52-55), Waloy Village (Fig.57-61) and Bechiel Village (Fig.62-64) respectively. We also investigated one women's house (Fig.65-67) in Rumuw Village.

Called *faluw* by local people, men's houses are the most important buildings on Yap Island. There is usually one men's house in each village, and, even at present, men's houses are still built by traditional methods. We also found a building under construction as a men's house in Rumuw Village which had been formerly used as a women's house for 20 years. With no platform at the base of the building and no fittings on the windows, the wooden-wall-enclosed wo men's house is quite different from the men's house. We asked several local people what they called the women's house, but nobody knew, and probably it had no name at all. Since we only find one example, it is possible that women's houses were rarely built.

The common characteristics of the men's houses are as follows:

a. Located along the seaside, they are built with their ridge beams facing east and west, which shows consciousness of the sunrise among local people.
b. The platforms are very high. With walls made of bamboo or palms on each side, and with fittings on windows, men's houses are closed spaces.
c. With the central one being the biggest, five splendid core columns stand in a line in the middle of each building. Except in one building, a hearth, and, in some cases, several hearths, are set in front of these columns.

A big men's house is now under construction in *Runuw Village*. It was said that the construction would take eleven carpenters three to six months to complete.

The building process for men's houses is as follows:

First, the platform where the columns will stand is built by piling up stones roughly 30 centimeters in diameter. Since the building is near the sea, the platform is set approximately 70 centimeters higher than those for rural houses and community houses.

The columns are built together with the platform, and the stones of the platform are used to fix the columns. All of the structural columns are set directly in the earth, except that, in some

Table 2. Data on men's houses (Faluw)

unit: mm

Place	Period	Width	Depth	Width of open space	Height of platform	Height of core column	Number of columns and span	Width of main building: Width of eaves	Direction of ridge beam
Balabat	1999 (the inside part) under construction (the ouside part)	5203	14478	3246	650	4950	5 (from east to west: 3491,3977,3210,3246)	3920 634	east-west
Runuw	under construction	5302	2003	nothing	660	5820	5 (from east to west: 5350,4620,4390,5670)	4660 321	east-west
Amun	1994	4924	11957	nothing	680	4640	5 (from east to west: 2488,3533,3643,2293)	3538 693	east-west
Maaq	1991	4973	15333	2715	870	4895	5 (from east to west: 4218,4210,4190,3326)	4153 410	east-west
Waloy	about 1992	4256	11254	None	820	4040	5 (from east to west: 3008,2598,2823,2825)	3410 423	east-west
Bechiel	about 1968	4910	12196	None	920	4380	5 (from east to west: 2685,3405,3378,2728)	3680 615	east-west
Rumuw (women's house)		4594	8965	None			5 (from north to south: 2685,3405,3378,2728)	4594 none	north-south

cases, columns at the outer corners of the building are laid on wooden pedestals as a frame for the walls. The structural columns stand in a line under the ridge beam to support it. Since these high central columns are curved (Fig.42), and the ridge beam is relatively straight, when they are joined the curved columns can be rotated to fit the beam. Once the positions of the columns are set, the stones can be piled up and fixed in place (Fig. 44). Because in all of the buildings we surveyed there are just five columns under the ridge beam, some construction rules evidently exist.

The distances between the columns are variable (Table 2), and, in the direction at right angle to the ridge beam, columns without pedestals stand on each side of the central line of columns symmetrically. According to our investigation, four buildings have six columns on each side of the middle row of columns; one building has seven, and the other eight, a pattern seemingly not regular at all. The columns on the two sides are curved, but the cross beams to connect them are straight. Just like the ridge beam, straight cross beams become the standard to erect the whole building. Because principal rafters are laid between ridge beams and cross beams, construction would be too difficult if curved beams were used. At the same time, it is obvious that straight ridge beams and cross beams are very important to the building.

In some cases, cross beams are set on all the columns standing in line, but, in other cases, they only cover the four middle columns (Fig.37). In the latter situation, the columns on either side without cross beams are set apart from the center. Although this is a more complicated method, it is intended to make the building stronger. Since this building method was found only in three villages-Balabat Village, Runuw Village and Anum Village, it is clear that it is not universally applied.

Inheritance of Traditional Technology

Excluding the rural house (*Tabinaw*) here, I would like to focus attention on the traditional technology applied in the construction of community houses (*Peebay*) and men's houses (*Faluw*).

Structure (column, cross beam, beam and ridge beam, etc.)

Construction begins with the laying of stones for the platform. Big stones are piled up in three layers and the columns are fixed at the same time. From several remains found on the island where nothing is left but platforms, we can conditionally confirm the existence of holes for columns in the past also.

The columns are made from the *Terminalia* tree, and the stone base is covered by divided and barked boards. Round columns are lined up in three rows-one in the middle and two more on either side of it. Huge and curved, the columns in the middle row reach to the ridge beam above them. Since columns on the two sides are also curved, they match the straight ridge beam and the cross beams well. More beams are laid on these cross beams, and ridge beams and principal rafters are laid on top of them. The ridge beam protrudes at the two ends and makes the roof incline upwards.

There is an additional wooden platform on the outer side of the side columns in these buildings. Corner columns are positioned on it and connected up with cross beams made of bamboo. Both the corner columns and beams are made of *pandanus* wood, and are tied together in a

unique way by coconut fiber cord to form an artistic pattern (Fig.3, Fig.24, Fig.33, Fig.43, Fig.49, Fig.58).

Large-scale building

We mentioned that the *Peebay* is the largest scale building on the island-it is a long and slender rectangle of about 20 meters in length, more than 7 meters in width and with center columns more than 43 centimeters in diameter. In some cases, logs for the joints of this building are cut in halves to be connected to each other, which we think of as the primordial form of the so-called "halved joint". In most other cases, cords are used to connect jointed members (Fig.38).

In the situation where column and cross beam are connected, usually only the cross beam is cut to make the combination fit. When beams and posts are combined, cords are usually used, with posts being cut in order to protrude a little below the beam so as to make it easier to tie the cords (Fig.33). From these facts, we know that, instead of developing a joint technology, emphasis was put on how to tie cords in order to secure the different parts of a joint.

As for building tools, it seems that saw, hammer and chisel were enough for the carpenters. The technology developed to accomplish such a large-scale building by tying most of the joints with cords is really worth a thorough assessment.

The Uniqueness of Technology

Compared with modern advanced technology, no-pedestal columns, ridge-beam-supporting columns, primordial joints and cord-connected joints might be considered simple and inferior technology. On the other hand, the local people can find coconuts everywhere to make cords, and can also gather other architectural materials easily. The technology they apply in the construction of large-scale buildings with only these materials should be considered advanced technology.

A traditional building does sway in the wind, but, since joints are connected with cords, flexibility prevents the building from being demolished. When the wind blows very hard, the palm leaf roof will blow away, which will save the columns, beams and so forth from being destroyed. If the roof is blown away it can be repaired, but if the structure collapses it has to be rebuilt. It is really ingenious for the Yap people to protect the structure by making the roof "dispensable" when the wind is strong. Here is a traditional way to coexist with nature by constructing flexible structures: not to "go against" nature by constructing solid ones. And furthermore, based on a full understanding of a human being's position in nature, this is a unique technology which has made sustainable development possible. Since it is also connected with the spirit of autonomy of the islanders, we think it well worth full evaluation.

Acknowledgements

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Fig. 1. Exterior view of rural house: Bechiel Village.

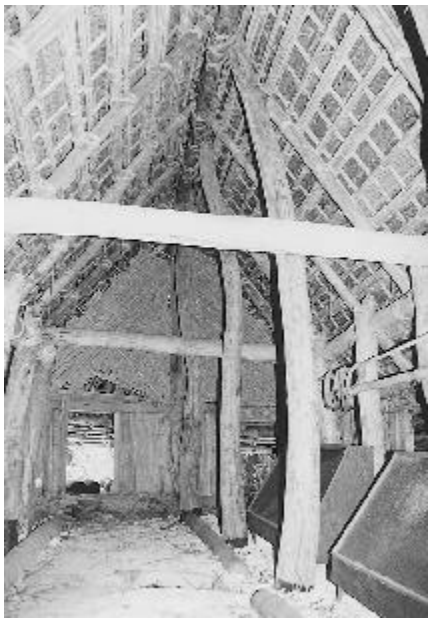


Fig. 2. Interior view of rural house, Bechiel Village: the core column is set in the center.

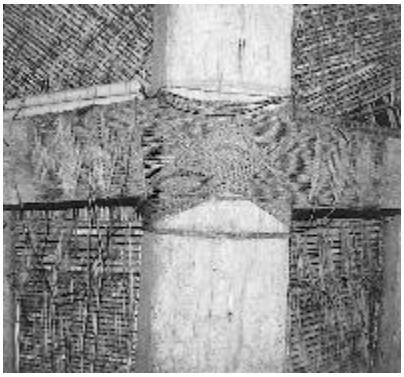


Fig. 3. Cords made of palm tree fiber are used to join the different parts of the house: Bechiel Village.

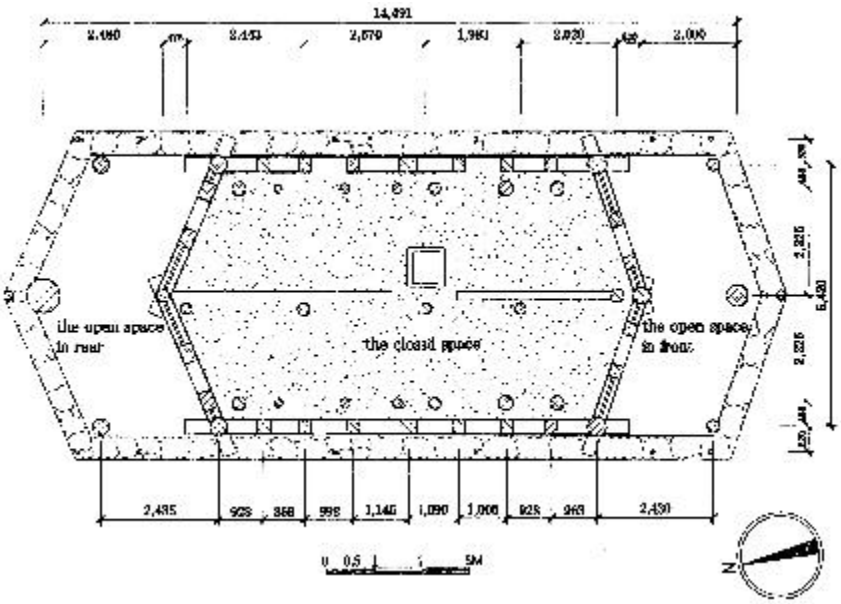
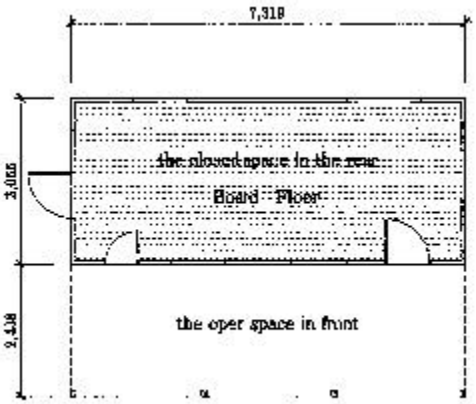


Fig. 4. Plan of “old” traditional house: Bechiel Village.

Fig. 5. Mr. Roarad's traditional house: Rumuuq Village.

Fig. 6. Mr. Roarad's kitchen and dining room: Rumuuq Village.

Fig. 7. Hearth of Mr. Roarad’s house: Rumuuq Village.



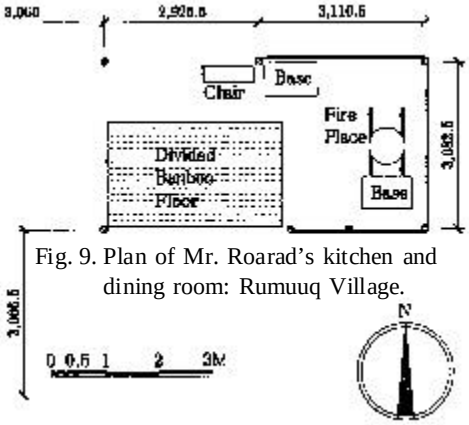


Fig. 9. Plan of Mr. Roarad’s kitchen and dining room: Rumuuq Village.

Fig. 8. Plan of Mr. Roarad’s house: Rumuuq Village.

Fig. 10. Exterior View of another rural house: Runuw Village.

Fig. 11. Kitchen and dining room (box on the left side is a cupboard) of another rural house: Runuw Village.

Fig. 12. Toilet of another rural house: Runuw Village.

Fig. 13. Exterior view of Mr. Mangefel's house: Runuw Village.

Fig. 14. Interior view of Mr. Mangefel's house: Runuw Village.

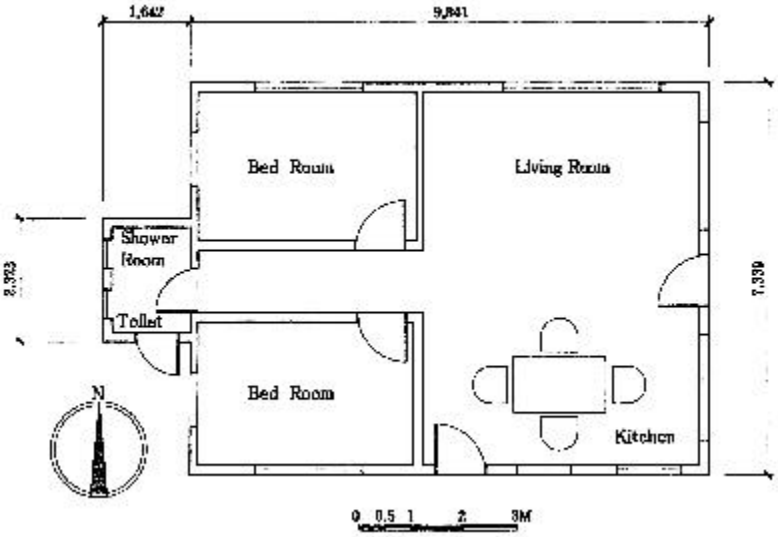


Fig. 15. Plan of Mr. Mangefel's modern house: Runuw Village.

Fig.16. Exterior view of community house: Kaday Village.

Fig. 18. Joint of column, beam and principal rafter, community house: Kaday Village.

Fig. 17. Interior view of community house: Kaday Village.

Fig. 19. Hearth and column set directly on the ground, community house: Kaday Village.

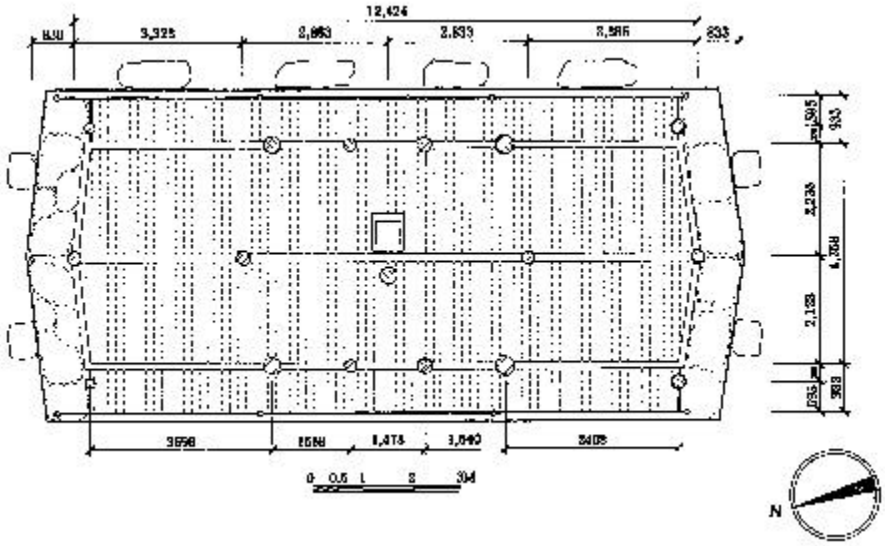


Fig. 20. Plan of community house: Kaday Village.

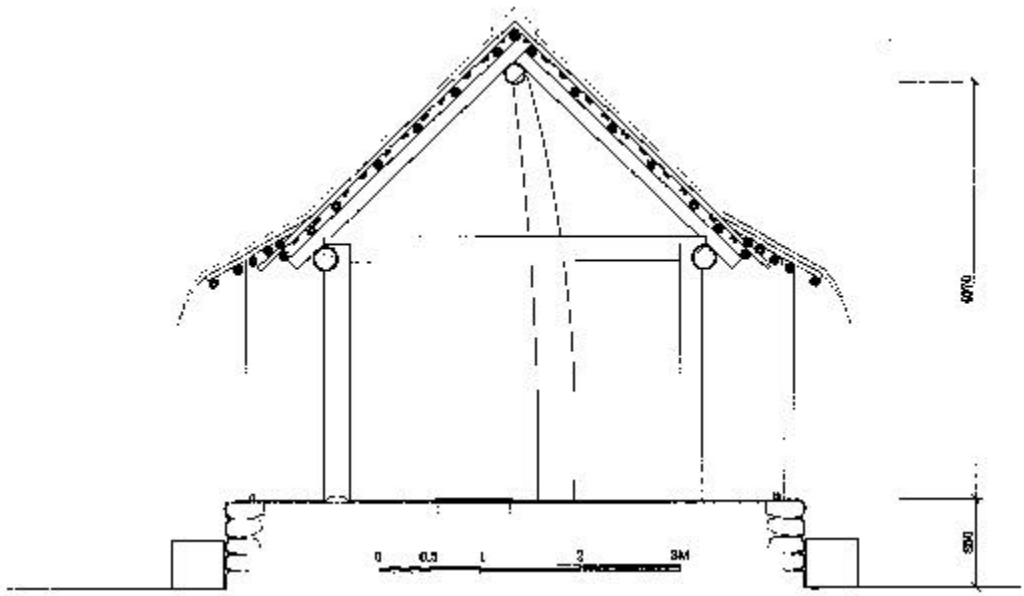


Fig. 21. Section of community house: Kaday Village.

Fig. 22. Exterior view of community house: Tomor Village.

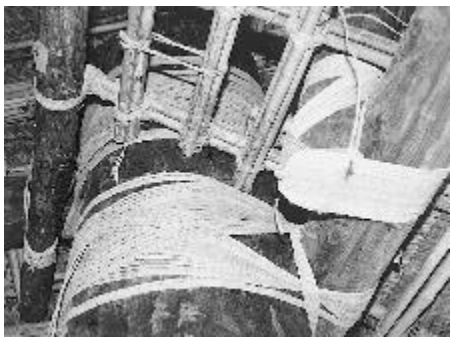


Fig. 23. Interior view of community house: Tomor Village. Fig. 24. Joint connected with cord, community house: Tomor Village.

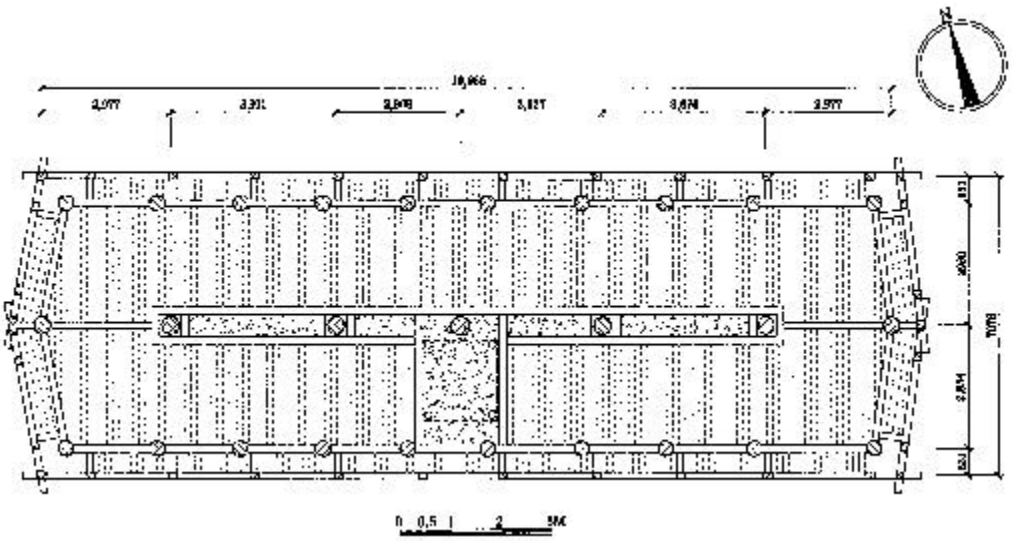


Fig. 25. Plan of community house: Tomor Village.

Fig. 26. Exterior view of community house: Bechiel Village.

Fig. 27. Interior view of community house: Bechiel Village.

Fig. 28. Decoration of core column and beam, community house: Bechiel Village.

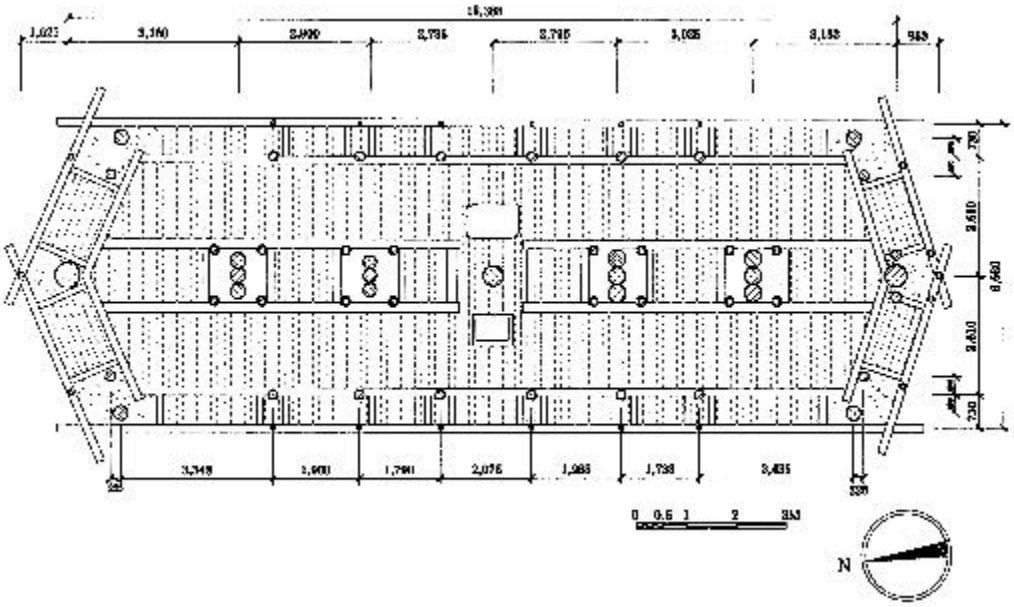


Fig. 29. Plan of community house: Bechiel Village.

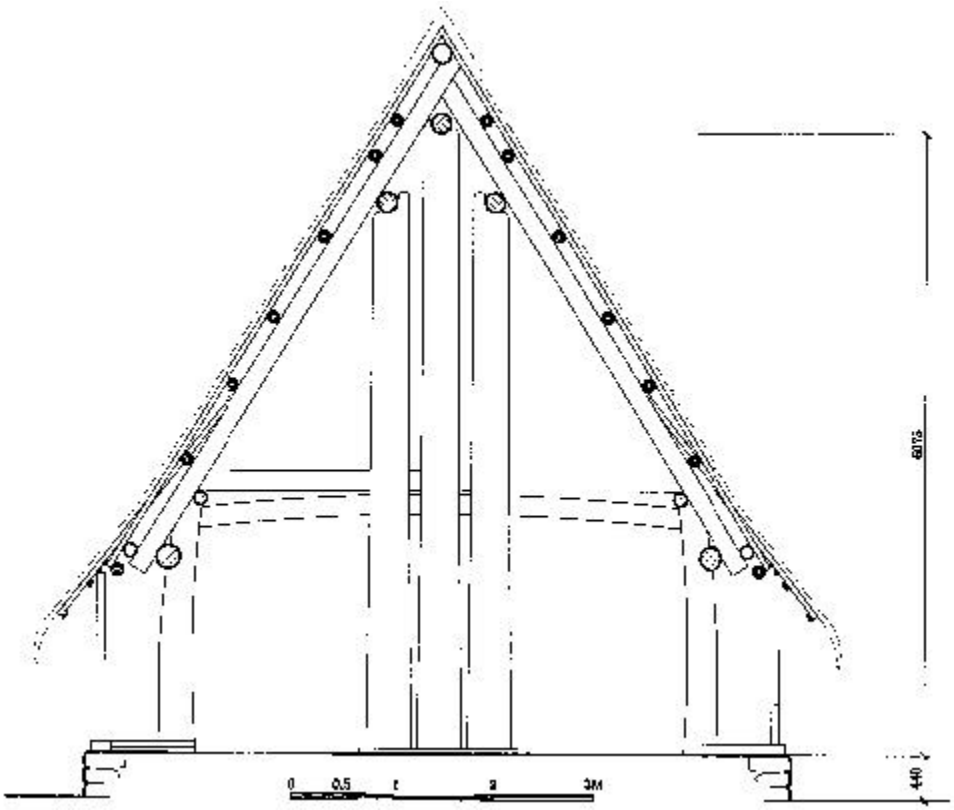


Fig. 30. Section of community house: Bechiel Village.

Fig. 31. Exterior view of community house: Anoth Village.

Fig. 32. Interior view of community house: Anoth Village.

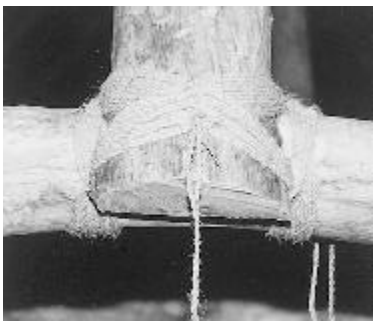


Fig. 33. Joint of beam and post, community house: Anoth Village.

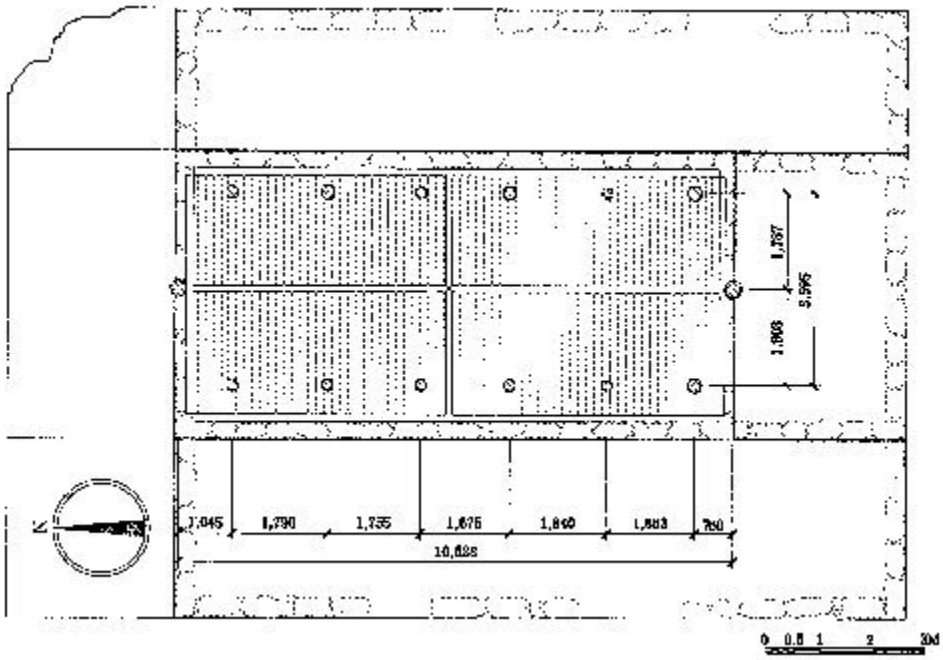


Fig. 34. Plan of community house: Anoth Village.

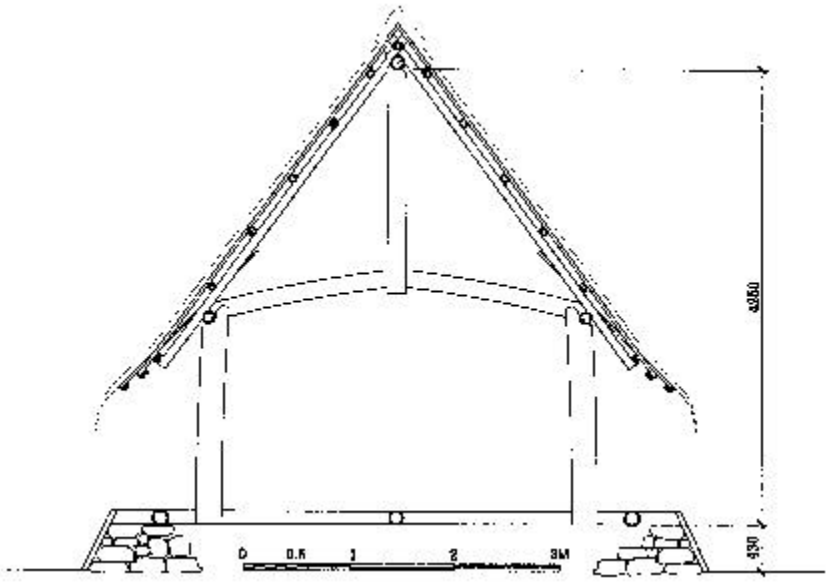


Fig. 35. Section of community house: Anoth Village.

Fig. 36. Exterior view of men's house: Balabat Village.

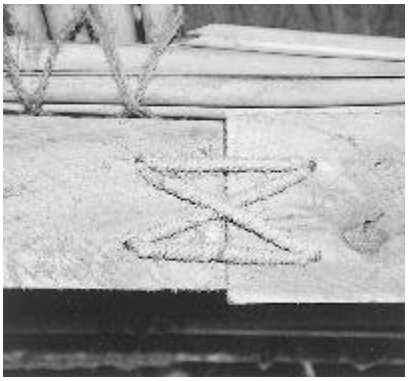


Fig. 38. Detailed combination of cross beams, men's house: Balabat Village.

Fig. 37. Outside corner column (166×263mm) and inside round column (265mm diameter), men's house: Balabat Village.

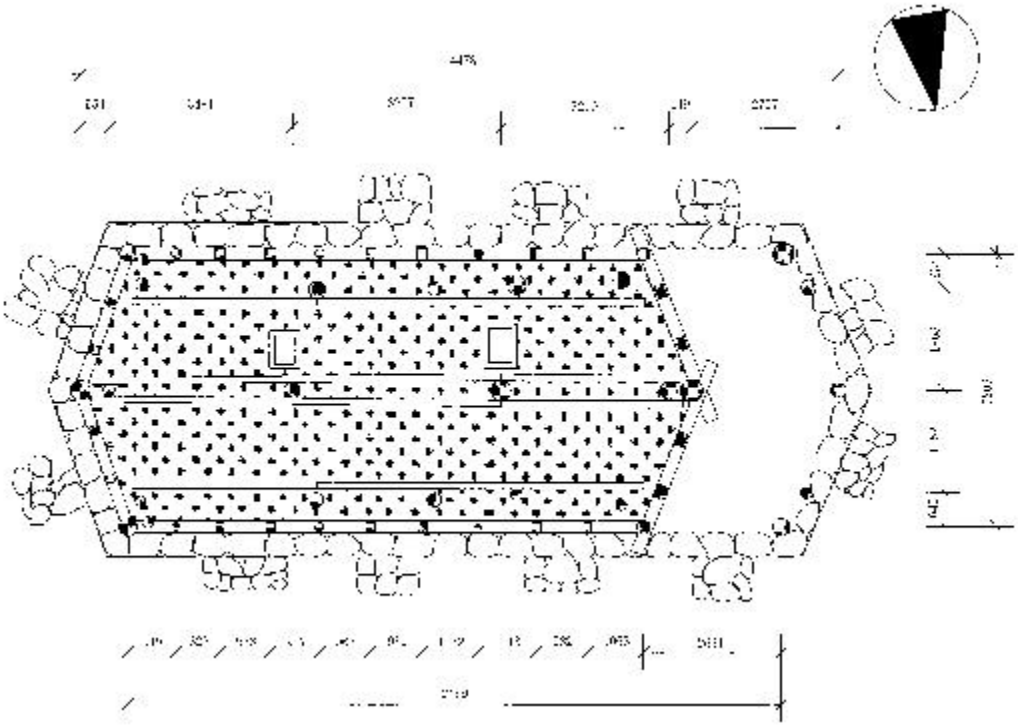


Fig. 39. Plan of men's house: Balabat Village.

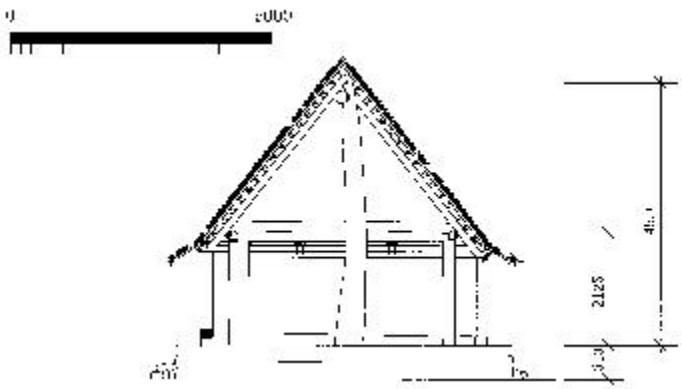


Fig. 40. Section of men's house: Balabat Village.

Fig. 41. Men's house under construction: Runuw Village.

Fig. 43. Detailed combination of column and post (bamboo) of men's house: Runuw Village.

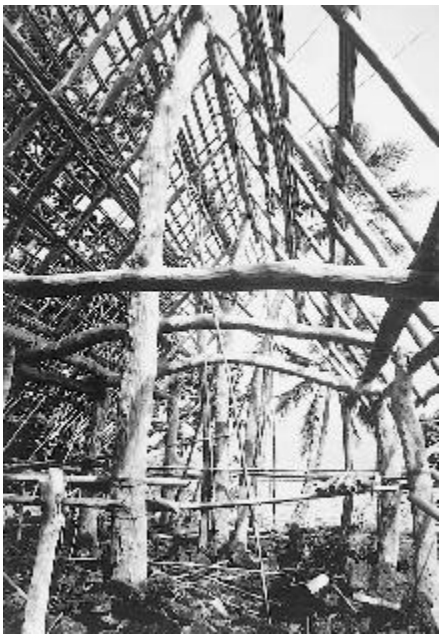


Fig. 42. Interior view of men's house under construction: Runuw Village.

Fig. 44. Column without pedestal, fixed by stones: Runuw Village.

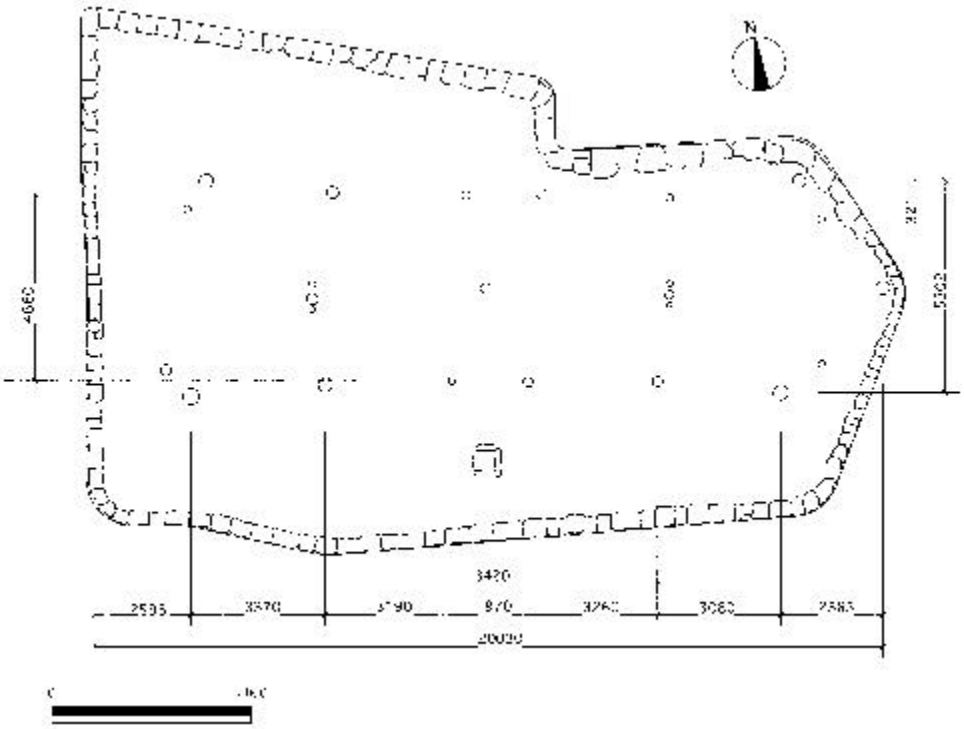


Fig. 45. Plan of men's house under construction: Runuw Village.

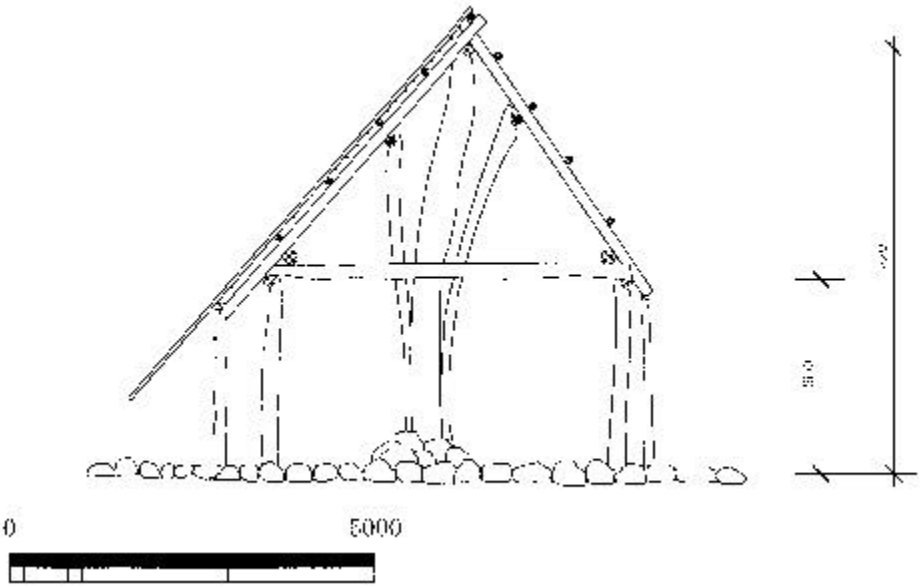


Fig. 46. Section of men's house under construction: Runuw Village.

Fig. 47. Exterior view of men's house: Amun Village.

Fig. 48. Interior view of men's house: Amun Village.

Fig. 49. Detailed combination of column and beam, men's house: Amun Village.

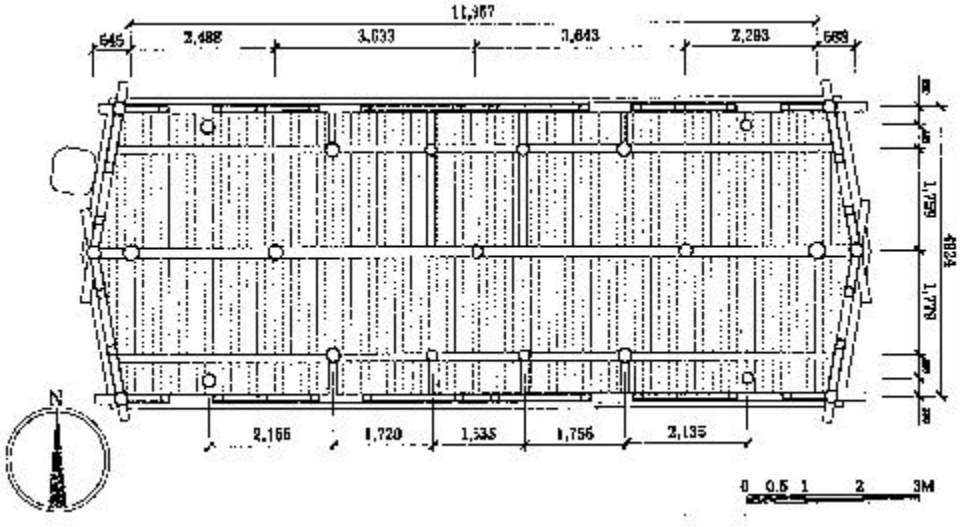


Fig. 50. Plan of men's house: Amun Village.

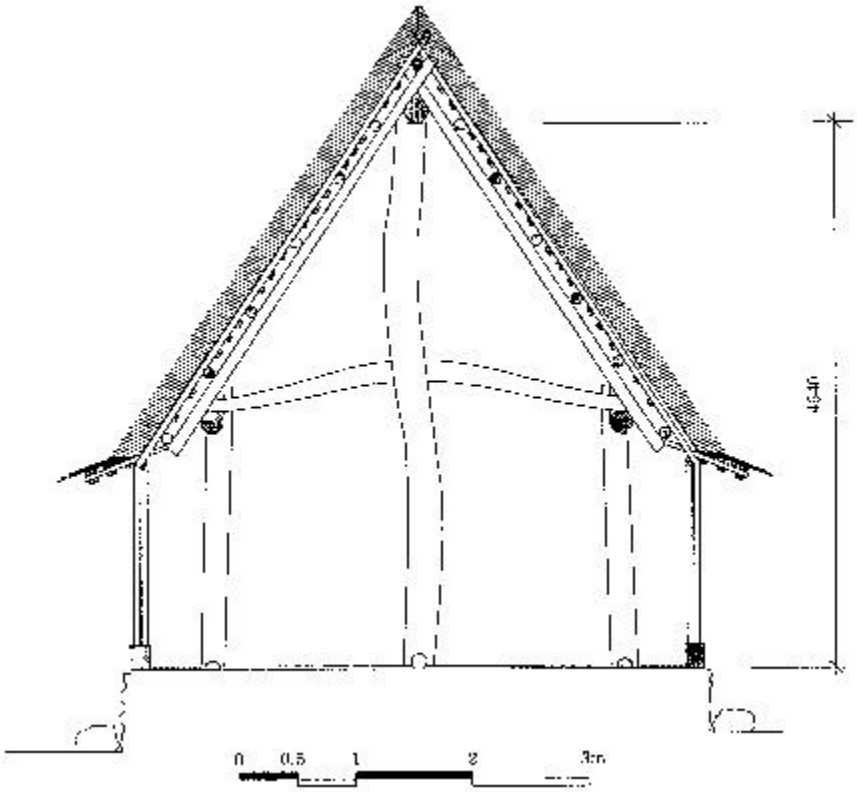


Fig. 51. Section of men's house: Amun Village.

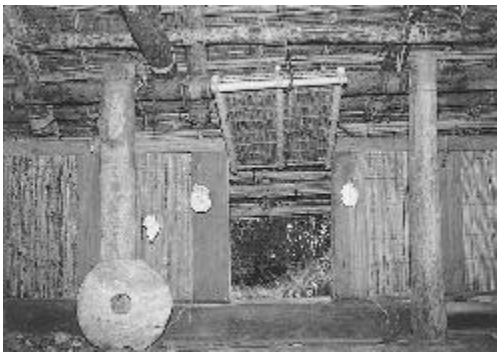


Fig. 52. Exterior view of men's house: Maaq Village. Fig. 53. Interior view of men's house: Maaq Village.

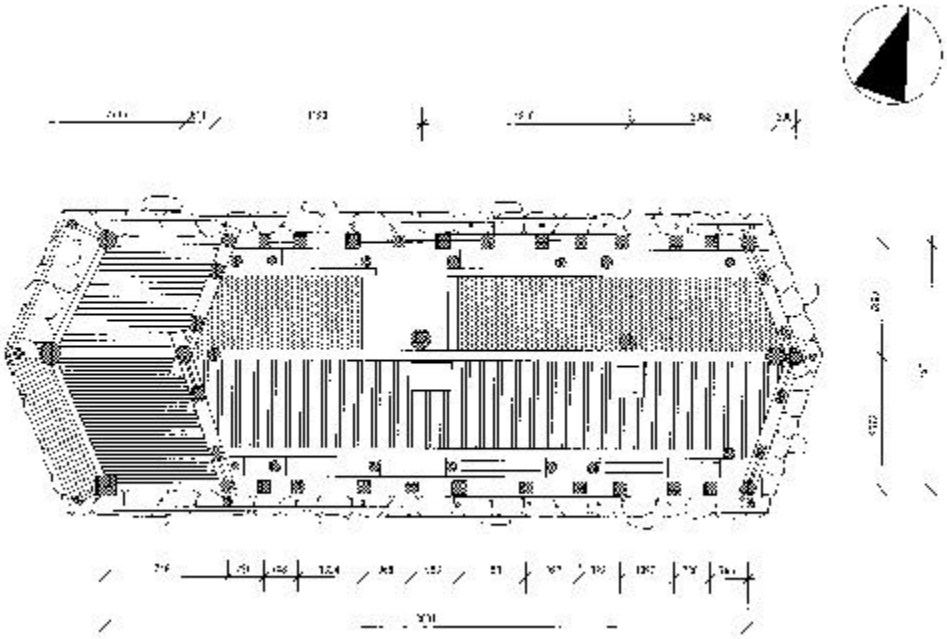


Fig. 54. Plan of men's house: Maaq Village.

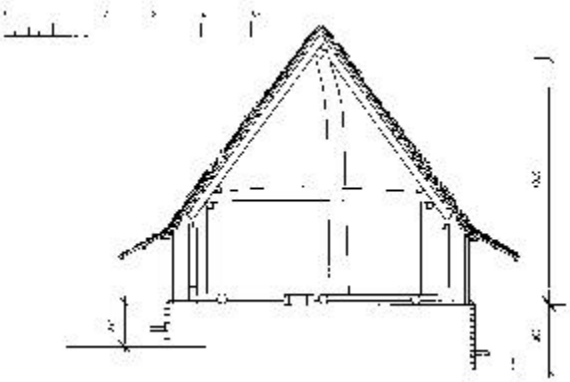


Fig. 55. Section of men's house: Maaq Village.

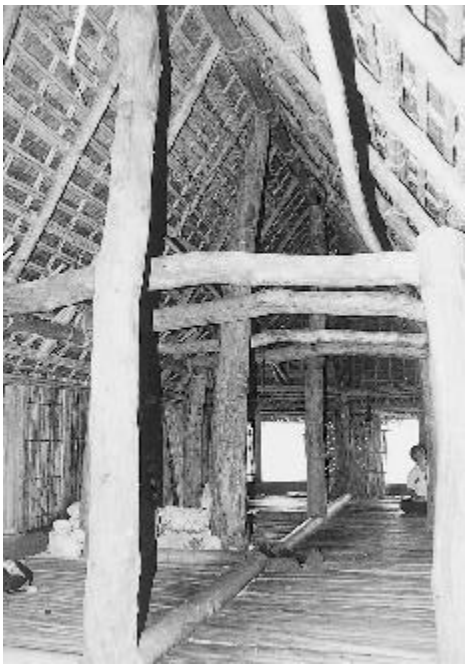


Fig. 57. Interior view of men's house: Waloy Village.

Fig. 56. Exterior view of men's house: Waloy Village.

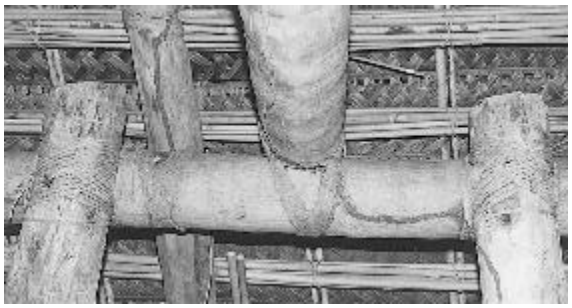


Fig. 58. Members tied separately, men's house: Waloy Village.

Fig. 59. Hearth and column without pedestal: Waloy Village.

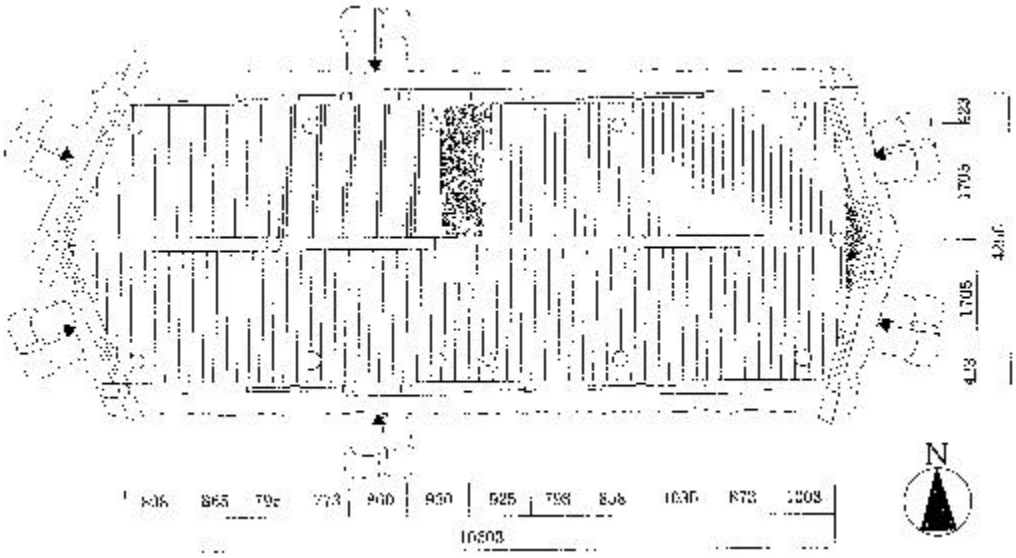


Fig. 60. Plan of men's house: Waloy Village.

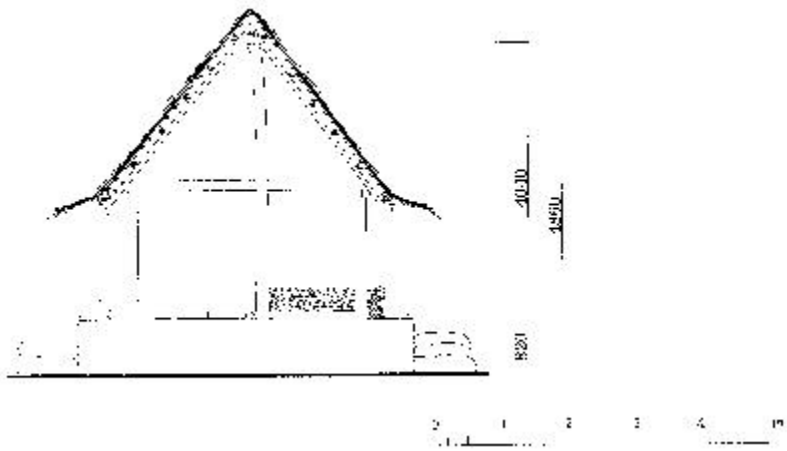


Fig. 61. Section of men's house: Waloy Village.

Fig. 62. Exterior view of men's house: Bachiel Village.

Fig. 63. Interior view of traditional men's house: Bachiel Village.

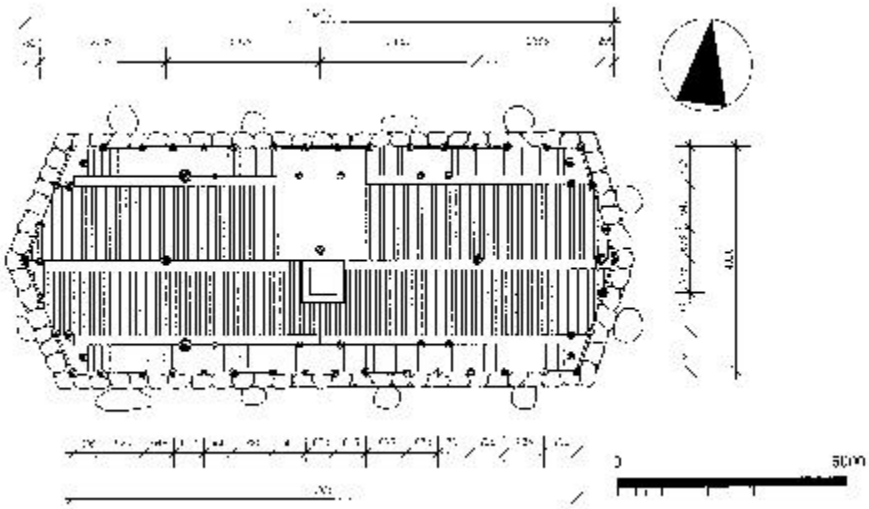


Fig. 64. Plan of men's house: Bachiel Village.

Fig. 65. Exterior view of women's house: Rumuw Village.

Fig. 66. Interior view of women's house: Rumuw Village.

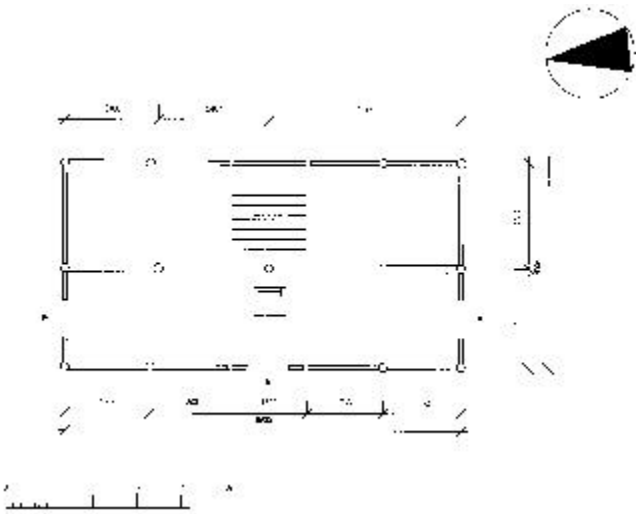


Fig. 67. Plan of women's house: Rumuw Village.