3 - 2 - 2 Location and Conditions of the Site on 'Eua Island

(1) Social and Economic Situations

'Eua island is located approximately 25 km east of Tongatapu island (lat. 21° 10' S, long. 175° 10'W) and, with an area of 87.44 km^2, is the third largest island of Tonga. The population was 4,393 and that of the central area, Ohonua district where the project is located, was 2,398, according to a survey done in 1986. As for the population movement trends, the population of the 'Eua district was 1,925 in 1955, 3,391 in 1966 and 4,486 in 1976 increasing two-fold during the period of 20 years, it has decreased slightly to 4,393 in 1986. During the same period, the population increased three-fold in the central area and eight-fold in the regional areas. There is a trend toward the concentration of the population in the larger cities. Further, same as the population, the number of emigrants coming to the island also increased by 1,270 from 1957 to 1966, 1,002 from 1967 to 1976 and 286 from 1977 to 1984.

On the island, personal cars, trucks, taxies and buses are used for transportation. There are only a few taxies. There is one periodical air flight between 'Eua and Tongatapu once a day (no flight on Sunday), but as the airport is not surfaced, it is easily influenced by the weather. There is a periodical marine transportation service mainly for the transportation of agricultural products and cargoes.

The main industry on the island is agriculture. There are also fisheries, which mainly cater for demand on the island. As the island is adjacent to Tongatapu island, the demand for its agricultural products increased along with the economic expansion of the capital, 70% of the agricultural products traded in the capital, Nuku'arofa, now comes from 'Eua. Consequently, agriculture has become one of the main sources of income of the island. It has stabilized as a commercially viable industry and the island is developing as a kitchen of the capital, Nuku'arofa, in contrast to the stagnated conditions of primary industry on the other islands.

Regarding tourism, as there are no attractive beaches or facilities, but only agricultural land and mountains, no tourist visit the island and tourism has not developed.

As 'Eua island is the third largest island and is adjacent to Tongatapu island, expansion of the island's agricultural industry and increase of its population have been brought about by the economic expansion in the capital in recent years. Consequently, the problems of 'Eua island are environmental and regional gaps which have been brought about by the unbalanced condition of its infrastructures, public facilities and education, etc., which have not kept up with the expansion of agricultural industry, and increase in the population. In recent years, 'Eua has dramatically increased in population, but the growth rate is now shrinking. Further, the reason for the recent decrease in enrollments, which once drastically increased immediately after the establishment of the district high school, is the size of facilities which have not kept pace with the increase in enrollments. The inadequate conditions of the infrastructures, public facilities and educational system and facilities along with the increase in social demand and consequently widened regional gap, seem to be slowing down the development of the regional economy.

(2) Natural Environment of 'Eua island

The island is formed of risen coral. There are no inlets and the island generally comprises a steep terrace starting from the coastline. The land is of a simple, long and narrow shape, 20 km long from north to south and 7 km wide from east to west. The altitude is 100~150m at the flat area which is suitable for housing and agriculture and 312 m at the top of the highest mountain. The eastern part of the island, where the mountain range stretches from north to south is covered with tropical plants, is almost undeveloped. Villages and agricultural fields are concentrated in the central and western flat area. The largest river in Tonga is found here and at the mouth of the river, there is the largest port on 'Eua island.

As for the geological features and soil quality, the soil is formed of a coral limestone stratum and conglomerate clay bed, covered with red old volcanic ash with brown volcanic ash on the surface. Generally, the island itself formed of risen coral, is infertile and unsuitable for agriculture. However, owing to the volcanic ash covering the surface, the soil maintains appropriate nutritious conditions which allows plants to grow well, and the land is suitable for agriculture. (See Apendix 17)

As 'Eua is adjacent to Tongatapu island, the climatic data of Tongatapu is referred to. The climate is tropical and generally hot all the year round but

because of its landscape which is full of variety, with rivers and mountains, compared to the plain landscape of Tongatapu island, the difference between low and high temperatures is larger than on Tongatapu, and the atmosphere is exhilarating. (See Appendix 16)

(3) Site and the Peripheral Environment

The site is adjacent to the existing primary school and located on flat land at the top of a high hill, approximately 10m higher than the road in front of the land. The ventilation, draining of water and sunlight conditions are very good and the area commands a fine view. There are no problems regarding infrastructures, water mains and electricity lines are installed along the public road which touches the northern end of the site.

- Conditions of infrastructures:

i) Electricity

The 'Eua branch of the Tonga National Electric Power Board distributes power of 415V/240V, 50Hz, three-phase, 4 wires, using three generators (75KVA×2units, 100KVA×1 unit, of which one is stand-by). Expansion to 375KVA is scheduled in 1993. Electricity cost is 0.2692 T$/kwH.

ii) Telephone

The Tonga Telecommunication Commission installed a telephone exchange for 168 lines in the 'Eua branch. At present, about 10 lines are in reserve. While there are many applicants for telephone installation, the installation work including expansion of the telephone exchange, cannot keep pace with the demand.

For this project, one incoming line is scheduled and the line used now in the existing facilities can be utilized.

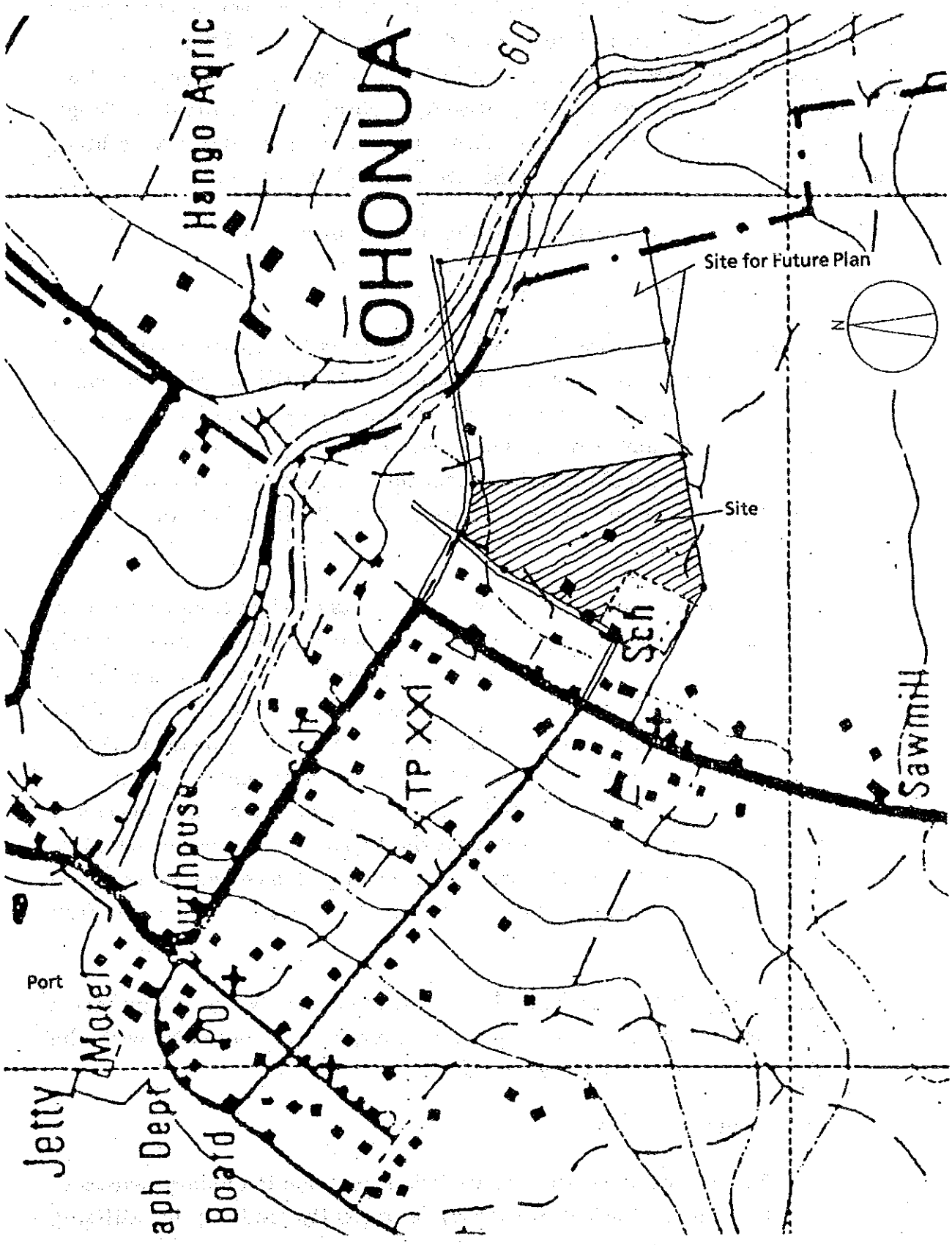
iii) Water Supply

The Tonga Water Board installed quality water supply facilities utilizing natural spring water. The source of the water is located in the mountain 350 feet above the sea and the water pressure is sufficient (the site is 200 feet above sea level). The project facilities will use this water for

drinking and laboratory testing purposes. Water rates is 2.90T$/thousand gallon.

The location of the 'Eua District High School is shown in Table 3 - 2.

Fig. 3－2 Location of the Site for 'Eua District High School



3 - 2 - 3 Earthquake in Tonga

The Kingdom of Tonga is located in one of the most severe earthquake zones. In 1988, the area of sea around Tonga was hit thirteen times by earthquakes of magnitude of 6 or more. In 1977, Tonga was the epicentre of an earthquake, which damaged buildings (See Appendices - 16). Fortunately, Tonga has not been hit by earthquakes so often, but still the potential is very high, sufficient precautions must be taken (See structural plan 4 - 3 - 6).

3 - 2 - 4 Details of Requested Facilities and Equipment

(1) Vava'u High School Expansion

The size of the existing facilities was designed for accommodating 500 students with 16 classrooms. After the opening of the school, there was a rush of applicants for admission, enrollment reaching 683 at peak. However, the number of teachers were insufficient for such increase of students, the quota of admission of students been limited to 100 since 1988. Despite this, applications kept increasing from 301 in 1985 to 455 in 1989. (See Table 2 - 24)

In the Vava'u District, there are several mission-run secondary schools excluding the Vava'u High School. The total capacity is around 2,000 students. There is room in mission-run schools for those who cannot enter the Vava'u High School. However, the objectives of the improvement of the Government are provision of equal opportunities of education to all regions and upgrading of the educational standard by enhancing public-run secondary schools. Further, demand is very high to increase the capacity of this high school in order to meet the regional people's requirements, that is, they want to send their children to Vava'u High School whose scholastic achievement is second highest in the country, next to the Tonga High School.

Accordingly, the Vava'u High School, which is the only public high school in Tonga is required to be expanded in order to be consistent with the objectives in educational reformation.

1) General Classroom

The existing 16 classrooms are insufficient due to the large excess in enrollment. Such insufficiency is presently made up by utilizing

lecture hall, etc. Normal classes are carried out in general classroom in home room system. For general classrooms as a basic unit, the expansion in a number sufficient for the increase in enrollment is required

The floor space of the classrooms (7.2m×8.6m) is designed based on the standard number of students per class, i.e., 35 of the Ministry of Education. Considering the layout of furniture, such as desks, chairs, supplies, etc. in use now the width is ideal. Also, from a project expansion point of view, such are adequate, being consistent with the floor space of the existing classrooms.

2) Special Classrooms

For subjects requiring experiments, practices, etc. in special classrooms, expansion of classrooms in sufficient numbers are necessary.

In this high school, there are existing special classrooms (Two Science Rooms, a Home Studies Room, a Crafts Room and a Business Study Room) sufficient for the designed number of students, i.e., 500 at the time of the establishment of the school. The deficiency in number of special classrooms in the existing facilities will be constructed after the establishment of the total number required for the increased number of students. It is adequate to design the floor space of the additional special classrooms consistent with those of the existing facilities.

3) Equipment

The existing equipment at this school is utilized relatively well. The selection of equipment to be provided will be made from amongst the list of equipment items necessary in the case of the construction of a new school, deleting from this list existing items which are still usable, so as to correspond with the curriculums and details of education.

Also, the equipment will be ranked thus: indispensable (A), generally required (B) and convenient if available (C), selection commencing from those of the highest priority ranking.

(2) Sports Ground Facilities Preparation

It is necessary as part of high school education, but the requested "spectators wooden stadium with a seating capacity of 500" was judged not so necessary from point of view of the project objectives, such as the improvement in education and provision of equal educational opportunities. However, the present school courtyard is a little bit too small for a sports ground, other grounds being utilized for big athletic meets, etc. Consequently, adequate preparation and equipment arrangement for a ground of adequate high school size is necessary.

(3) 'Eua District High School Construction

The purpose, nature of the school and details of the education to be provided at the 'Eua District High School are basically the same as those of Vava'u High School. However, as this is the only high school available on the island (no mission-run schools), all applicants of school age, can enter the school. Consequently, it is necessary to expand the school to the size suitable for the number of applicants in the region. As to the facility size and equipment selection, it is appropriate to adopt basically the same criteria as that for Vava'u High School, considering the nature and purpose of education as a public-run high school.

As for the detailed requests, such as provision of small office or staff room which serves concurrently as a control room, they are considered necessary in Tonga's educational system in which, the students generally do not own their own text or educational materials but borrow them from the school when they attend each class must be prepared and stored in each room. These will be considered in the floor planning, within the limit of the estimation of the facility scale as a whole.

1) Administrative Offices

Offices and rooms for principal, vice principal, teachers will have sufficient space and facilities for carrying out all internal and external service of school.

2) Library/resource unit

Especially in the outer is lands, people do not have many opportunities to read a book except in school library, they are very important for

school facilities. Also, as books are very valuable there, the facilities must be designed so as to be readily maintained, controlled and repaired by the people.

3) General Classrooms

Classes, except for the special subjects which require testing and practicing, are conducted in general classrooms, in a homeroom system. Accordingly, classrooms must be designed as a fundamental unit of the school, according to enrollment, class unit and curriculums as well as with consideration to the actual conditions of similar facilities, such as the Vava'u High School.

4) Special Classrooms

According to the curriculums, general science, higher-level science, craftwork, home economics study rooms are necessary. Their sizes, facilities and numbers will be planned based on periods, time slot, utilization rate of special studies in all classes as well as actual conditions in similar facilities, such as Vava'u High School, etc.

5) Toilets, etc.

They will be designed considering provision of sufficient number according to the size of facilities and easy maintenance. Furthermore, as water rates are relatively high in Tonga, the utilization of rainwater will be considered.

6) Equipment

As the curriculums are uniform in public schools and details of education are basically same with those of Vava'u High School, an equipment plan appropriate for the size and details of facilities will be prepared in the same standard and procedure as those for the Vava'u High School.

7) Lecture Hall

The lecture hall will be multi-purpose use such as students' and teachers' indoor sports events, various events of regional societies and coefficient of utilization is very high. However, its size and functions

will be designed on the basis of the assembly of all students and teachers.

(4) Teachers' Housing in Vava'u and 'Eua

For the improvement of education, it is necessary to upgrade the quality of teachers as well as educational facility environments. On the outer islands, it is difficult to employ the necessary number of teachers from other islands due to the difficulty in assuring an appropriate living environments for teachers as well as unprepared conditions of school facilities and work environments. Accordingly, the preparation of teachers' general living environment will be designed in such a scale as will be suitable for one of the objectives of this project redressing the regional gaps in education.

Although there is the Teachers' Training Center (TTC), graduates from this school are qualified to teach only all levels of normal primary education and Forms 1 through 4 of secondary education. For Forms 5 and 6, the qualification of a university graduate is generally required. Consequently, Tonga, which has no universities, is obliged to rely on graduates of foreign universities for teachers of higher level.

In order to achieve improvement in the quality of the education, which is one of the main objectives of this project, it is indispensable to secure teachers of higher level. To this end, the Government is making effort to arrange housing, ameliorate salaries and reinforce details of teachers' training school. Above all, the problem of insufficient housing is serious, such being urgently required.

3-2-5 Organization in Charge of Execution, Management System and Operational Budget

(1) Organization in Charge of Execution

- The Ministry of Education, Youth, Sports and Culture of Tonga will be the main organization responsible for the execution of the project and the operation of the facilities after their completion.

- The execution organization headed by the Director of Education of the Ministry of Education, Youth, Sports and Culture of Tonga will be wholly responsible for the planning, formalities and meetings relating to the execution of the project.

Table 3－7 Project Executing Organization

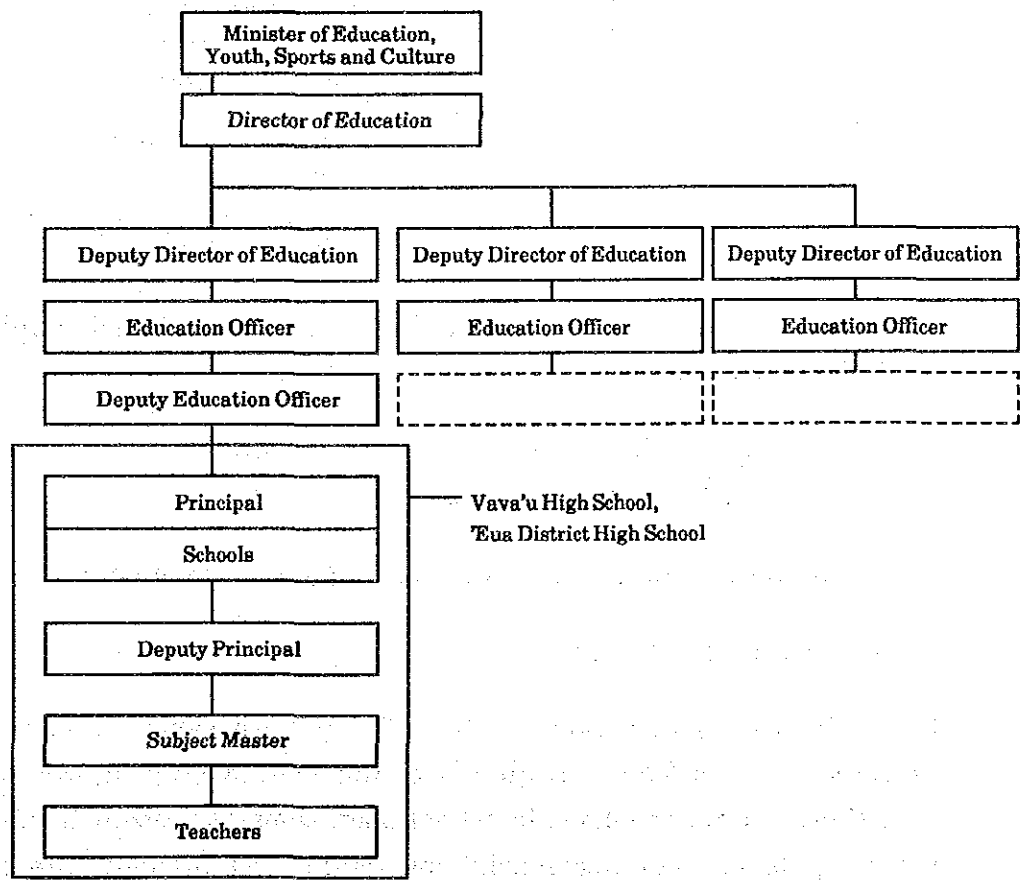
Person responsible for overall matters Director of Education	1 person
Person responsible for practical affairs Chief Education Officer	1 person
Ministry of Education, Youth, Sports and Culture	Authorities Concerned

* There is no particular staff. The person responsible for overall matters will organize staff, as necessary, and practical affairs will be carried out through the Chief Education Officer.

(2) Management System

- The Ministry of Education, Youth, Sports and Culture will be directly responsible for management matters.

Table 3－8 Organization of the Ministry of Education, Youth, Sports and Culture of Tonga



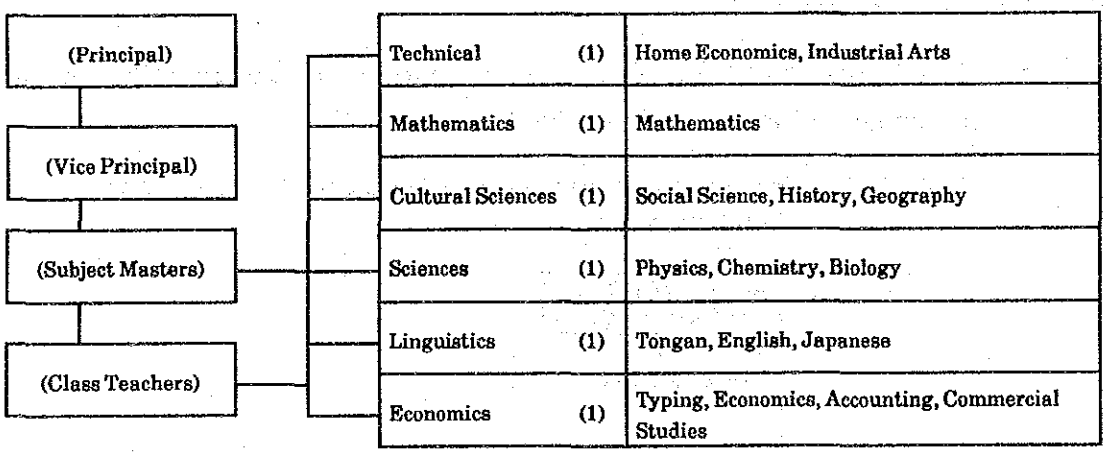
(3) Organizational Members (See Appendix 6.)

The organization consists of members of the Ministry of Education, Youth, Sports and Culture and the teachers of each school. Teachers of each school are assigned based on curriculums and time schedules but in reality, the insufficiency is covered by foreign members under cooperation scheme.

(4) School Organization after Completion of the Project

The curriculums of public high schools are uniform and already in effect, the structure of both Vava'u and 'Eua Schools are the same and will be maintained even after the completion of the Project.

Table 3 – 9 School Organization at Vava'u High School and 'Eua District High School



Technical	(1)	Home Economics, Industrial Arts
Mathematics	(1)	Mathematics
Cultural Sciences	(1)	Social Science, History, Geography
Sciences	(1)	Physics, Chemistry, Biology
Linguistics	(1)	Tongan, English, Japanese
Economics	(1)	Typing, Economics, Accounting, Commercial Studies

Remarks: The numbers in ( ) denote the number of teachers in charge of the subject.

The total numbers of teachers at the Vava'u and 'Eua District High Schools as of 1990 are as follows:

Vava'u High School:	40
'Eua District High School:	34

These numbers include young overseas cooperation members.

(5) School Operational Budget

Regarding the operational budget, the five years of experience since its first establishment for Vava'u High School and 4 years for 'Eua, would indicate that there are no problems in school operations at present levels, though the budgets are not necessarily sufficient. At present, the following

operational budget plan (1991~1995) as shown in Table 3 - 10 has been prepared, and the Government of Tonga is considering the revision of the operational budget so as to correspond with the size of the project, when it is determined.

However, if such measures as the provision of educational materials, educational equipment, consumables, desks, chairs, maintenance of facilities and securing of teachers are insufficient, the initial objectives would not be achieved. Therefore, the implementation of appropriate measures are earnestly requested.

Shown below are the operational costs for Vava'u High School and 'Eua District High School as well as the operation budget plan after the completion of the project.

Table 3 – 10 Operational Budget for Vava'u High School and 'Eua District High School

Vava'u High School

Year	Total Amount	Increased Amount	Increased Amount
1985	64,552	6,900	11 %
1986	71,452	25,088	35 %
1987	96,543	3,254	3 %
1988	99,797	6,073	6 %
1989	105,870	83,255	78 %
1990	189,125		
		Compared to the previous year	Compared to the previous year

* The 78% increase in 1990 is due to the increase in teachers' salaries.

'Eua District High School

Year	Total Amount	Increased Amount	Increased Amount
1986	68,270	6,196	9 %
1987	74,466	1,607	2 %
1988	76,073	10,115	13 %
1989	86,228	47,470	55 %
1990	133,698		
		Compared to the previous year	Compared to the previous year

* The 55% increase in 1990 is due to the increase in teachers' salaries.

Operational Budget Plan after Completion of the Project

Year	Total Amount	Increased Amount	Increased Amount
1991	196,690	7,873	4 %
1992	204,563	8,182	4 %
1993	212,745	8,509	4 %
1994	221,254	8,850	4 %
1995	230,104		
		Compared to the previous year	Compared to the previous year

Operational Budget Plan after Completion of the Project

Year	Total Amount	Increased Amount	Increased Amount
1991	147,007	2,734	1.9%
1992	149,741	4,001	2.7%
1993	153,752	4,013	2.6%
1994	157,765	2,672	1.7%
1995	160,437		
		Compared to the previous year	Compared to the previous year

3 - 2 - 6 Maintenance Control Plan

(1) Maintenance Control of Facilities and Equipment

- Facilities:
  The construction, facilities and structural planning have been prepared with consideration to ease of maintenance so as not to require special technicians for daily maintenance of materials, structures, facilities and equipment. However, as the durability of the facilities and systems largely depends on daily maintenance, inspection and steps taken in the event of failures, the personnel in charge of maintenance and inspection must have a full understanding of the nature and structural features of the school facilities concerned.

- Equipment:
  There are no special types of equipment among the general business equipment to be supplied under this project. Only inspections and procedures based on operating manuals are required. Accordingly, no special technicians will be dispatched, basically, but appropriate remedial steps are important in the case of failure, as is the case with other facilities and systems.

  There are no problems associated with the special items of equipment to be used as educational aids, as their use will be controlled by teachers specialized in the field. However, appropriate remedial measures in cases of failure are important.

(2) Estimation of Facilities Maintenance and Control Cost

Shown in Table 3 - 11 is the breakdown of school running cost at Vava'u and 'Eua District High Schools (1989/1990, 1990/1991). The salaries for teachers for the 1990/1991 period having been reviewed and largely improved upon, the percentage increased from 85% to 90% or more of the school running cost. On the other hand, the other costs remained almost constant for last year. Comparing the running cost between the two high schools, 'Eua District High School spends half of the electricity of that of Vava'u High School owing respectively to its closer distance to the capital Tongatapu and its old deteriorated building accommodating only 200 students. As for the other items of cost, the 'Eua District High School spends slightly more on facility maintenance and less on material cost than

the Vava'u High School owing respectively to the deteriorated conditions of the school building and the utility facilities and its smaller size.

On a whole, library, printing and educational material, consumable costs, etc. are almost the same, as the scale of changing in enrollment is almost the same in both schools.

Out of these items, what are most directly related to facility maintenance and control cost are the electricity and water fee. Of these, the electricity fee is the factor which largely influences the running cost amount after the completion of this project. With a view to maintaining the present facility maintenance level, the electricity fee will be multiplied by 1.25 at the Vava'u High School and by 1.13 at the 'Eua District High School corresponding with the size of the school building. The school running cost can be approximately estimated by multiplying the total cost of each school by price index of each year.

However, past budgets appear to be insufficient, insufficient maintenance condition exists at present.

It is particularly necessary to secure facility maintenance cost.

Table 3 – 11 School Running Cost at Vava'u High School and 'Eua District High School

(Unit: T$)

	Vava'u High School		'Eua District High School	
	1989/1990	1990/1991	1989/1990	1990/1991
Salary for Teachers (%)	89,710 (85.0%)	172,965 (91.5%)	73,298 (85.0%)	120,718 (90.3%)
Transportation Cost	3,000	3,000	1,500	1,500
Electricity Fee	2,000	2,000	900	900
Water Fee	800	800	800	800
Telecommunication Fee	60	60	50	50
Books, Printing Cost	3,400	3,400	3,600	3,500
Material Cost	3,700	3,700	2,800	2,800
Consumables	1,800	1,800	1,500	1,650
Maintenance & Control Cost	1,400	1,400	1,780	1,780
Sub - Total (Ratio %)	89,710 (15.0%)	172,965 (8.5%)	73,298 (15.0%)	120,718 (9.7%)
Total	105,870	189,125	86,228	133,698

(Source: The Ministry of Education of Tonga)

3 - 3 Technical Assistance

At the Vava'u High School, several young overseas cooperation members have been dispatched every year from Japan since its establishment. As of 1990, six members work there and continuity of their assistance is more than ever expected by Tonga, who highly appreciate their contribution until now.

At the 'Eua District High School, there are several foreign teachers but no young overseas cooperation members now. Enhancement of the teaching staff after the completion of the facilities, is planned but as this is not very easy to achieve, as mentioned above, it will be necessary to continue relying on foreign teachers. The environments relating to teachers' housing in 'Eua are inferior to those at Vava'u. There are a few government's houses, but no non-governmental rental houses. Such conditions make it more difficult to secure the necessary teachers. Dispatching of young overseas cooperation member to the 'Eua District High School for teaching science, mathematics, and Japanese is requested at this time, being necessary to reinforce the numbers of teachers along with the teachers' housing.

CHAPTER 4

BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4 - 1 Design Basis

The design is prepared with consideration to the results of the site surveys, and based on the following:

(1) Formulation of land utilization and construction plans with sufficient possibility for future development, with consideration to the education policy and future aspects of the Government of Tonga.

(2) Formulation of land utilization and construction plans appropriate for the peripheral, natural environment and environments.

(3) Formulation of facility plans with consideration to materials, construction methods and facilities most suitable for the local conditions, as far as possible.

(4) Further study of the facilities suitable for a Grant Aid project, in line with the purpose of the facilities and the guidelines.

4 - 2 Study of Project Size

4 - 2 - 1 Philosophy of Sizing

(1) Vava'u High School

The Vava'u High School, whose capacity of facilities was designed to accommodate 500 students, had a rush of applicants for admission, after the establishment with a Grant Aid from Japan in 1985, because it facilitated education of the same standard as those provided in public-run high schools in the capital, and the school attained the second highest scholastic achievement next to the Tonga High School.

In recent years, as a result of admission of new students more than the quota, the enrollment increased in 1988 to 683 against 500 students, which is the capacity of the school building. As it became difficult to provide an appropriate education, the quota of new students has been limited to 100. However, the number of applicants for admission kept progressively increasing and reached 455 in 1989 (See Table 2 - 23 and 2 - 24).

On the other hand, the mission-run high schools are reducing the size of school operation and pulling out from that domain and therefore the regional demand of public-run high schools is further increasing. However, as it is difficult for public-run high schools to suddenly receive the students from mission-run high schools from education administrative point of view, public-run high schools must be ameliorated and reinforced firstly, keeping a balance with mission-run high schools for the time-being. The Government of Tonga now subsidizes mission-run and public-run high schools in proportion to each enrollment, with a view to enhancing the improvement of the education as a whole by mutual cooperation between mission-run and public-run high schools.

Considering such situation and targeting the relaxation in competitive rate of applicants from 4.55 in 1989 to approximately 2.5~3.0, on the assumption that the number of applicants for admission to the Vava'u High School is maintained at the level of 1989, the quota is determined to be 700 students based on figures in Table 4 - 1. (Form 1, 23.4%*)

Competitive Rate	Number of New Students	Total Enrollment
3.0 times	150 *	641
2.5 times	182 *	777
Average		709

(2) 'Eua District High School

As the size of the community of 'Eua is small and this is the only high school available there, the 'Eua District High School is in a position to take care of all needs of the region. Consequently, the needs of this school are the needs of the entire region and of educational administration at the same time. Since its establishment as a public high school, enrollment has rapidly increased and, within three years, reached 644 (registered enrollment: 796) against the maximum capacity of 200 students. However, as the education provided was not effective due to the difficulty in making the facilities to meet the scale of enrollment, it decreased again.

At present (1990), the enrollment is 580, the average in the past five years being 546. Considering the enrollment and the population movement which were highest in the past, adequate facilities to accommodate at least about 644 students would be necessary. Besides, the average of high school students in comparison with the general population over the past five years was 14.65%, which means 632.3 students based on a population of 4,393 in 1986.

Accordingly, we have determined the size of the facilities so as to accommodate 630 students, considering the recorded number of students in the past (644), present number of students (632), population movement trends, effectiveness of upgraded facilities as well as the decreasing number of children of secondary school age.

4 - 2 - 2 Estimation of Size

(1) Estimation of number of classes in the Vava'u and 'Eua District High School

Based on the philosophy mentioned in 4-2-1 above, the size of the facilities were determined so as to accommodate 700 and 630 students at the Vava'u

High School and the 'Eua District High School. The capacity of each class figure between 30 to 35, which is the standard number of students per class advocated by the Ministry of Education, Youth, Sports and culture of Tonga, the minimum number of classes in each school is estimated as follows:

Vava'u High School: 700÷35=20→20 (classes)
'Eua District High School: 630÷35=18→18 (classes

These numbers of classes are right and adequate in accordance with the request.

(2) Estimation of Number of Classes per Level in Each School

The enrollment per level is calculated based on the ratio of total enrollment at public-run secondary schools, because the grading system in mission-run high schools are different from that in the public-run schools.

① Enrollment per Level in Secondary High School

Table 4－1 Enrollment per Level in Secondary High School - 1989

	Class	Form 1	Form 2	Form 3	Form 4	Form 5	Form 6	Total
a	Enrollments at Public High School	631	550	488	450	360	197	2691
b	Student %	23.4	20.4	18.1	16.7	13.4	7.3	

(Source: Annual Report of The Ministry of Education - 1989)

- Public-run high school student ratio: b=a÷2,691

② Estimation of Number of Classes per Level in the Vava'u High School and 'Eua District High School

The suitable numbers of classes per level are the of divided number of classes at each school by the enrollment ratio per level found in ① above.

c (Vava'u High School)=20 (classes) × ①
d ('Eua District High School)=18(classes) × ①

Shown below are the suitable numbers of classes, found by this method.

Table 4－2 The Appropriate Numbers of Classes

	Class	Form 1	Form 2	Form 3	Form 4	Form 5	Form 6	
e	Vava'u High School (Number of Classes)	※1 4.4(4)	4.0(4)	3.6(4)	※1 3.3(3)	2.9(3)	※2 1.4(2)	20 classes (requested)
f	'Eua High School (Number of Classes)	3.9(4)	3.6(4)	※3 3.2(3)	2.9(3)	2.6(3)	※3 1.3(1)	18 classes (requested)

※1 The number of lower level classes (3 or 4) at Vava'u High School was determined based on the fact that it is possible to limit the quota for admission because there are similar high schools.

※2 The number of classes (2) for Form 6 at the Vava'u High School is determined with consideration to the nature of the school as a preparatory school of the highest level preceding higher education in the district.

※3 This is based on teh fact that 'Eua is within the Tongatapu area, although there are no similar schools in the 'Eua District.

(3) Estimation of Size of classes of the Vava'u High School Facilities

1) Estimation of Scale of Normal Classroom

Shown below are the maximum enrollment to be accommodated and enrollments per level calculated based on the numbers of classrooms found in (2) above.

Table 4－3 Maximum Capacity of Students: 700 (max. 35 students per Class)

Form 1	4 Class	×	35	=	140
Form 2	4 Class	×	35	=	140
Form 3	4 Class	×	35	=	140
Form 4	3 Class	×	35	=	105
Form 5	3 Class	×	35	=	105
Form 6	2 Class	×	35	=	70
				Total	700

2) Estimation of Scale of Special Classrooms

The figure found by multiplying the total number of study periods, calculated based on the number of classes per level, curriculums and time table (See Appendix 11.) by the satisfaction rate is the number of periods of utilization of the classroom.

Shown in Table 4-4 are the numbers of projected classrooms calculated by dividing the found number of periods of utilization of the classroom by total number of periods (30 periods) and the upper limit of utilization rate of classrooms (80%).

The following is the procedure of estimation of the required number of science rooms for example.

① Calculate number of periods of science for each level and class based on the curriculums and time tables, and add them all to find the total number of periods (105 periods).

② Multiply the above (total periods) by the rate of classes carried out in special classrooms (project satisfaction rate of special classroom: 60%) to find the number of periods for which the special classroom are used (63 periods).

③ Divide the found number of periods of utilization of the special classroom by total number of periods (30 periods for Day 1~Day 6) and the upper limit of utilization rate of classrooms (80%) to determine the necessary number of classrooms, i.e., 3.

④ Reduce the number of existing classrooms (2) from the above necessary number of classrooms (3) to determine the project number of classrooms, i.e., 1.

⑤ For agricultural study course, any specific classrooms will not be provided, as science rooms and general classrooms are available for it. The excess in number of science room, i.e., the result of the reduction of the necessary number of classrooms (2.625) from the project number of classrooms (3) being 0.375, it will meet the required number of classes for agricultural studies course. Consequently, the agricultural study classes can be conducted in science rooms.

Applying the same way for the case of 'Eua District High School (Table 4 - 7), the excess in number of science classes, namely, the result of the reduction of the necessary number of classrooms (2.667) from the project number of classes (3), is 0.333. Consequently, 0.333 out of the necessary number of classrooms (0.792) will be covered by science room.

The remaining 0.459 will be covered by general classrooms.

Table 4 – 4 Estimation of Required Number of Special Classrooms calculated from the Planned Number of Classes based on the Existing Curriculums

(Day 1~6 5 periods per day, 30 periods per 1 cycle)

Subjects	Science	Home Economics	Industrial Technology	Agri-culture	Business Studies	Remarks
Form 1	(5×4) 20	(3×1) 3	(3×1) 3	(3×1) 3	–	
Form 2	(5×4) 20	(3×1) 3	(3×1) 3	(3×1) 3	–	
Form 3	(5×4) 20	(3×1) 3	(3×1) 3	(3×1) 3	(2×3×1) 6	
Form 4	(5×3) 15	(3×1) 3	(3×1) 3	(3×1) 3	(3×1) 3	
Form 5	(2×6×1) *12	–	(6×1) *6	(6×1) 6	–	*Science 1 " 2
Form 6	(3×6×1) ★18	–	–	–	–	★Biology Chemistry Physics
Ⓐ Total Number of Periods	105	12	18	18	9	
Ⓑ Special Classroom Plan Satisfactory Rate(%)	60	100	100	50	100	
Ⓒ Number of Periods for Special Classroom Utilization Periods	63	12	18	9	9	Ⓐ×Ⓑ
Ⓓ Number of Necessary Classrooms	1) 2.625	0.5	0.75	2) 0.375	0.375	Ⓒ / 30×0.8
Ⓔ Planned Number of Classrooms (existing)	3 (2)	3) 1 (1)	1 (1)	0	1 (1)	

Notes) 1) It is possible to use the preparatio rooms for part of the Biology, Chemistry and Physics classes in Form 6

2) 50% of the classes in agricultural studies are held in the science rooms and the remaining 50% in open air. 1) + 2) = 2.625 + 0.375 = 3.0

3) Regarding the home economics studies, the kitchen area and sewing area are considered as one classroom.

4) The estimations regarding the classrooms for special classes are derived as follows:

$$\frac{Ⓐ \times Ⓑ}{Ⓓ} = a \times b$$

$$= \frac{Ⓒ}{30 \times 0.8}$$

Ⓐ: Total number of study periods

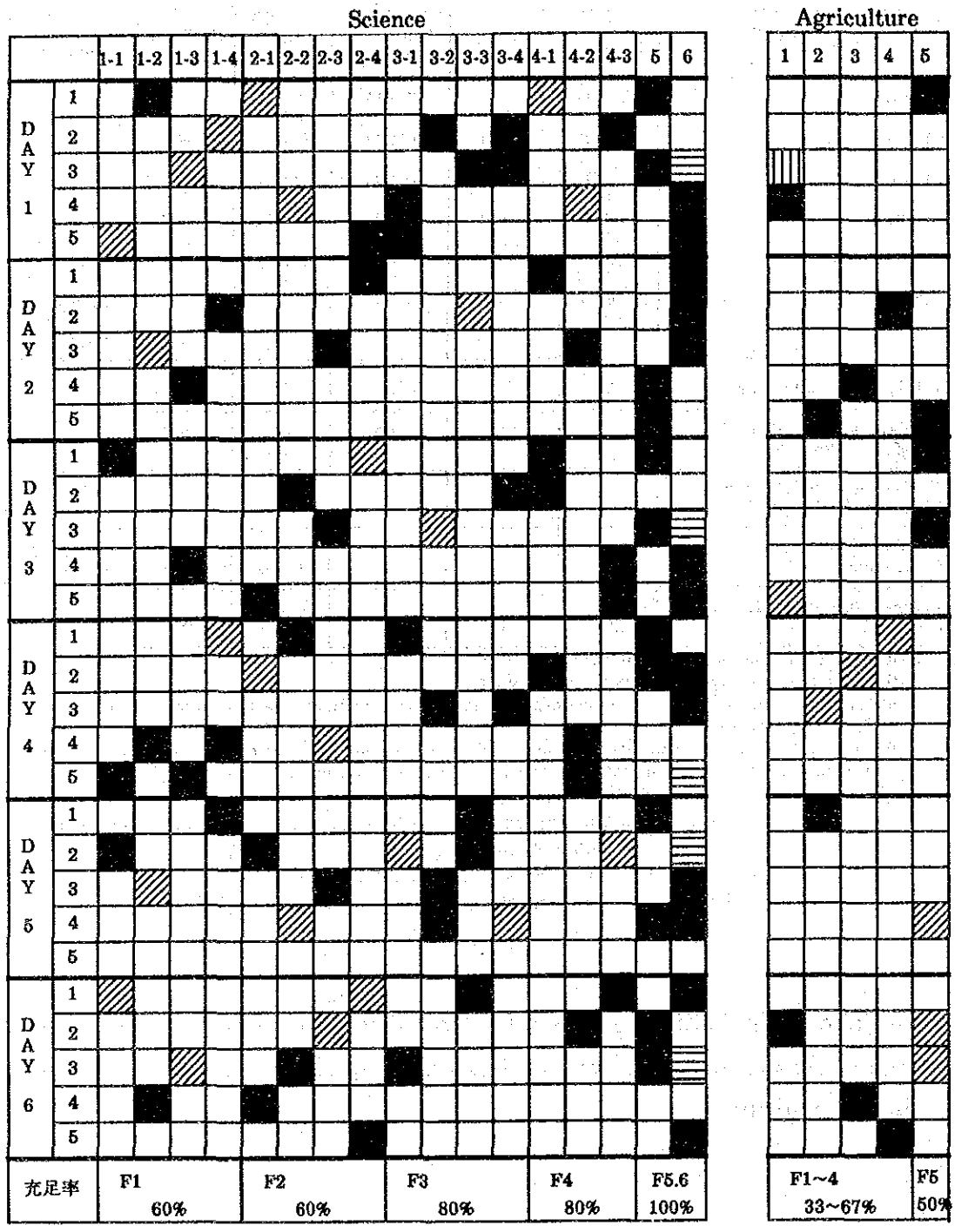
Ⓑ: Satisfaction Rate = Rate of classes given in special classrooms in comprison with Ⓐ above.

a: Total periods (= 30 periods) per week (Day 1~Day 6)

b: Upper limit of classroom utilization rate (= 80%)

The shown in Table 4-5 is a reference utilization plan for the projected special classrooms in the Vava'u High School, which is calculated based on the curriculum.

Table 4－5　Example of Science Room Utilization at the Vava'u High School



※　1) F denotes Form (school year)

(4) Estimation of Size of Classroom in 'Eua District High School

1) Estimation of Size of General Classrooms

The maximum student accommodating capacity and enrollment per level calculated based on the number of classes found in (2) is shown in Table 4-6.

Table 4 – 6 Maximum Accommodating Capacity of 630 Students (Maximum 35 students/class)

Form 1	4 Classes	×	35	=	140
Form 2	4 Classes	×	35	=	140
Form 3	3 Classes	×	35	=	105
Form 4	3 Classes	×	35	=	105
Form 5	3 Classes	×	35	=	105
Form 6	1 Classes	×	35	=	35
				Total	630

2) Determination of Size of Special Classrooms

As the 'Eua District High School uses the same curriculum as that of Vava'u High School, it can be considered that the details of education are same as public-run school, though there are some difference in time table. Therefore, the necessary numbers of general classrooms and special classrooms are calculated based on projected accommodating capacity of students, curriculum and time table (See Appendix 11) in the same method and standard as for Vava'u.

Table 4－7 Estimation of Required Number of Special Classrooms calculated from the Planned Number of Classes based on the Existing Curriculums

(Monday ~ Friday 6 periods per day, 30 periods per 1 cycle)

Subjects	Science	Home Economics	Industrial Technology	Agri-culture	Business Studies	Remarks
Form 1	(4×4) 16	(3×3) 9	–	(3×3) 9	–	
Form 2	(4×4) 16	(3×3) 9	–	(3×3) 9	–	
Form 3	(5×3) 15	8	–	6	*9	* Economics
Form 4	(5×3) 15	8	–	8	–	
Form 5	*20	5	–	5	–	* Science 15 Biology 5
Form 6	★24	–	–	–	–	★Chemistry 12 Physics 12
Ⓐ Total Number of Periods	105	39	–	37	9	Number of classes×Number of periods
Ⓑ Special Classroom Plan Satisfactory Rate(%)	60	100	–	50	100	
Ⓒ Number of Periods for Special Classroom Utilizatio Periods	64	39	–	19	9	Ⓐ×Ⓑ
Ⓓ Number of Necessary Classrooms	1) 2.667	1,625	5) –	2) 0.792	0.375	Ⓒ / 30×0.8
Ⓔ Planned Number of Classrooms (existing)	3	1	1	(0)	1	

Note) 1) It is possible to use the preparation rooms for part of the Biology, Chemistry and Physics classes in Form 6.
2) 50% of the classes of agricultural studies are held in the science rooms and the remaining 50% are in open air.
3) Regarding the home economics studies, the kitchen area and sewing area are considered as one classroom.
4) The estimation of classrooms for special classes are derived as follows:

$$Ⓓ = \frac{Ⓐ \times Ⓑ}{a \times b} = \frac{Ⓒ}{30 \times 0.8}$$

Ⓐ: Total number of study periods
Ⓑ: Satisfaction Rate = Rate of classes given in special classrooms in comparison with Ⓐ above.
a: Total periods (= 30 periods) per week (Day 1~Day 6)
b: Upper limit of classroom utilization rate (= 8%)

5) Industrial technology classes will be started after the completion of the new school building.

* The "Form" means a grade.

(5) Number of Teachers and Teachers' Housing in Vava'u and 'Eua Districts

The Vava'u High School and 'Eua District High School, which are within the scope of the current grant aid, require more advanced level teachers along with the amplification of their facilities and it is necessary to recruit candidates who have obtained qualifications abroad to fill this need. The required number of advanced level teachers is estimated here, assuming the houses are allocated to only advanced level teachers.

Also, assuming teachers are assigned irrespectively of the island where they came from, the rate of assignment is considered as the same as the population ratio of each island. Namely, the totalized value of the population ratio excluding the islands is considered as the ratio applicable for the teachers from the other island than the one concerned.

Table 4－8 Population Ratio per Island

Regions or islands	Population (1986)	Population Ratio per Island (%)
Tongatapu	63,614	67.3
○ Vavau	15,170	16.0
Ha'Apai	8,979	9.5
○ 'Eua	4,393	4.7
Niuas	2,379	2.5
Total	94,535	100

1) Sizing of Teachers' Housing and Projected Number of Teachers at Vava'u High School

Table 4－9 Future Number of Teachers

A)	Total number of teachers		1)	※1.
B)	Advanced level teachers (including principal and vice-principal)	2)	16	(=20classes×2.0)
C)	Those who live in public housing		13	※2

※1. With reference to Japanese Standard (54 teachers for 20 classes in Japan)
※2. Assuming that the number of those who live in public housing will not change in the future.

Table 4 – 10 Evidences for The Required Number of Advanced Level Teachers
(Maximum periods/teacher = 18 hours)

	Form 5 (3Class)	Form 6 (2Class)	Total periods	Required Number of Teachers
Principal				1
Vice Principal				1
Mathematics	(5×3=) 15	(5×2=) 10	25	2
English	(6×3=) 18	(6×2=) 12	30	2
Tongan	(5×3=) 15		15	1
Economics/Accounting	12	12	24	2
Geology	6	6	12	1
History	6	12	18	1
Science 1/2	12		12	
Chemistry		6	6(10)	1
Physics		6	6(10)	1
Biology		6	6(10)	1
Agriculture	6			1
Industrial Technology	6			1
Total				16

The number of higher-level teachers required in the future in the Vava'u District is 16 according to Table 4-9 and the number they have now, including those from inside or outside of Tonga, is :

$$(16-3)\times 0.84 = 10.92 \rightarrow 11 \text{ teachers}$$

The number of teachers who will need housing, including those from abroad (Table 2-26):

$$11+10=21 \text{ teachers}$$

If it is reduced by the number of existing public houses (Table 2-29), the following is found:

$$21-13=8$$

which is the required number of houses.

Based on the ratio of number of houses for married teachers against single according to the 'Application Documents", which is 10:8,

Houses for married $8\times \frac{10}{18} = 4.4 \rightarrow 5$ houses

Houses for single $8\times \frac{8}{18} = 3.5 \rightarrow 3$ houses

Consequently, five (5) houses for married teachers and three (3) for single will be provided.

2) Sizing of Teachers' Housing and Projected Number of Teachers in 'Eua District High School.

Table 4 – 11 Future Number of Teachers

Total number of teachers	1) 36	※1.
Advanced level teachers (including principal and vice-principal)	2) 16	(=16classes×2.0)
Those who live in public housing	4	※2

※1. With reference to Japanese standards (18 teachers for 48 classes in Japan)
※2. Assuming that the number of those who live in public housing will not change in the future.

Table 4 – 12 Evidences for The Required Number of Advanced Level Teachers

Maximum periods/teacher = 18 hours

	Form 5 (3classes)	Form 6 (1class)	Total Periods	Required Number of Teachers
Principal				1
Vice Principal				1
Mathematics	(5×3=) 15	6	21	2
English	(5×3=) 18	6	21	2
Tongan	(5×3=) 15	–	15	1
Economics/Accounting	(10+5) 15	(12+6) 18	33	2
Geology	5	6	5	1
History	5		5	1
Science	15		15	1
Chemistry	–		12	1
Biology	5	12	17	1
Agriculture	5	12	5	1
Industrial Technology	5	–	5	1
Total				16 teachers

At 'Eua District High School, the number of higher-level teachers required in the future is 16 according to Table 4-11 and they do not have any higher-level teachers either from Tonga or abroad:

$16 \times 0.953 = 15.248 \rightarrow 15$ teachers

Of these, the number of teachers who will need housing, including teachers from abroad (Table 2 - 27) is:

$15 + 6 = 21$ teachers

If it is reduced by the number of existing public houses,

$21-4=17$

which is the required number of houses.

Based on the ratio of number of houses for married teachers against single according to the 'Application Documents", which is 10:8,

Houses for married $17\times\frac{10}{18}=9.4\rightarrow 10$ houses

Houses for single $17\times\frac{8}{18}=7.5\rightarrow 7$ houses

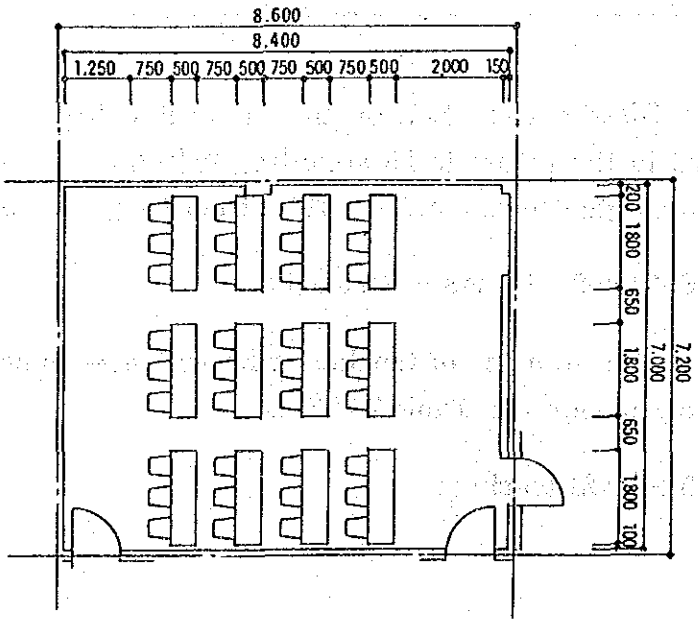
4 - 2 - 3 Bases for Estimation of Floor Area and Project Floor Area

The floor area is estimated based on the size determined in 4-2-2 of the Vava'u and 'Eua District High Schools. The form and floor area of General classrooms and special classrooms, which are the main elements of the facilities, are studied as follows:

At first, the construction plans of the expansion of the Vava'u High School and 'Eua District High School were studied, adopting the span (4,800 m ×7,200) of the Vava'u High School (constructed last year, with Grant Aid from Japan), which is one of the objectives of this expansion project.

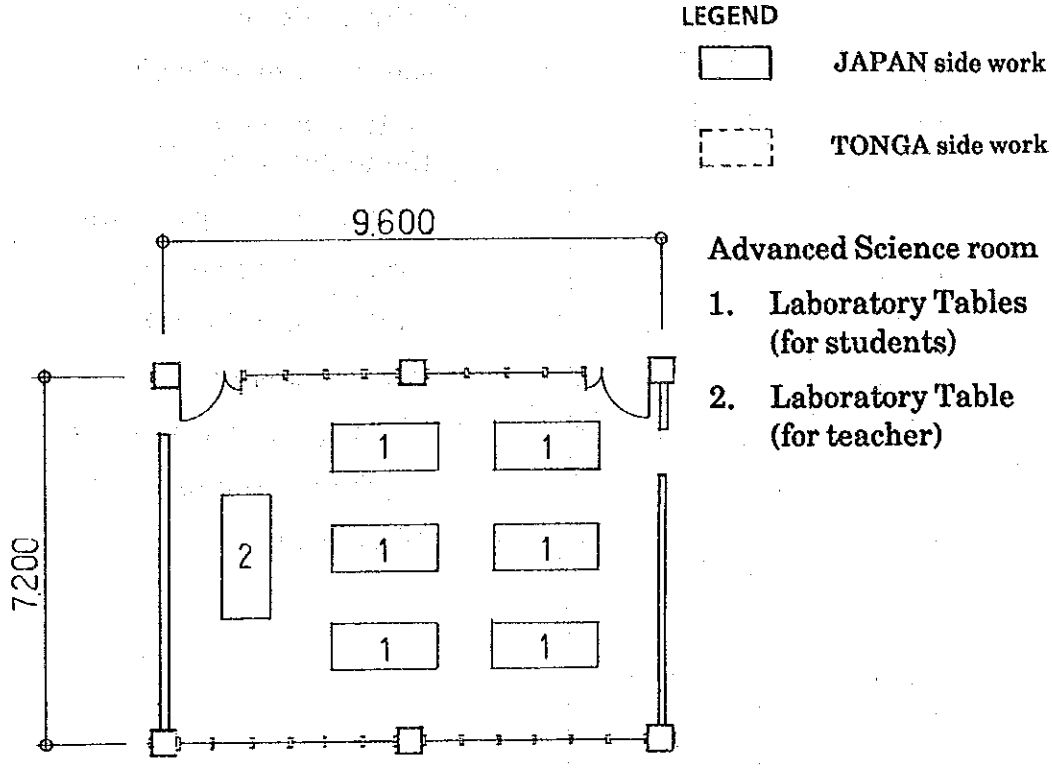
(1) General Classrooms

Shown below is the layout plan of furnitures based on the number of students per home class as well as the above span.



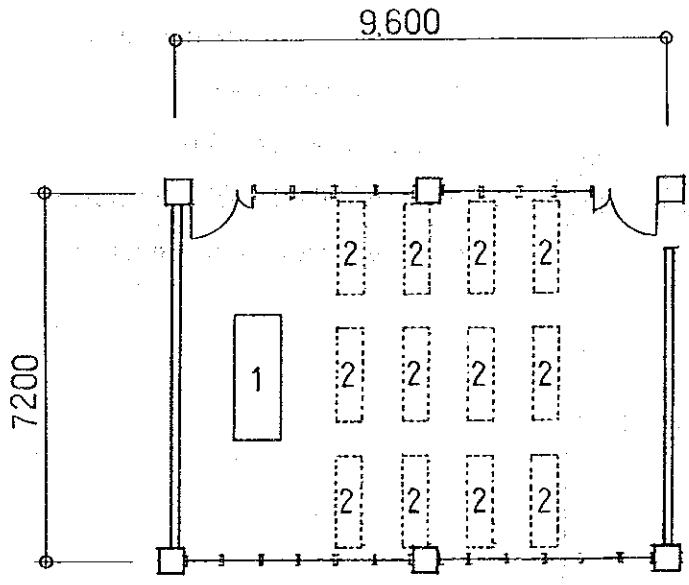
(2) Special Classrooms

Shown below is the layout plans of main educational equipment in special classrooms adopting the above-mentioned span.



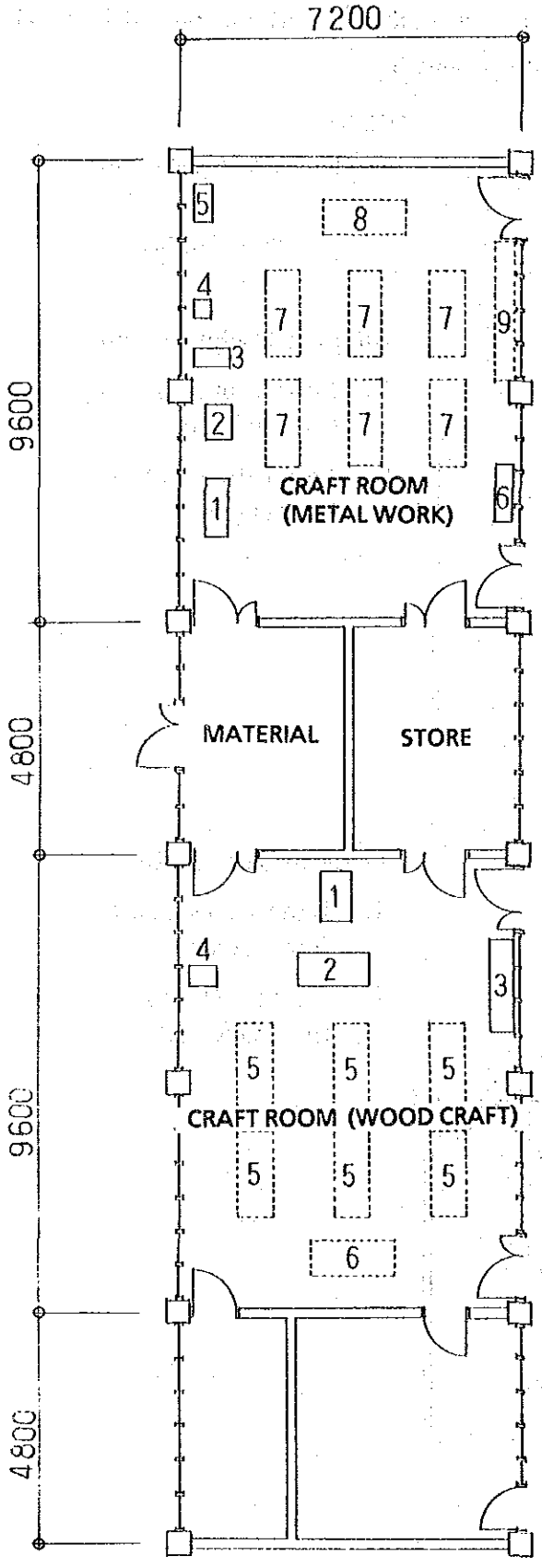
Advanced Science room

1. Laboratory Tables (for students)
2. Laboratory Table (for teacher)



General Science Room

1. Laboratory Table (for teacher)
2. Normal Desks (for students)

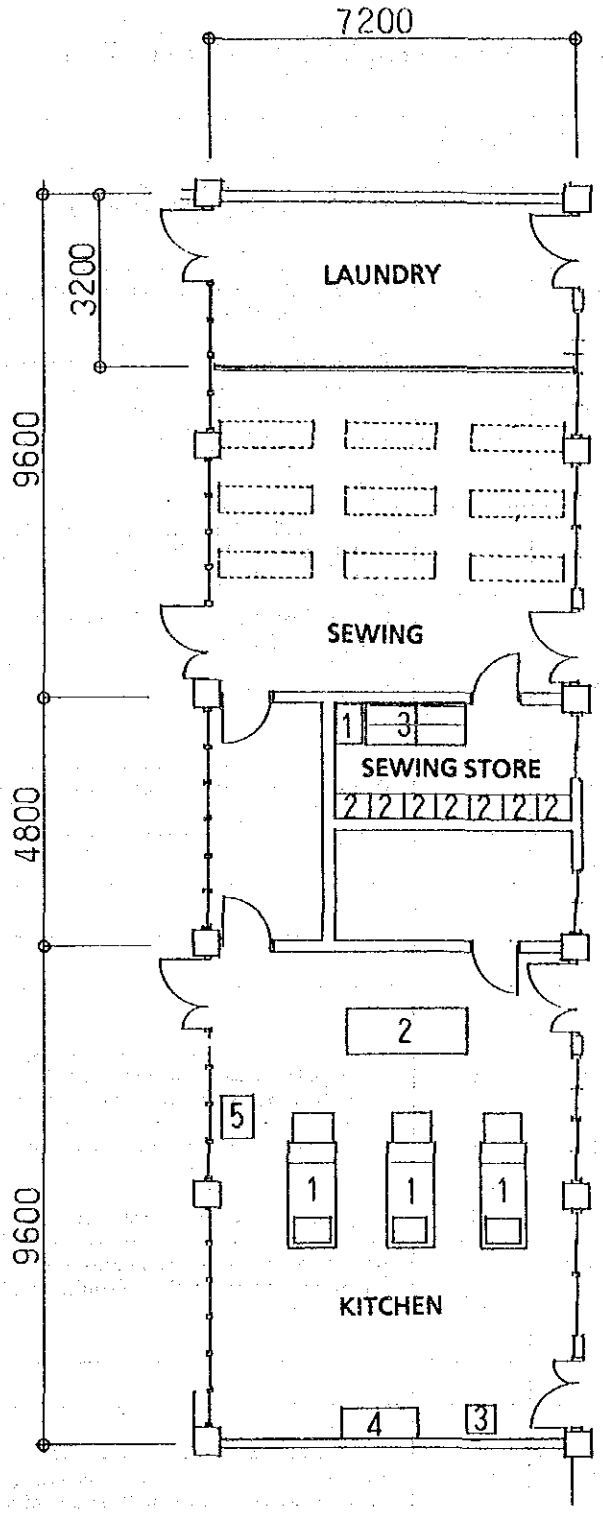


Metalwork Room

1. Lathe (for metalwork)
2. Cutting machine (for metalwork)
3. Portable drilling machine
4. Two-headed grinder
5. Buffing machine set
6. Air-compressor
7. Work tables (for students)
8. Work table (for teacher)
9. Work table

Woodwork Room

1. Circular saw machine
2. Common plane machine
3. Lathe (for woodwork)
4. Band saw machine
5. Work Tables (for students)
6. Work Tables (for teacher)



Sewing Room Storage

1. Electric sewing machine
2. Treadle sewing machine
3. Ironing board

Kitchen Practice Room

1. Cooking table with gas burner
2. Cooking table for demonstration
3. *Refrigerator*
4. Cupboard
5. Gas oven

(3) Rooms Required and the Floor Area

1) Floor area of each room at the Vava'u High School (Expansion)

Room		Project floor area	Number of rooms	Functions
General Class Room (Extension)		There are now 16 rooms, which will be increased by 4 to 20 classes (quota; 700).		
1 F	General Class Room (G.C.R.)	61.92	4	General subjects study, number of students: 35, 1.72m²/student
	Staff Room	7.2	4	Preparation for classes, school affairs work
Total		276.48		
1 F	Business Room (Extension)			
	Business Room	69.12	1	Business office work study, practice of type writer, number of students: 35, 1.72m²/student
Annex		41.76	1	Special classes except practice classes, number of students: 25
Total		110.88		
Common Area				
1 F	Open Corridor	162.64		Connection corridor between classrooms and sunshade
Total		162.64		
Extension Total		550.00		
Special Class Room (Renovation)				
1 F	Advanced Science Room	69.12	1	Advanced science experimentation, 6 laboratory tables, number of students: 35
	Preparation Room	34.56	1	Storage of test equipment and tools, and preparation work
	Staff	7.2	1	Preparation for classes, school affairs work
2 F	Advanced Science Room	71.52	1	Advanced science experimentation, 6 laboratory tables, number of students: 35
Renovation Total		182.4		
Staff House				
1 story	Married	64.08	5	Housing for married teachers (including principal and vice-principal), 4~6 family members
	Single	30.00	3	Housing for single teachers
Total		410.4	8	
Grand Total		1,142.8		

2) Floor area of each room at the 'Eua District High School

Room			Project floor area	Number of rooms	Functions
Administration					
1 F	Principal's		19.44	1	Office for principal and reception of visitors
	Deputy Principal's		14.58	1	Office for vice-principal and reception of visitors
	Office		34.56	1	Office for general school affaires and management
	Staff Office		115.20	1	Office for teacher's school affaires and management
	Store – 1		11.34	1	Documents storage for principal and vice-principal
	Store – 2		28.8	1	Documents storage for teachers
	Machine Room		5.76	1	Water pump for water storage tank
Administration Total			229.68		
General Class Room					
1 F	General Class Room		61.92	4	General subjects, number of students: 35, 1.72m²/student
	Staff		7.2	4	Preparation for classes, school affaires work
2 F	General Class Room		61.92	14	General subjects, number of students: 35, 1.72m²/student
	Staff		7.2	14	Preparation for classes, school affaires work
General Class Room Total			1,244.16		
Special Class Room					
1 F	Science	General Science	69.12	1	General Science experimentation, 1 table for teacher, number of students: 35
		Advance Science	69.12	2	Advanced Science experimentation, 1 table for teacher, number of students: 35
		Staff and Preparation	29.76	2	Storage for test equipment, preparation work
		Material	4.8	2	Storage for test materials
		Annex	51.84	1	Special classes for Level 6, number of students: 25
		Staff	17.28	1	Preparation for special classes, school affaires work
	Home Economics	Laundry and Sewing	69.12	1	Sewing and washing practice, number of students: 35
		Store	11.52	1	Storage of practice equipment
		Kitchen	69.12	1	Cooking practice, 4 cooking tables, number of students: 35
		Material	11.52	1	Storage for kitchen equipment
		Staff	11.52	1	Preparation for practices, school affaires work

Room			Project floor area	Number of rooms	Functions
Special Class Room					
1 F	Craft Room	Wood Craft Room	69.12	1	Woodwork processing machine training, 7 work tables, 2 lathes, number of students: 35
		Tool Store	23.04	1	Storage and maintenance of tools
		Metal Craft Room	69.12	1	Metalwork processing machine training, 7 work tables, 2 lathes, number of students: 35
		Material Store	17.28	1	Storage for materials of woodwork and metalwork training
		Store	17.28	1	Storage of equipment of woodwork and metalwork rooms
		Staff Room	11.52	1	Preparation for training classes, school affaires work
2 F	Business Room	Business Room	69.12	1	Business office work, typing training, 20 typewriters, number of students: 35
		Stff Room	17.28	1	Preparation for training, school affaires work
		Annex	51.84	1	Special classes excluding training, teachers' meeting, training, 2.0~2.6m²/student, for 25 people
Special Class Room Total			864.00		
Library					
1 F	Library		92.16	1	Open-shelf, storage for collected data, for approx 1,200 books
	Work and Store Room		23.04	1	Lending of books and repairing of bookbinding
Library Total			115.20		
Hall					
1 F	Hall (including Stage)		737.28 (92.16)	1	Gymnasium, lecture hall, assembly of local people, number of users: 38
	Changing Room		34.56	1	Wear for physical class, locker for people
			771.84		
共用部分					
1 F	Toilet－1		22.68	1	For teachers
	Toilet－2		21.60	1	For Multi-purpose hall (for students)
	Toilet－3	(boys)	69.12	1	For students, 4 W.C., 6 urinals
	Toilet－3	(girls)	69.12	1	For students, 7 W.C.
	Entrance		34.56	1	Entrance for teachers and students, doormat
1 F 2 F	Open Corridor, Stair		1,942.33		Connecting passage between classrooms and sunshade
Total			2,085.12	1	
Grand Total			5,310.0		

Room		Project floor area	Number of rooms	Functions
Staff House				
1 Story	Married	64.08	10	*Housing for married teachers (including principal and vice-principal) for 4~6 family members*
	Single	30.0	7	*Housing for single teachers*
Total		850.8		
Grand Total		6,452.8		

(4) Project Floor Area

1) School Buildings

① Vava'u High School (Expansion)

- General classrooms (4 classrooms)	276.48 m2
- Special classrooms	103.68 m2
- Common area (Corridor, staircase, toilets, etc.)	169.84 m2
Total expansion area	550.00 m2
Total renovation area	182.40 m2

② 'Eua District High School

- Administration section	229.68 m2
- General classrooms (18 classrooms)	1,244.16 m2
- Special classrooms	864.00 m2
- Library	115.20 m2
- Lecture hall	771.84 m2
- Common area (Corridor, staircase, toilets, etc.)	2,085.12 m2
Total construction	5,310.00 m2

2) Teachers' Housing

① Vava'u High School

- Married teachers	64.0×5 houses	320.00 m2
- Single teachers	30.0×3 houses	90.00 m2
Total		410.00 m2

② 'Eua District High School

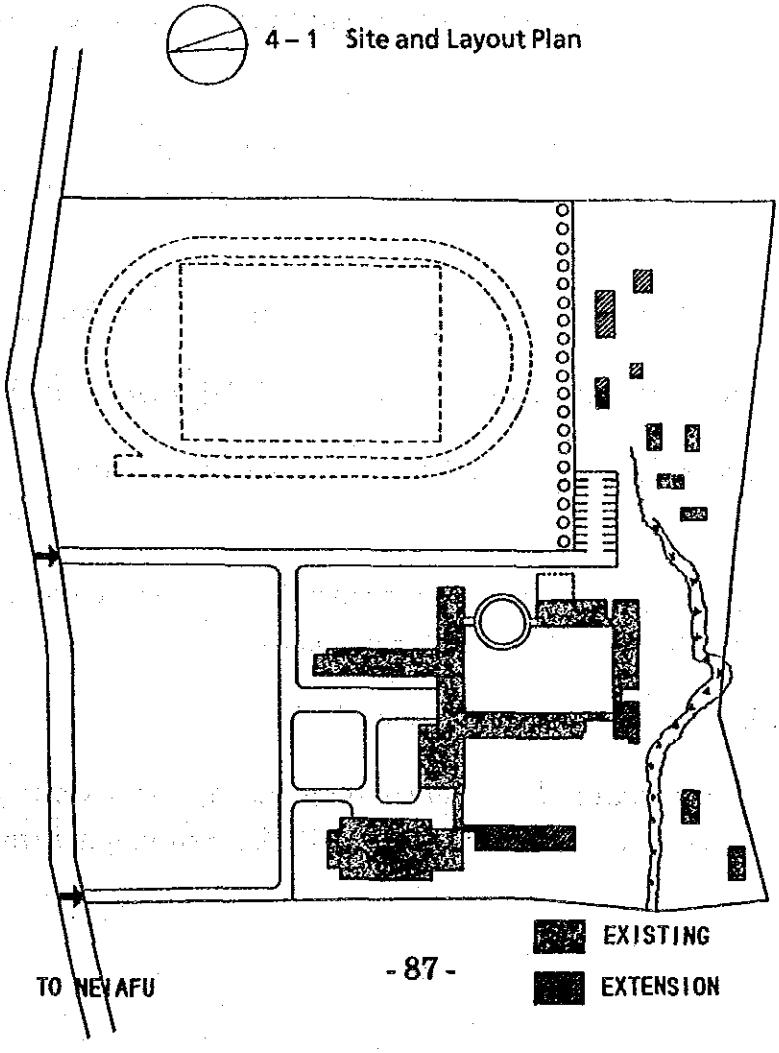
- Married teachers	64.0×10 houses	640.00 m2
- Single teachers	30.0×7 houses	210.00 m2
Total		850.00 m2

4 - 3 School Facilities Layout Plan

4 - 3 - 1 Vava'u High School Site Layout Plan

The site is located in the outskirt of the central area of Neiafu on Vava'u island, 800m east of Neiafu Port. Vava'u High School was built there with grant aid from the Government of Japan in 1985. The site is within the same area as the existing Vava'u High School, together with eight acres of adjoining land to the east. The adjoining land has been set aside as a sports ground and is presently being used as a coconut and potato field. It is sloped slightly toward the south. As electricity, telephone, drinking water and sewage facilities are already installed at the Vava'u High School, it should be convenient to locate the extended school building within the existing area, considering its relationship with the existing building.

As for teachers' housing, it should be located in the south-east portion of the land with consideration to the adjoining of the future sports ground and the existing building. An internal road and parking area will be provided to serve concurrently as a dividing zone between the two areas containing the school building and the sports ground.



As for the sports ground, uneven ground surface will be leveled and goal post for rugby and soccer will be installed.

Further, a main approach road will be provided in connection with the internal road mentioned above, at the west end of the site, for access from the road at the front.

In this way, the school building, teachers' housing area and the future sports ground will be laid out so as to functionally unified as a whole.

4-3-2 Vava'u High School Construction Plan

(1) Plan

Plot Plan

Alternative plot plans have been prepared and compared, bearing the following points in mind.

① Attach importance to the functional relationship between the extended science room and the existing science room.

② Shorten the flow line from the administrative sector as much as possible.

③ Consider distances between buildings and also orientation thereof in order to secure good ventilation and sunlight conditions throughout the year.

④ Consider effective utilization of external spaces, such as court yard.

⑤ Divide general classroom area and special classroom area clearly.

⑥ Make use of the existing toilets, avoiding new construction as much as possible.

⑦ Keep sports ground at an appropriate distance from classrooms, housings, etc. (for noise and privacy reasons).

The following three plot plans are conceivable:

Plan A: To integrate the science room area, the existing business classroom at the 1st level will be reformed into a science

classroom. A single-story building for business study classrooms will be newly constructed. A single-story building for general classrooms will be additionally constructed in the west portion of the site.

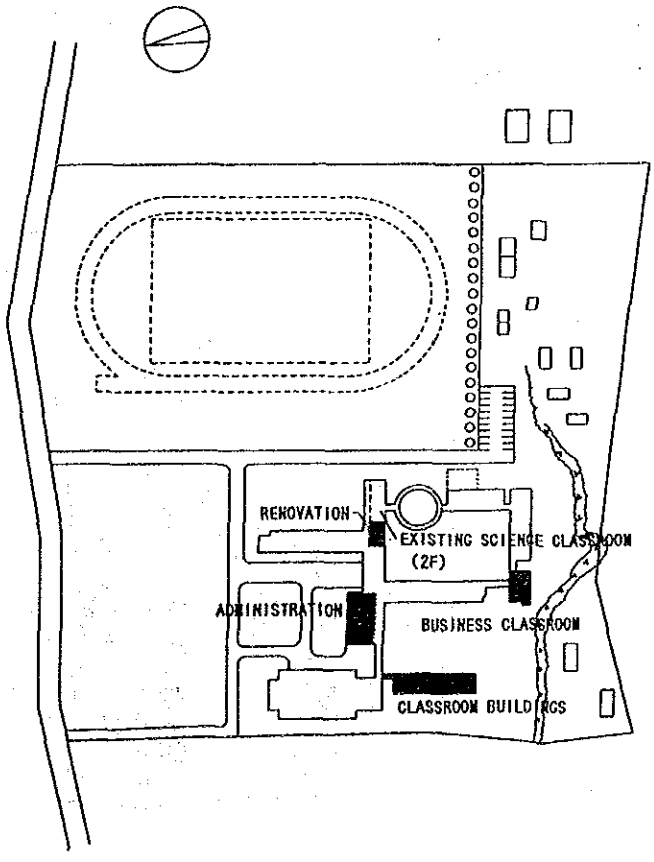
Plan B: A two-story building for science rooms and general classrooms will be additionally constructed beside the existing science room.

Plan C: A two-story building for the science room and general classrooms will be additionally constructed in the south-west portion of the site.

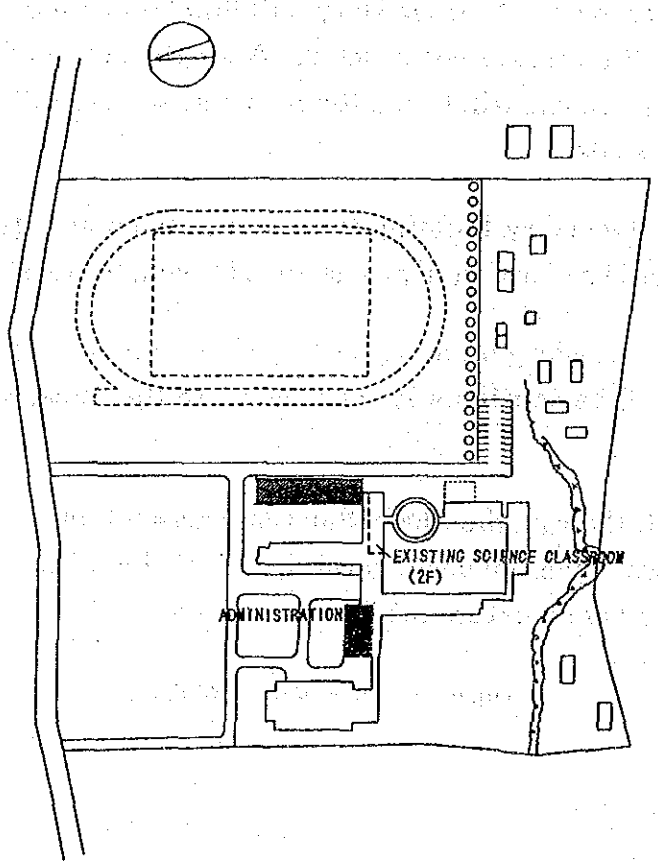
Judging totally from the Block Plan Comparison table 4 - 13, Plan A, which will not pose any problems regarding each of the points borne in mind, has been selected as an optimum plan.

Fig. 4 – 2 Alternative Plot Plans

(Plan A)



(Plan B)


EXISTING SCIENCE CLASSROOM
(2F)
ADMINISTRATION

(Plan C)

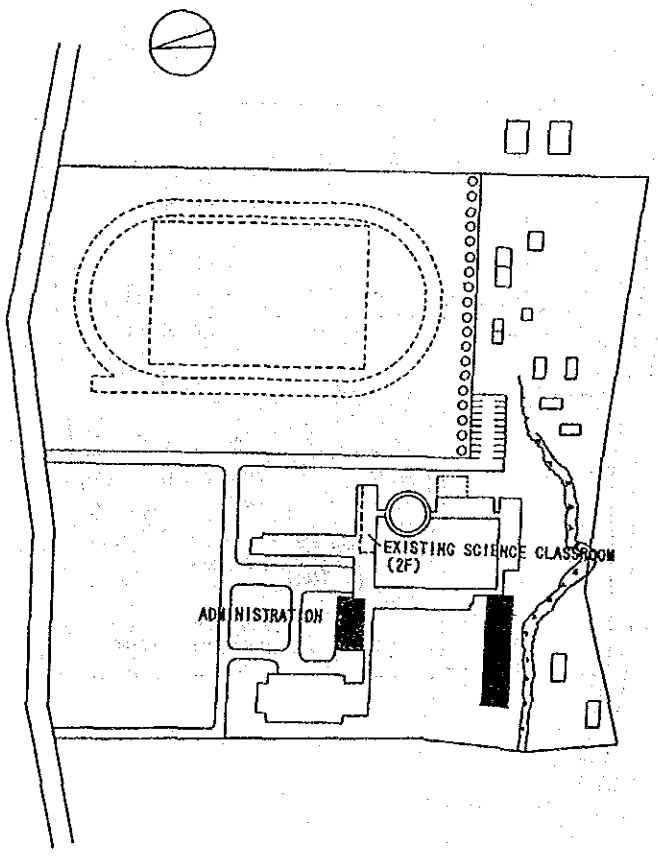
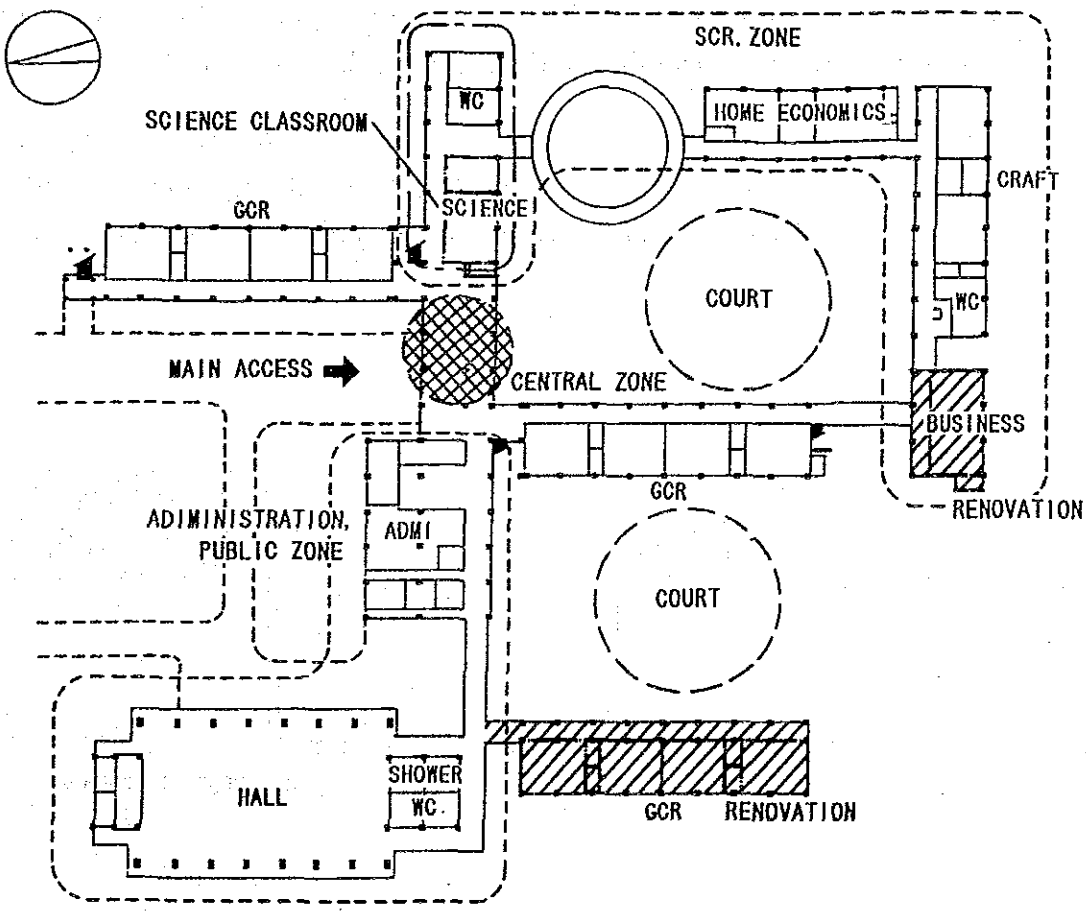

EXISTING SCIENCE CLASSROOM
(2F)
ADMINISTRATION

Table 4－13 Block Plan Comparison Table

Considerations	Plan A	Plan B	Plan C
1. Functional relatioship between expansion and existing facilities	◎	◎	△
2. Shorter movement line	○	◎	○
3. Ventilatio and sunlight	◎	△	○
4. Efective utilization of external space	◎	△	◎
5. Zoning	◎	○	△
6. Effective utilizatio of external space	◎	○	△
7. Relationship regarding sports ground and housing	◎	△	△
Total judgement	◎	○	△

Shown in Fig. 4－3 is the zoning after completion of the expansion and new construction. This was drawn up according to the block plan, based on zoning of the existing facilities.

Fig. 4－3 Zoning Plan



(2) Cross-section Planning

As mentioned in the guideline, in Tonga, it is necessary to draw up a cross-section plan, with consideration to sunlight, ventilation, etc.

Both the business study room building and general classroom building are single-storied with a roof slope of consistent with the existing building.

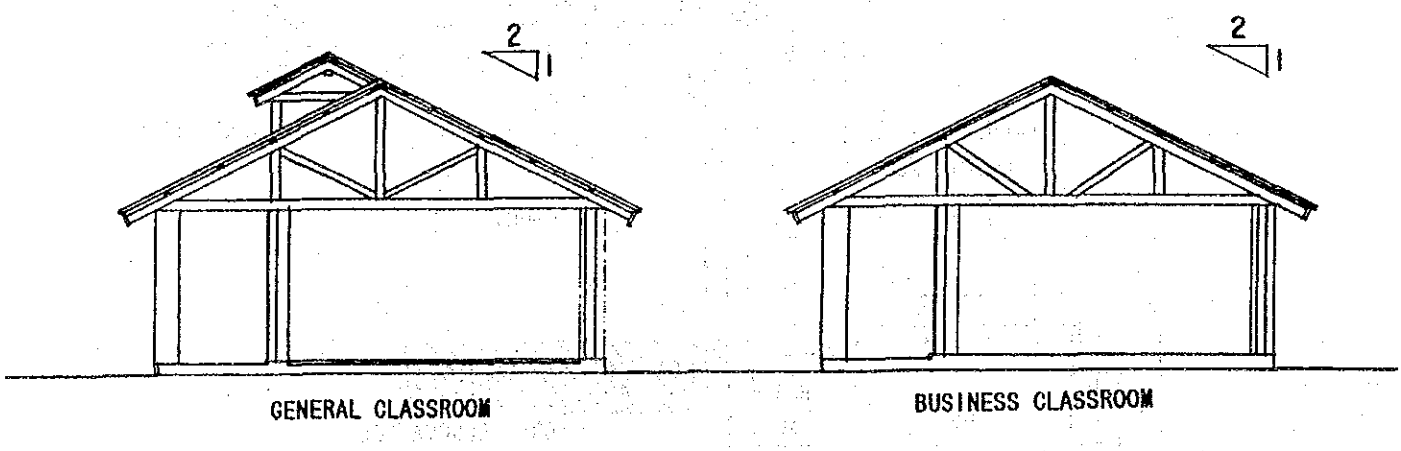
The floor of the 1st level will be 30 cm high from the present ground level with consideration to possible damage due flooding during hurricanes and radiant ground heat.

The roof will be sloped at a five tenth angle, consistent with the existing roof and will be of such construction as will quickly cope with heavy rain, with sufficient eaves to avoid direct sunlight. The roof will be of zinc iron sheet materials. A suspended ceiling will be provided for natural ventilation of the attic and to keep out radiant heat form the roof surface.

Wall surfaces, consisting of concrete blocks (produced locally) and sash, will have as much open space as possible. Fixed glass louver will be provided on the high side light part of the general classroom building in order to promote room ventilation and a balanced intake of sunlight.

From a three-dimensional point of view, the building will be composed of the horizontal lines of long eaves and vertical pillars, consistent with the existing facilities, with consideration to harmony with the peripheral view.

Fig. 4-4



4-3-3 Plot Plan of 'Eua District High School Site

The site is located a distance of 600m east from Ononua Port, which is the central area of 'Eua island, with government buildings and post offices concentrated there. The west area faces the one and only main road which runs from south to north on 'Eua island. This makes the location most convenient from the traffic point of view.

The Ononua Primary School and the teachers' housing are located within the site. The Government of Tonga is planning to integrate this project, sports ground, and regional development training center into an educational facility complex. The area of the site is approximately 80,000m^2, with the land sloped toward the west and north. The water line is branched from the underground pipeline at the road to the west of the site. The sewage facilities will be of a permeation treatment type. Excess rainwater will be drained through permeation tank.

The utilization and plot planning will be prepared based on all the above conditions. For the utilization plan, alternative plans were drawn up and studied with consideration to the following fundamental points.

① To integrate the existing primary school visually, while separating functions.

② To ensure an appropriate access to the school building, teachers' housing and sports ground (future project), with consideration to users from the outside.

③ To plan the layout with consideration to easy future expansion of the school building.

④ To maintain the privacy of the teachers' housing from the school building and external areas.

⑤ To locate the sports ground (future project) so as not to disturb the favorable school environment.

⑥ To secure space for outdoor activities, such as sports, outdoor training.

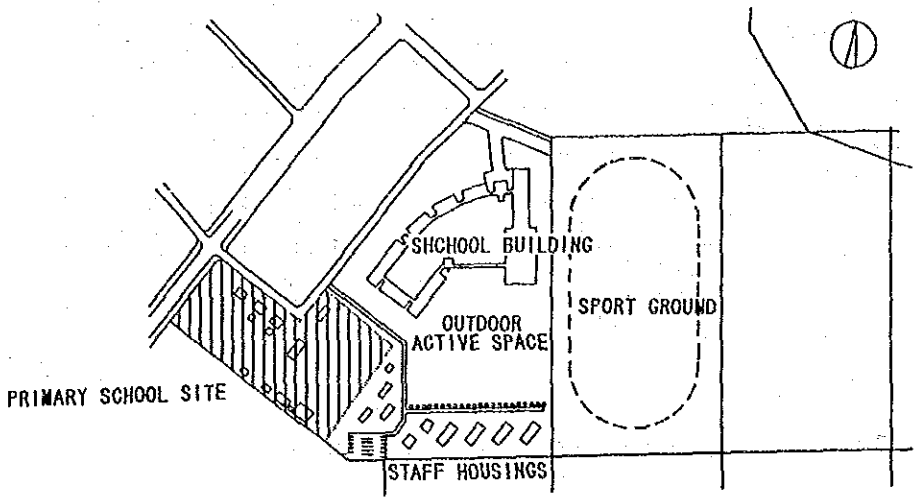
The following three alternative plot plans are conceivable:

i. Center of the northern side
ii. North-east
iii. Center of the southern side.

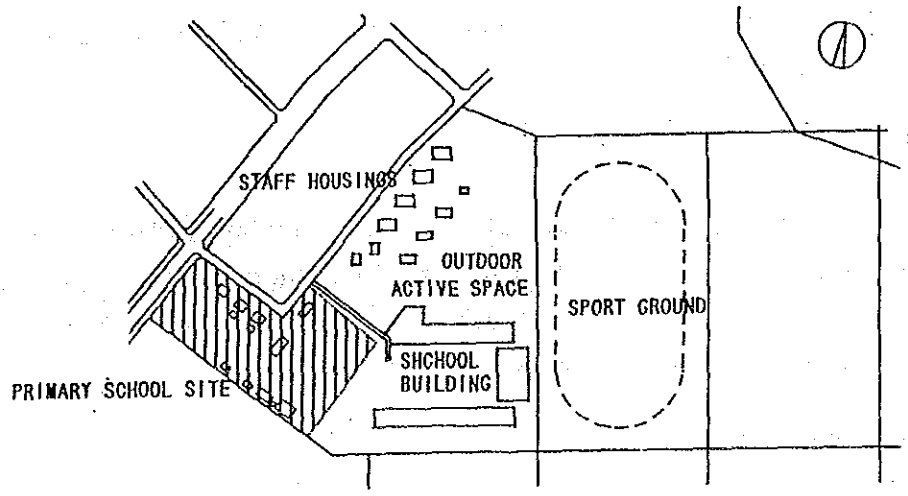
judging totally from the plot plan comparison table in Table 4 - 14, Plan A is selected as an optimum plan with due consideration to the points mentioned above.

Fig. 4 -- 5 Alternative Plot Plans

(Plan A)



(Plan B)



(Plan C)

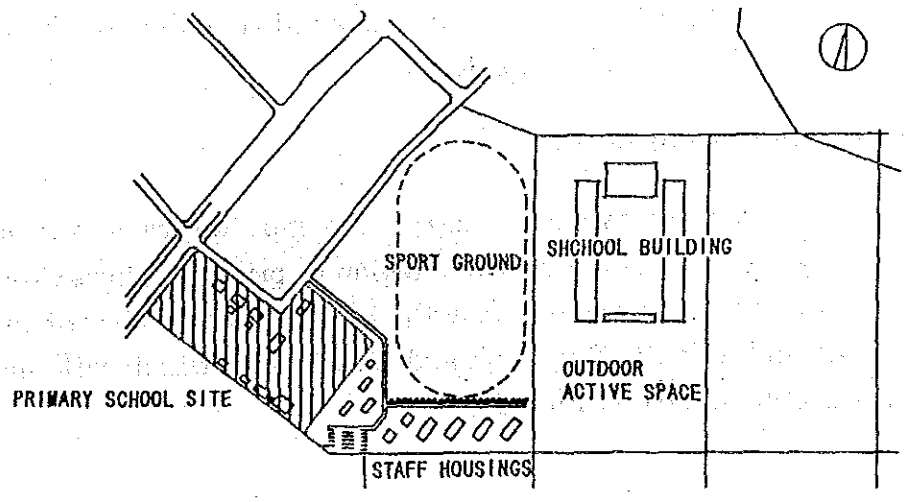


Table 4 – 14 Plot Plan Comparison Table

Considerations	Plan A	Plan B	Plan C
1. Relatioship with the existing primary school	◎	◎	◎
2. Access	◎	○	△
3. Easy future expansion	○	◎	△
4. Privacy of teachers' housing	◎	◎	○
5. Relationship with sports ground	◎	△	○
6. Adequate space for outdoor activities	○	○	○
Total judgement	◎	○	△

4 - 3 - 4 'Eua District High School Construction Plan

(1) Plan

The block plan was prepared with consideration to the following four points based on the plot plan.

1) Clear zoning

As the existing primary school, teachers' housing and sports ground (future project) are all to be integrated on the same land, the zoning must be clearly done on the block plan, respecting the nature of each facility and so as not to disturb the other facilities.

2) Good ventilation

To determine the longitudinal direction of the building, considering the south-east trade winds throughout the year. Moreover, the effectiveness of ventilation by maintaining sufficient distance between adjacent buildings must be considered.

3) Consideration of outside users

The facilities such as hall, administration sector, library, and so on, to be used by the general public of the region or primary school children on the island will be located near the approach and adjacent to the sports ground so as to form regional users' zone which will not to disturb people in the learning area.

4) Effective utilization of external space

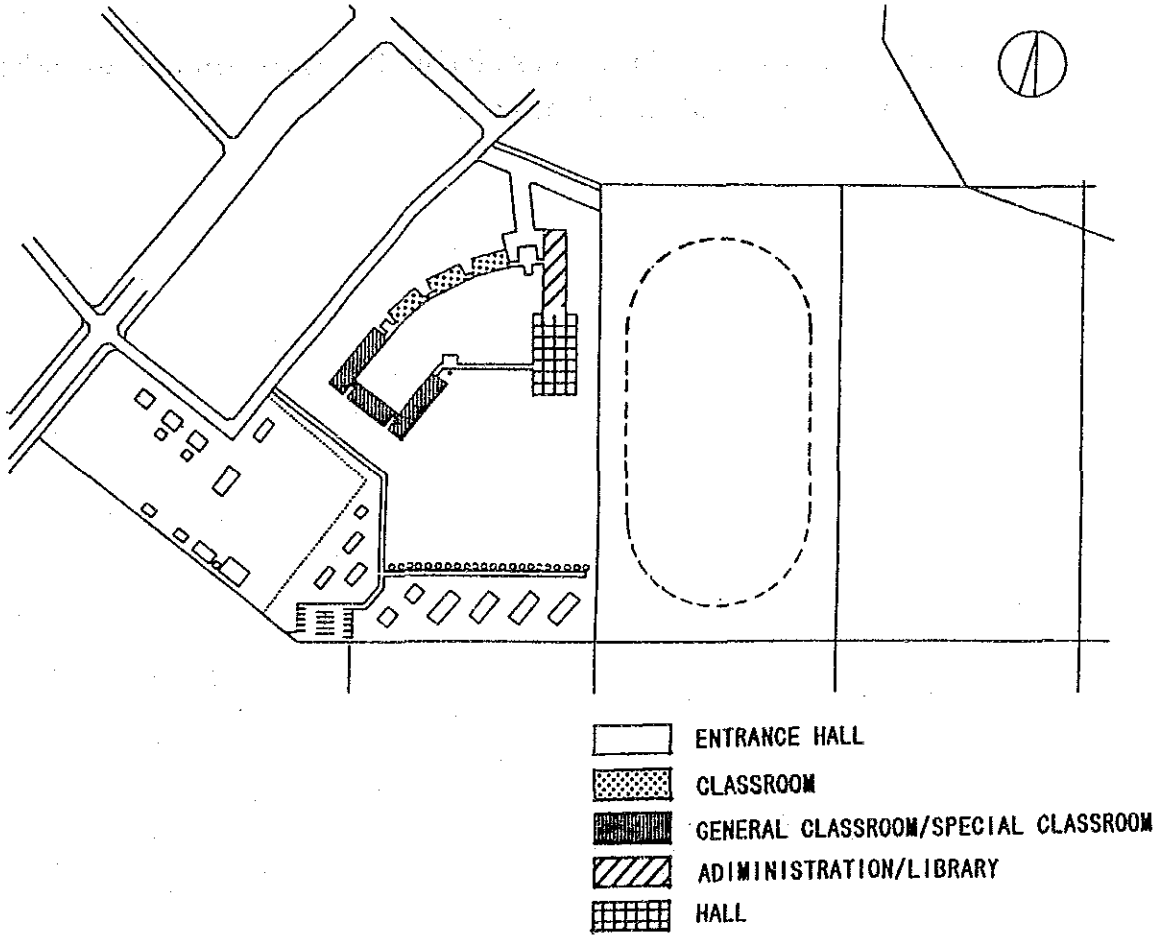
To lay out external space according to hierarchy: static and dynamic spaces, namely, respectively courtyard for relaxation and study, and the other external area for outdoor activities such as home economics, craft and agricultural studies and sports

5) Layout of two-story building

In this case of the layout in single-story buildings, the facilities will be widely spread, controlling them will become more difficult, and outdoor activity space will not be sufficiently reserved. Therefore, from the plane point of view, greater compactness of the whole facilities area is demanded. Therefore, it appears appropriate to construct two-story building as the Vava'u High School.

With consideration to the above five points, the buildings were plotted as follows:

Fig. 4 – 6 Block Plan



The school buildings are plotted in two blocks: a block consisting of an entrance hall located at the center, administration sector and hall, and an arched block consisting of general classrooms and special classrooms.

These blocks and connection corridor, which connects the blocks, surround a courtyard. The administration sector and hall provide easy access for visitors, by plotting the principal office, teachers' office and general office beside the entrance on the first floor. The library and business study rooms are located on the second level. The hall is plotted with consideration to clear zoning for utilization by the general public of the area and is located close to the sports ground (future project).

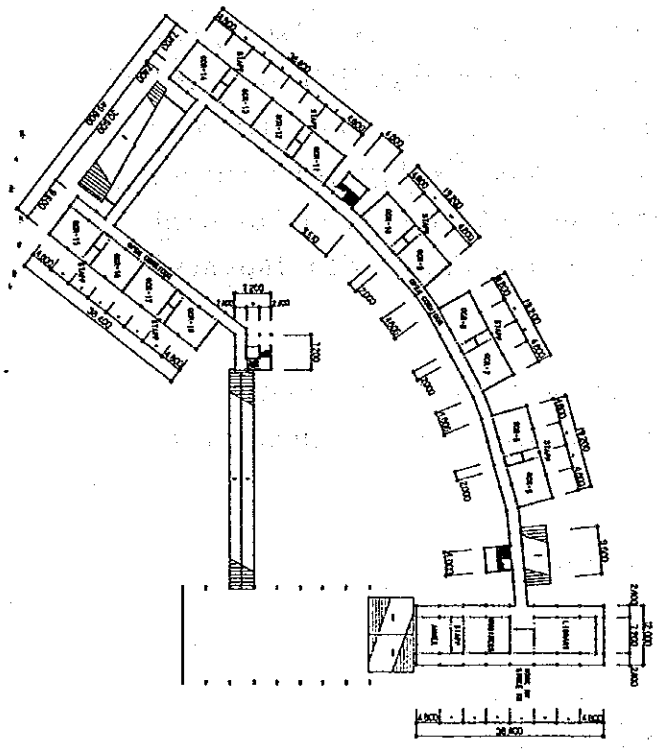
The general classroom and special classroom buildings. The general classrooms are in principle, located on the 2nd level, which is advantageous regarding ventilation and sunlight. The special classrooms are located on the first floor, in such a way that they enclose the courtyard and form an area. As for the home economic study rooms, it is desirable to provide thereon the first floor, considering their relationship with outdoor cooking (UMU). The same applies to the craft rooms considering the handling of heavy craft machines.

As to the general line of flow, all are facing the courtyard and the school buildings are in constant visual harmony.

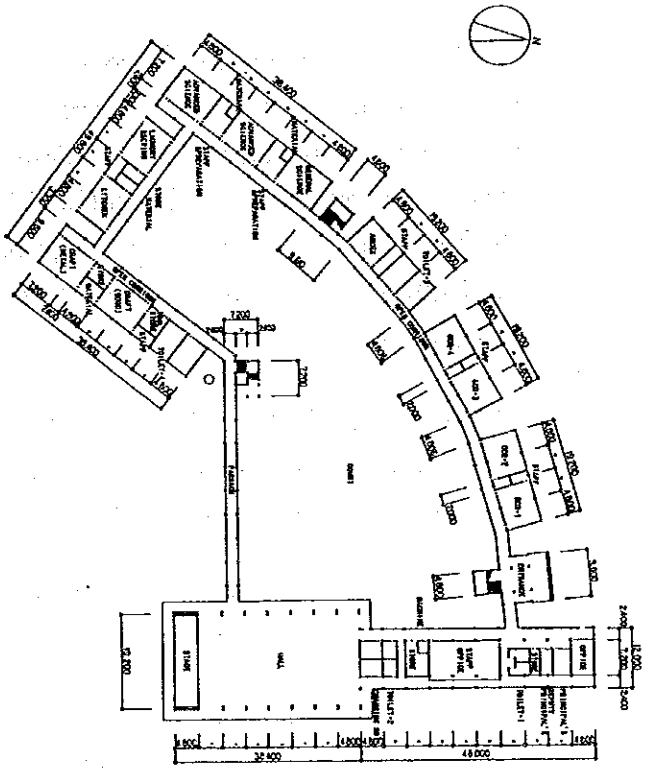
(2) Plan of Each Section

On the first level, the general classrooms are located on the right hand sides, facing the entrance, and the special classrooms, in the inner part. Administration offices and hall are located on the left handside. On the second level, only normal classrooms are located in the wing of the building and library and business study rooms are in the right wing, to provide a clear layout.

As for the lecture hall, the normal facility for high schools is an open hall with a basket court, which Vava'u also follows. In this project, it will be sized for accommodating a basket court, three (3) badminton courts and also provided with a stage.



1st Floor Plan



Ground Floor Plan

(3) Cross-section Planning

As with the expansion of the Vava'u High School, the cross-section plan was prepared, with consideration to the maximum utilization of sunlight, ventilation, etc.

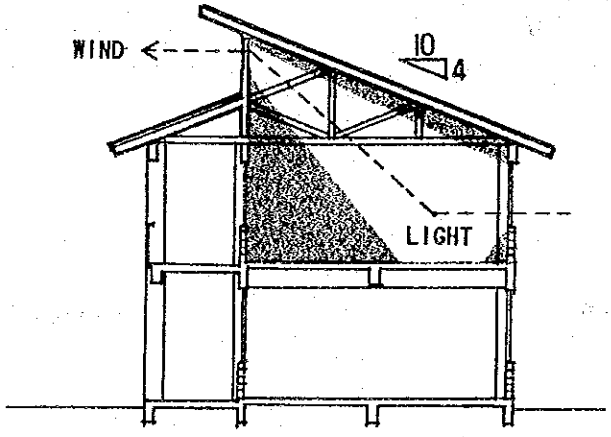
All buildings are two-stories, with a sloped roof. The height of the floor of the 1st level will be 30 cm from the present ground level as with the Vava'u High School.

The roof will be sloped at a four-tenth angle, of such construction as will quickly cope with heavy rain, and with sufficient eaves to avoid direct sunlight. The material for the roof will be zinc iron plate. A suspended ceiling will be provided for natural ventilation of the attic and to keep out radiant heat from the roof surface.

Wall surfaces, consisting of concrete blocks (produced locally) and sash, will have as much open space as possible. Many glass louvers will be provided in order to promote room ventilation and sunlight intake. Normal classrooms on the second level will b provided with fixed grass louvers on the high side light part so as to promote room ventilation and a balanced sunlight intake. The ceiling is 3m high, in accordance with Japanese Standards.

From a three-dimensional point of view, the three-dimensional formation consists of horizontal lines of long eaves and rhythmical arrangement of pillars, in the harmony with the peripheral view.

Figure 4 – 8 Cross-Section Planning



4 - 3 - 5 Construction Plan for Teachers' Housing

The following two (2) types of houses will be provided for married teachers and single.

- For married: m^2 area provided with a living room, two bedrooms, a kitchen, bathroom, toilet
- For single: 30 m^2 area provided with a bedroom, kitchen, bathroom and toilet.

The cross-section plan will be drawn up, with consideration to disasters such as earthquake, typhoon, and sunlight, ventilation, etc. The floor of the 1st level will be 60 cm high from the present ground level and the roof will be designed with sufficient eaves, sloping at a five tenth angle. The materials of roof and external wall, opening and attic will be designed consistently with those of school buildings.

4 - 3 - 6 Structure Plan

(1) Basic Policy

The structure will not be prone to harmful cracking, bending of beams or floor vibration, or lose durability due to earthquakes, strong winds, etc., during use. The construction will be sufficiently economical, with consideration also given to local construction work and maintenance control.

(2) Standard for Structural Design

In principle, structural design will conform to New Zealand standards.

(3) Methods and Materials

The most popular method is the use of wooden construction, reinforced concrete block construction, and partly reinforced concrete construction. As timber, cement, re-bars, etc., which constitute the main structural materials, are imported and their performances are not consistent, they will be carefully selected. The details are as follows:

- Concrete: - Cement — Those made in New Zealand are better from the performance point of view.

- Aggregates These will be procured locally on condition that their salt content will be washed off.

- Re-bar: The structural design being done in accordance with New Zealand standards, New Zealand products will be used.

- Timber: Those imported from New Zealand will be used on condition that preservative treatment and protection against insects have been carried out.

- Concrete Block:
  These will be produced at the site. Concrete will be of a high grade, consistent with general structural levels.

Judging totally fro the characteristics of each material and feasibility of local construction, reinforced concrete block or reinforced concrete construction with a roof of timber truss beam type will be employed. This is most effective for reducing building costs, including minimization of building quantity, protection against insects, preservative measure, maintenance control, etc.

(4) Earthquake and Basic Structure

The sites of this project are located in two places: Vava'u and 'Eua. Firstly, as the work at Vava'u, is an expansion project, the purpose, span and number of stories are the same as those of the existing building (opened in 1985 with grant aid from Japan). Accordingly, the basic structure will be continuous footing with comprise a continuous footing, with the supporting layer at around GL-85 cm and a soil bearing capacity of 6.0t/m^2 (long-term).

Secondary, for 'Eua, we have requested a soil study at the project site. This is still under study. For the time being, therefore, the supporting ground of the building is assumed based on the data "SOILS OF 'EUA ISLAND, KINGDOM OF TONGA" obtained locally. The project site is located at OHONUA, in the western part of 'Eua Island, at 50 m above sea level and 800 m from the coast. Geographically, 0.5~2.0m volcanic deposits are spread on upheaval coral. The soil 30~60 cm from the surface is weathered and fragile but the layer beneath it consists of slightly compacted clay (dark brown or red brown). Consequently, the projected building being low-rise with light roofing, the supporting layer will be set at a point deeper

than this (G.L. −80~100cm) and the soil bearing capacity be set at 6.0 t/m2. Further, the slab of the first level will be the popular earthen floor slab. For 'Eua, a flat board loading test will be carried out, as necessary, at the bottom of both the base and earthen slab to check the soil bearing capacity.

(5) Design Load

(a) Fixed Load (G)

Loads of the structure, finishing materials and equipment have been calculated individually. Unit weights of the main structural materials will be as follows:

- Concrete 2.3 ton/m2
- Reinforced concrete 2.4 ton/m2
- Mortar 2.0 ton/m2
- Concrete block (19cm×19cm×39cm) 2.3 ton/m2
- Timber (Oregon Pine) 0.42 (specific gravity)

(b) Loading Capacity (P)

The roof is not for walking on, and is loaded only at the time of construction and inspection.

	Slab/bidner	pillar/beam/foundation	Earthquake
Roof	60	60	40
Classroom	230	210	110
Office	300	180	80

(kg/m2)

(c) Wind Load (W)

Tonga is hit by hurricanes several times during the rainy season, the same as Japan. According to data entitled "THE CLIMATE AND WEATHER OF TONGA" obtained locally, 976.4 mbar minimum atmospheric pressure, 41.2/s maximum instant wind velocity were recorded in Fua'motu Airport on March 3, 1982. Based on this, the following wind load, which is the same as in Japan, will be adopted.

$p = C \cdot q$ C: Wind Force coefficient $q = 60\sqrt{h}$

q = Speed pressure (kg/m2) h: Height

(d) Earthquake Load (K)

Tonga is subject to earthquakes, the same as Japan. According to a science chronological table, it has been hit by earthquakes of magnitude 5.8 or more, three times in 1989. With an earthquake load similar to that in Japan being applied, the same as for wind load calculation, a construction of sufficient earthquake-resistivity will be designed.

$Q_1 = C_1 \times W1$

Q_1 : Earthquake layer shearing strength (t)
C_1 : Earthquake layer shearing strength coefficient of i level
W_1 : Building load of i level and higher

$C_1 = Z \times R_1 \times A_1 \times Co$

Z : Regional coefficient = 1.0
R_t : Vibration characteristic coefficient = 1.0
A_1 : Earthquake layer shearing strength spread coefficient
C_o : Standard shearing strength coefficient = 0.2

(e) Combination of loads

Design load – long – term (permanent)

(G)+(P)

Design load-short-term (At the time of strong wind or earthquake)

Larger of: (G)+(P)+(W)
(G)+(P)+(K)

(6) Admissible Stress of Main Structure Materials (kg/m2)

Material	Standard	Permissible Long-term Stress			Permission Short-term Stress		
		Compaction	Traction Strength	Shearing Strength	Compaction	Traction Strength	Shearing Strength
Concrete	Fc180	60	–	6	120	–	9
Re-bar	SD30	2,000	2,000	2,000	3,000	3,000	3,000

Salt contained in concrete aggregates will be washed off so that the total salt content will be 0.3 kg/m3 or less in order prevent the rusting of re-bars.

4 - 3 - 7 Facilities Plan

(1) Electrical Facilities Plan

A) Power Receiving and Distributing Facilities

The incoming pole will be installed near the battery limit of the site and the power will be received here above ground and distributed by underground cable.

- Receiving: Three-phase, 4-wire, 415/240V, 50Hz
- Power required for this project: 150KVA

B) Power Facilities

These will serve to supply power to equipment of the water supply facilities for providing drinking water and water for domestic use (including equipment for craft room) and their control systems.

C) Lighting Facilities

(a) General classroom, science room, etc.
Fluorescent lighting will be mainly used. The lighting appliances will mainly be directly attached to the ceiling.

(b) Hall
Mercury lamps will be used. The lighting appliances will be provided with elevating device for high ceilings.

(c) Illumination standard

• General Classroom	250~350LX
• Office	300~400LX
• Preparation Room	250~350LX
• Hall	150~250LX
• Corridor	30 ~ 50LX

(d) Outlets
Normal outlets will be provided at the necessary locations for supplying power to small electrical appliances.

(e) Broadcasting
Broadcasting facilities for general communication inside the

school and for chiming the start and end of classes will be provided. An amplifier will be provided in the office so as to communicate with each room. In the hall, broadcasting facilities for music diffusion and lecture will be provided.

(f) Inter-phone
Inter-phones of the reciprocating type will be provided in the offices, teachers' rooms and main rooms in order to enable communication from each location.

(g) Clocks
A solar clock will be provided at the upper part of the overhead water tank stand to communicate the time to students and teachers.

(h) Lighting rod
A lighting rod will be provided on the overhead water tank so as to prevent accidents due to lightning.

(2) Plumbing and Sanitary Facilities Plan

(a) Water Supply System
Both a city water system for supplying drinking water and water for scientific experiments, and a rainwater system for toilet flushing will be provided. City water will be received from the city water distribution main at the battery limit of the site and supplied to the kitchen, scientific laboratory and drinking water tank.

The rainwater collected for the rainwater system through drainspout on the large roof of the hall, will be stored in the double slab beneath the staff room. It will be pumped up to the high water tank and supplied to the required locations by gravity. In the drinking water tank, rainwater is also pooled to save water. For the piping, hard vinyl chloride pipes or polyethylene pipes will be used.

(b) Drainage System
This will employ a branch method for separating sewage and general drainage inside the buildings. The two will come together in a drainage pit located outside and will be treated in purification tanks installed at necessary positions. The treated water will be filtered through porous pipes into the ground. Drainage from the kitchen will

be drained through a grease trap. For the piping, hard vinyl chloride pipes will be used.

(c) Sanitary Equipment
For sanitary equipment, products locally sold will be used, in principle, considering the availability of parts for repairs.

(d) Fire Extinguishers
Small-size powder extinguishers (in box) will be provided wherever necessary.

4 - 3 - 8 Equipment Plan

(1) Policy for Planning

- Equipment

1) Of the requested equipment, the selection of equipment will be made first from the group of priority A.

Priority A: Indispensable

Priority B: Generally required

Priority C: Convenient if available

2) Those items equipment overlapping different subjects will be unified.

3) Of the requested equipment, those with doubtful performance have been omitted.

4) Number of equipment to be provided will be determined by reducing the number of existing equipment both in 'Eua and Vava'u High Schools from the basic selected equipment list.

(2) Details is of Planning

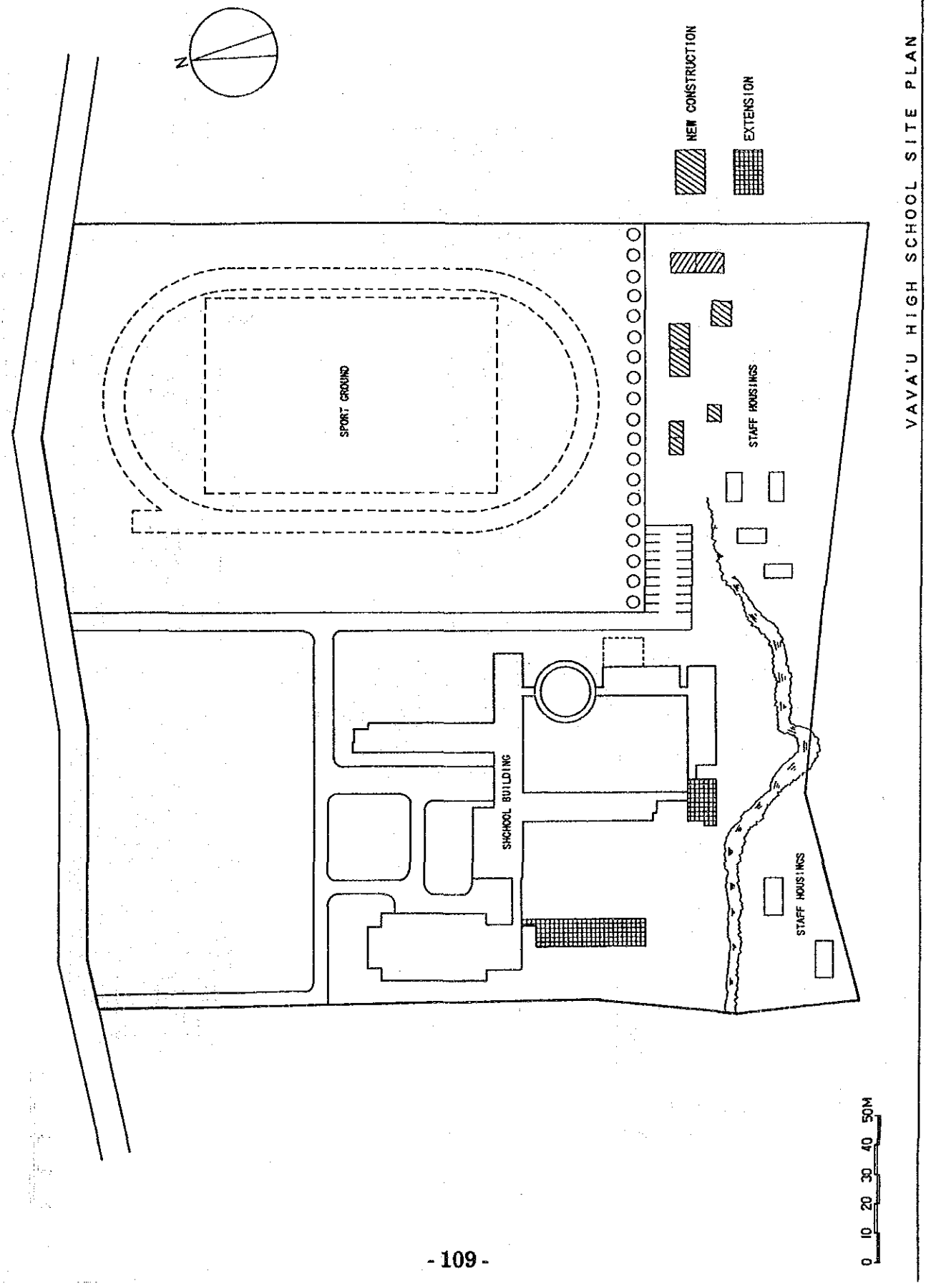
- Equipment

The equipment for the following categories will be provided in this project:

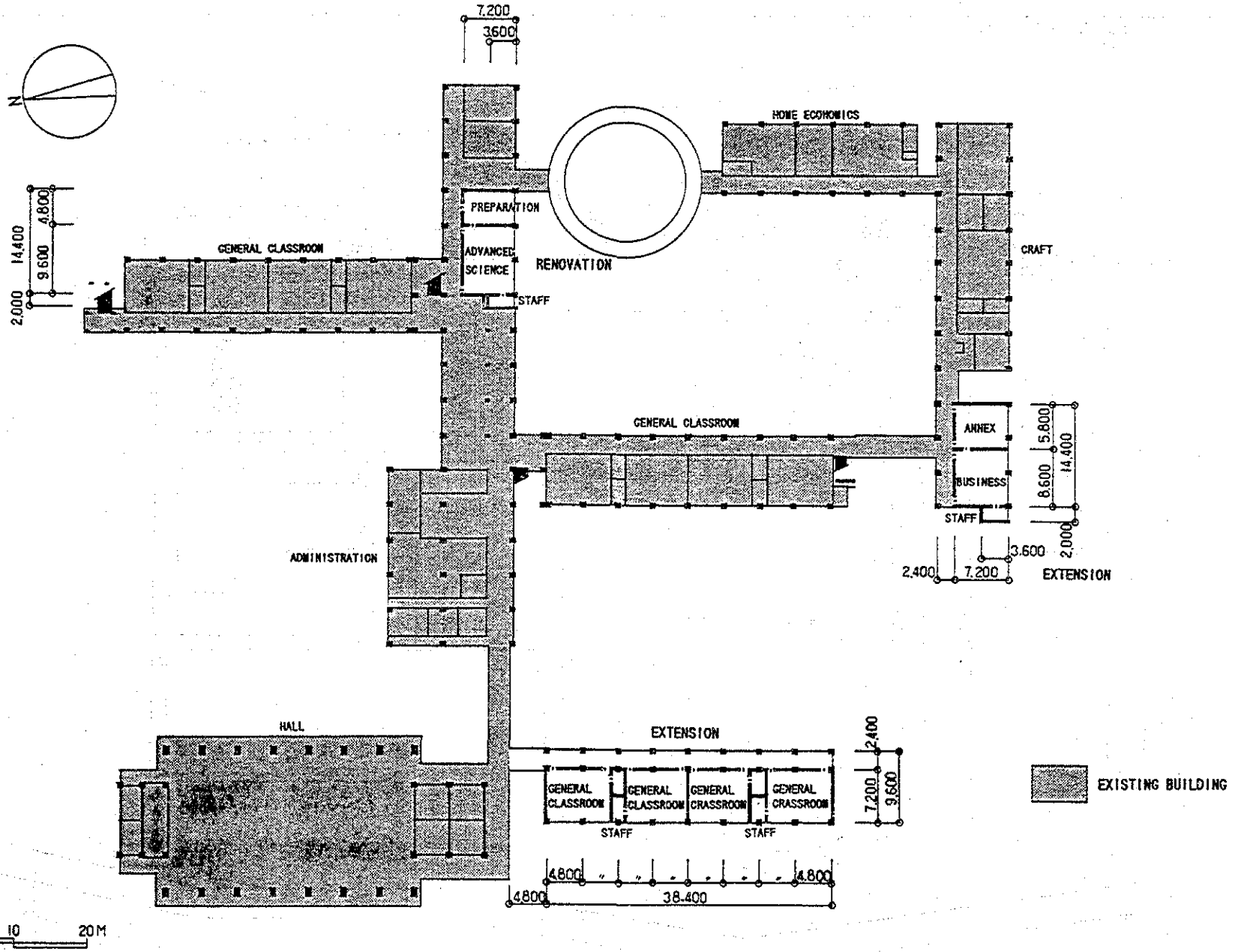
1) Office Equipment

2) Education supporting equipment
3) Testing equipment for science
4) Training equipment for home economics studies
5) Training equipment for craft studies
6) Training equipment for business studies
7) Training equipment for physical education
8) Training equipment for music studies
9) Training equipment for health/hygiene studies

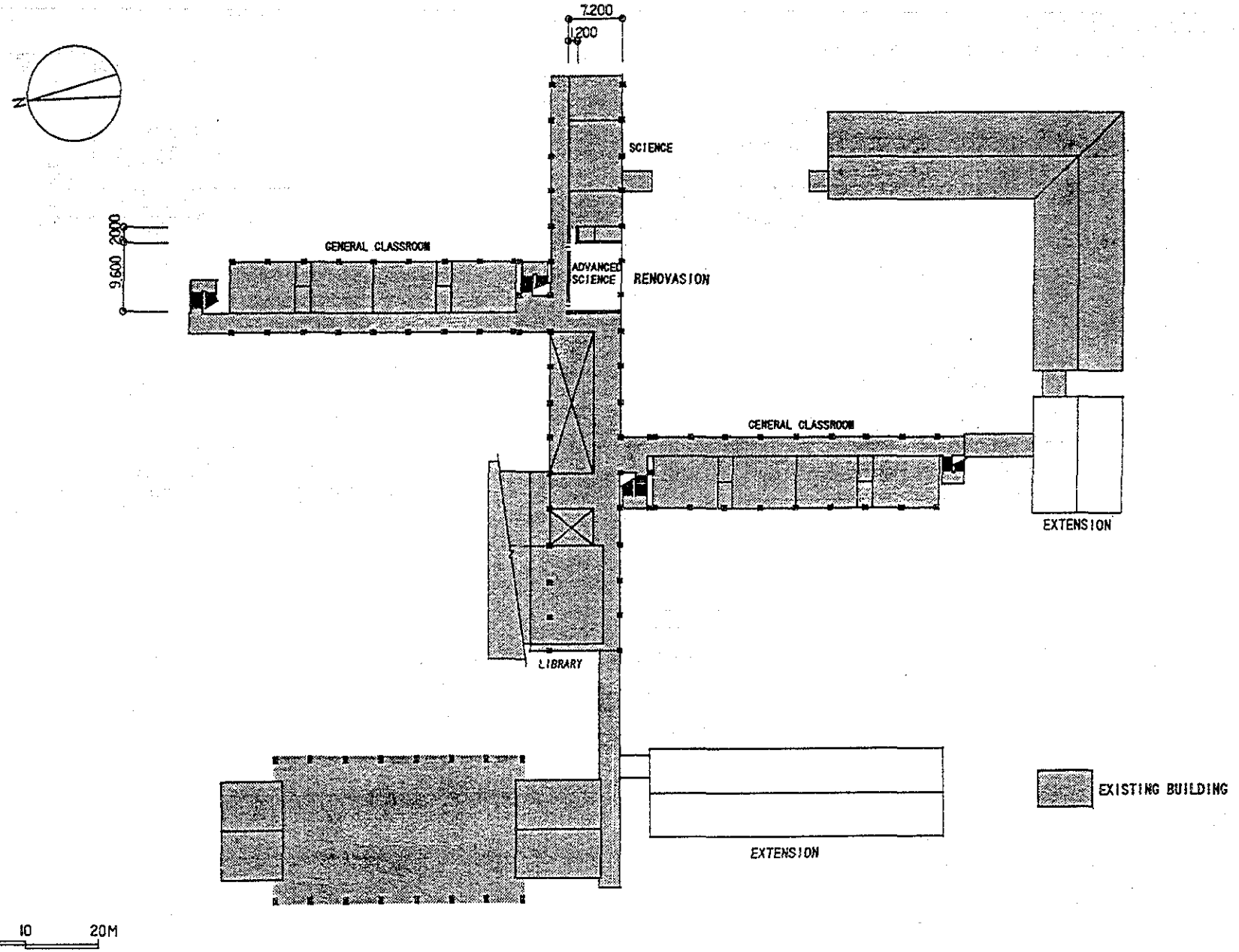
4 - 3 - 9 Basic Design Drawings



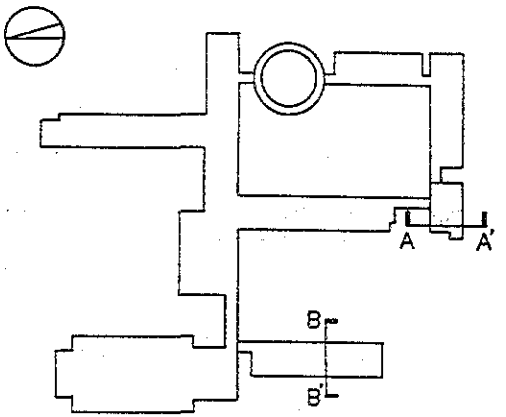
VAVA'U HIGH SCHOOL SITE PLAN



VAVA'U HIGH SCHOOL GROUND FLOOR PLAN



VAVA'U HIGH SCHOOL 1ST FLOOR PLAN



NORTH ELEVATION

WEST ELEVATION

SOUTH ELEVATION

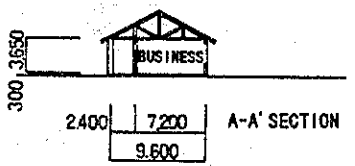
BUSINESS

EAST ELEVATION

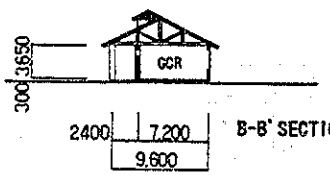
SOUTH ELEVATION

WEST ELEVATION

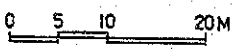
GENERAL CLASSROOM



A-A' SECTION

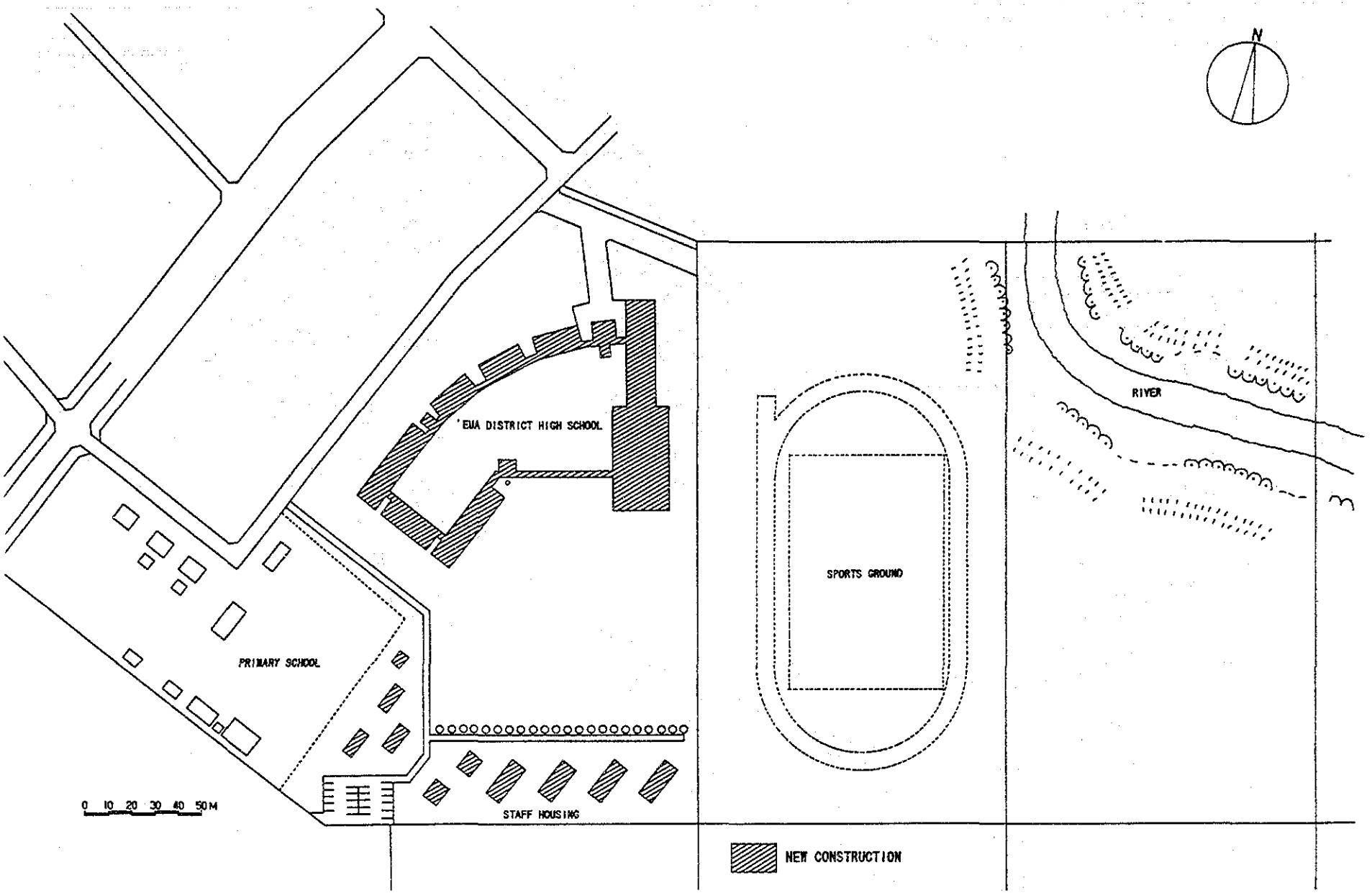


B-B' SECTION

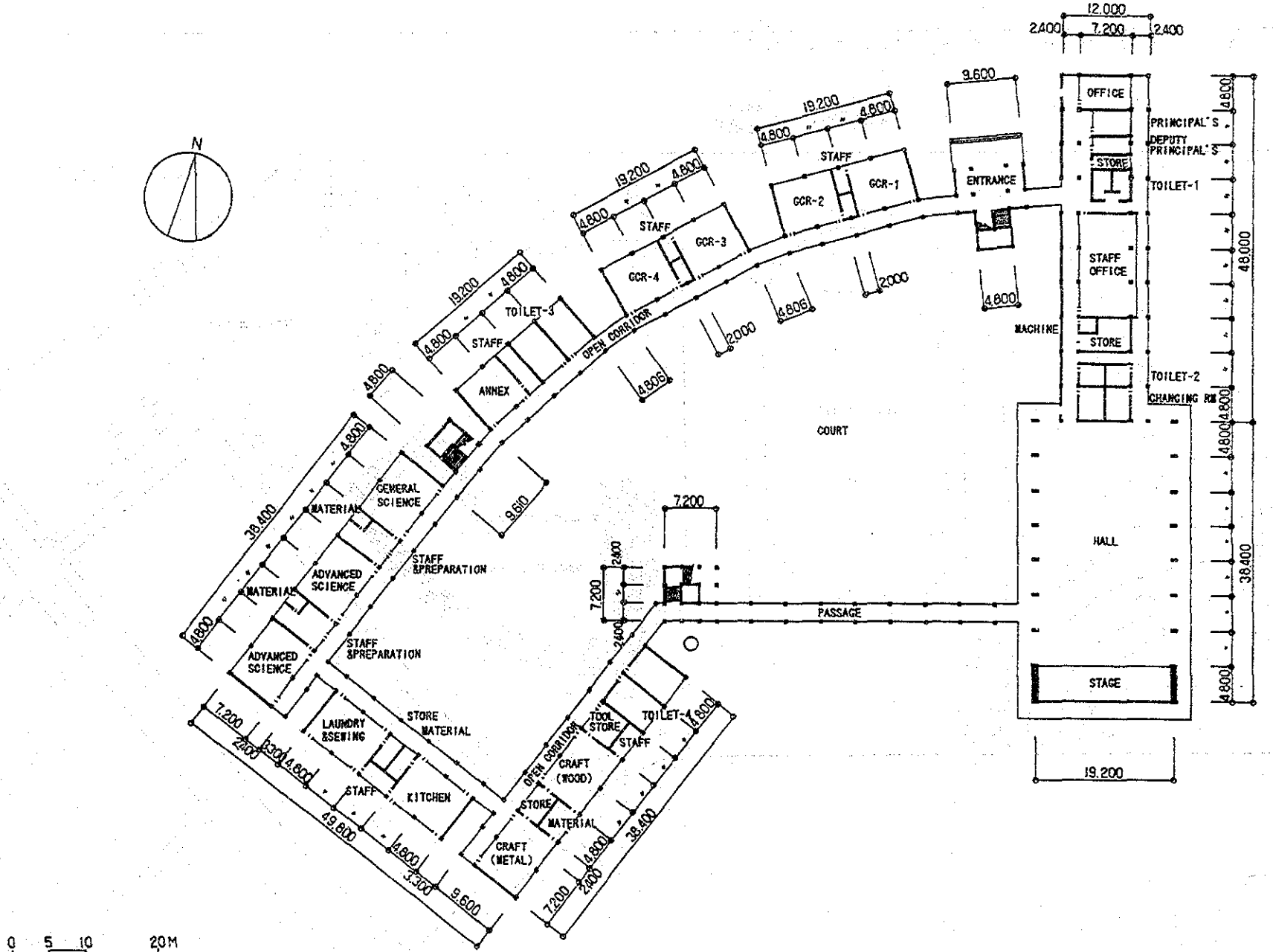


VAVA'U HIGH SCHOOL EXTENTION

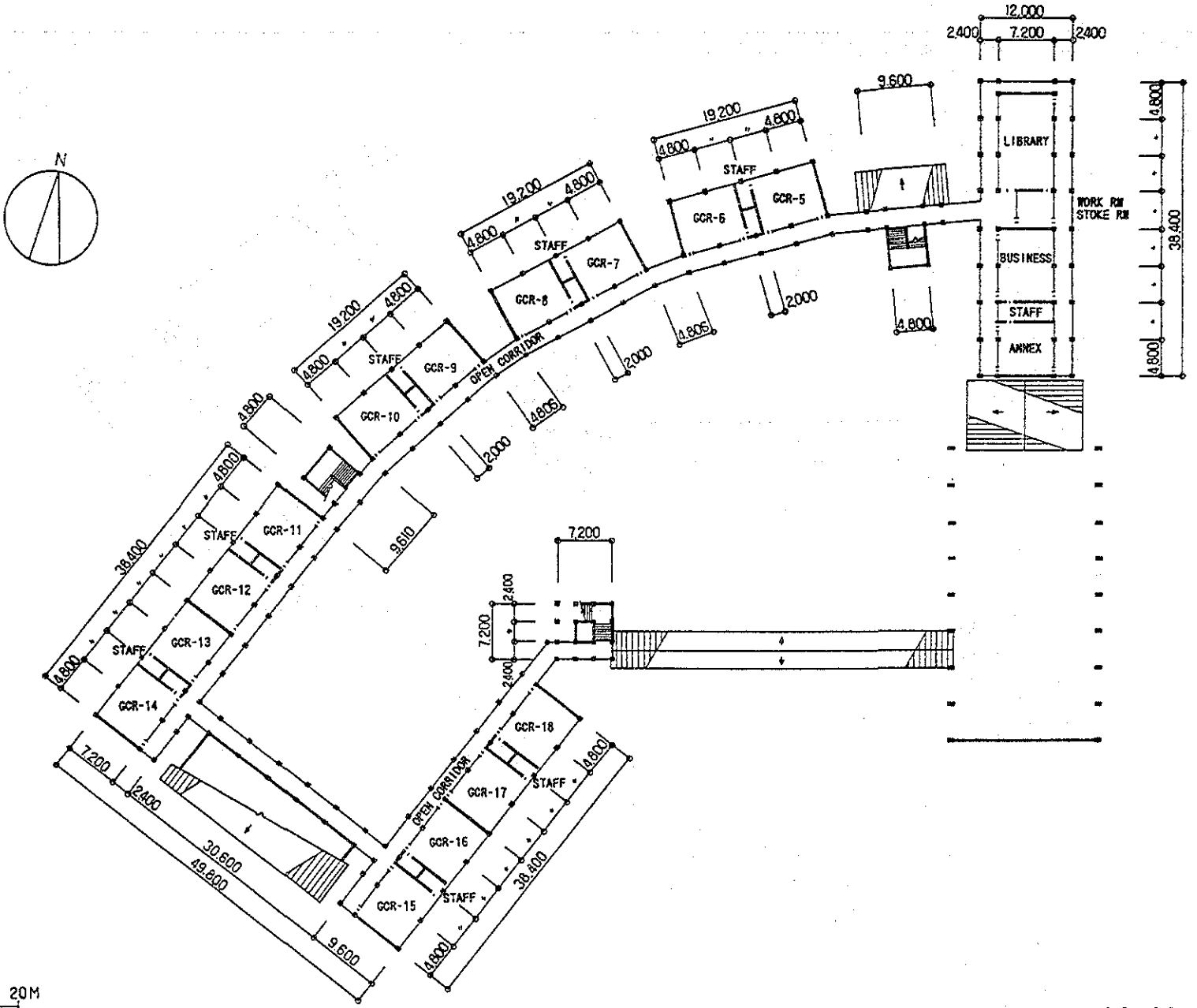
ELEVATION&SECTION



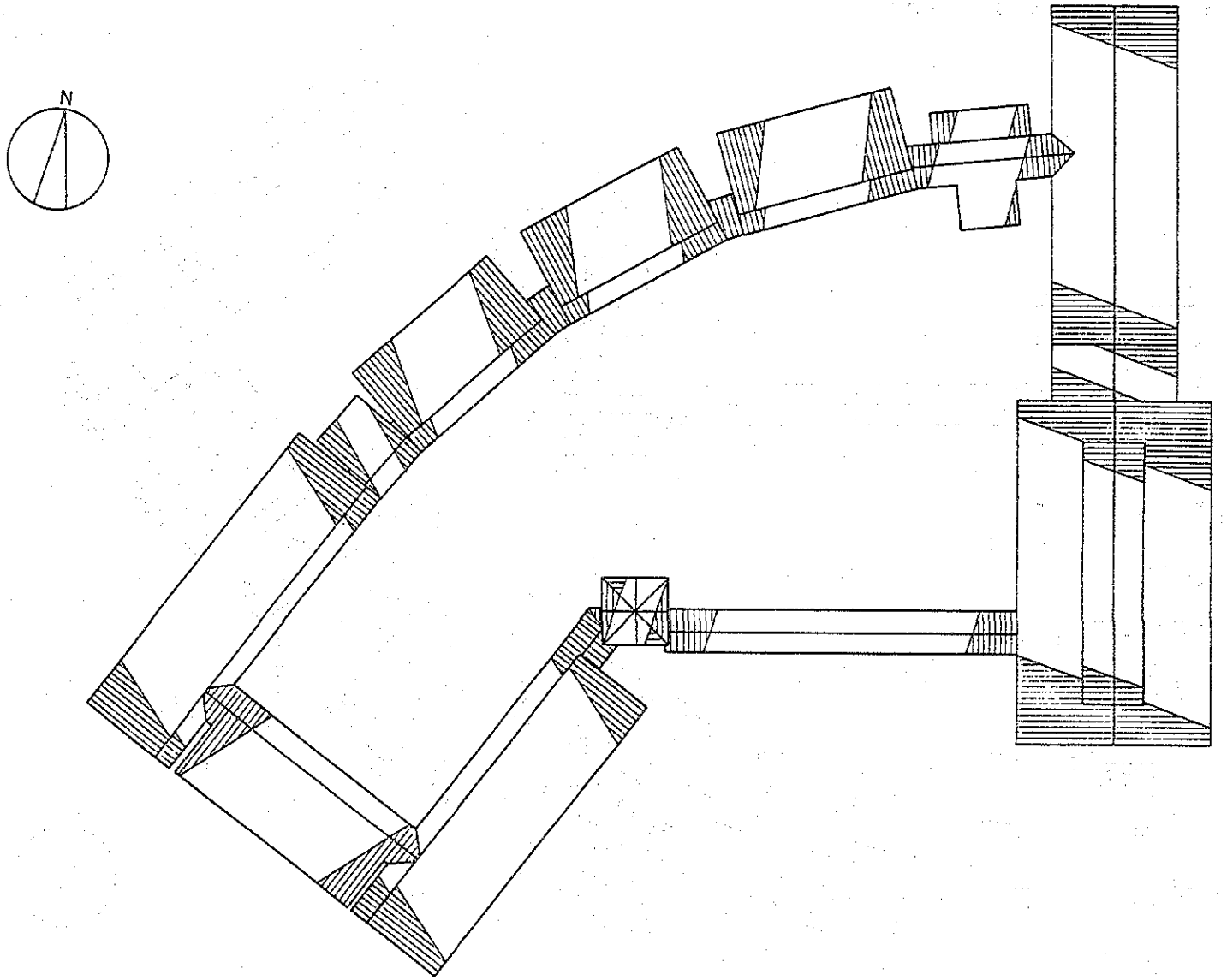
'EUA DISTRICT HIGH SCHOOL SITE PLAN



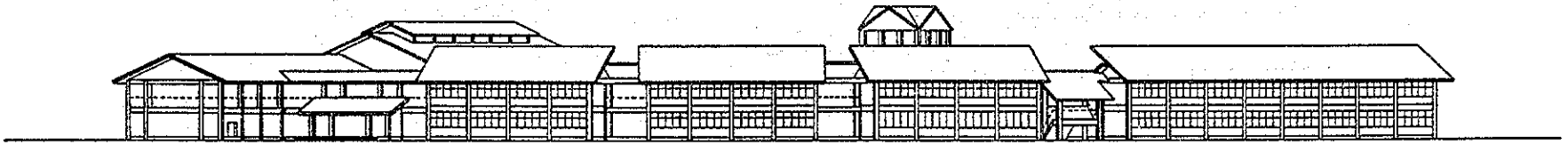
'EUA DISTRICT HIGH SCHOOL
GROUND FLOOR PLAN



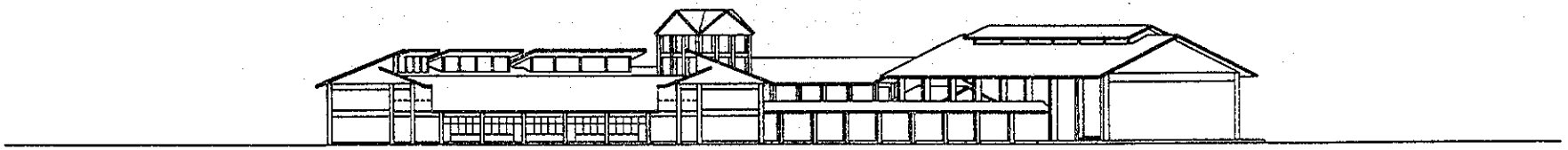
'EUA DISTRICT HIGH SCHOOL
1ST FLOOR PLAN



'EUA DISTRICT HIGH SCHOOL ROOF PLAN



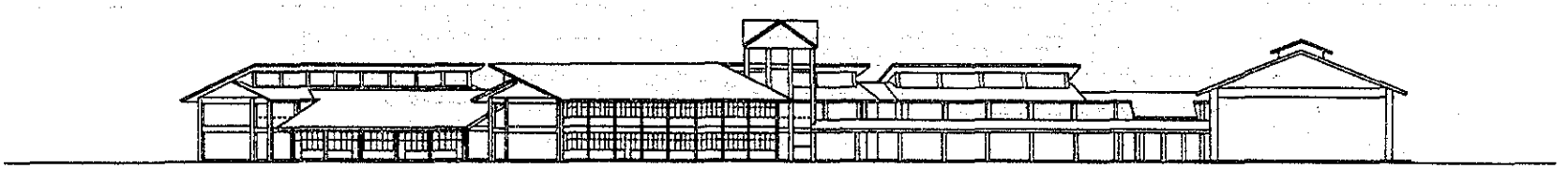
NORTHWEST ELEVATION



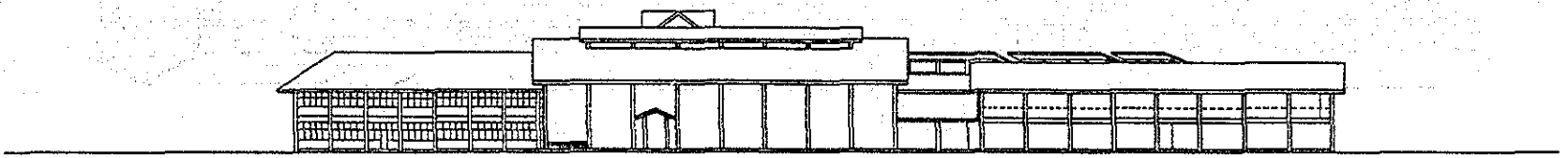
SOUTHWEST ELEVATION

0 5 10 20M

'EUA DISTRICT HIGH SCHOOL ELEVATION



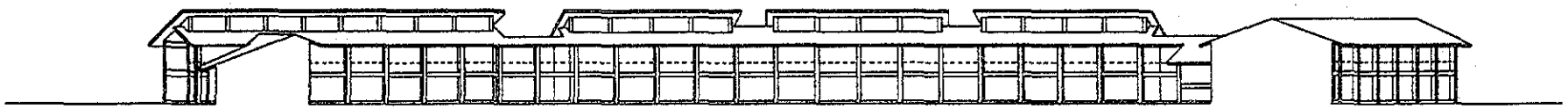
SOUTH ELEVATION



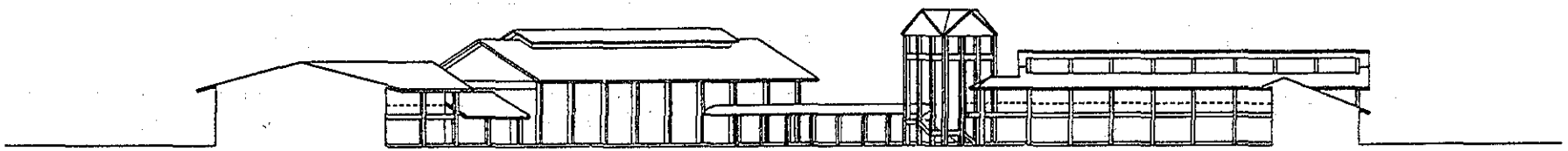
EAST ELEVATION

0 5 10 20 M

'EUA DISTRICT HIGH SCHOOL ELEVATION



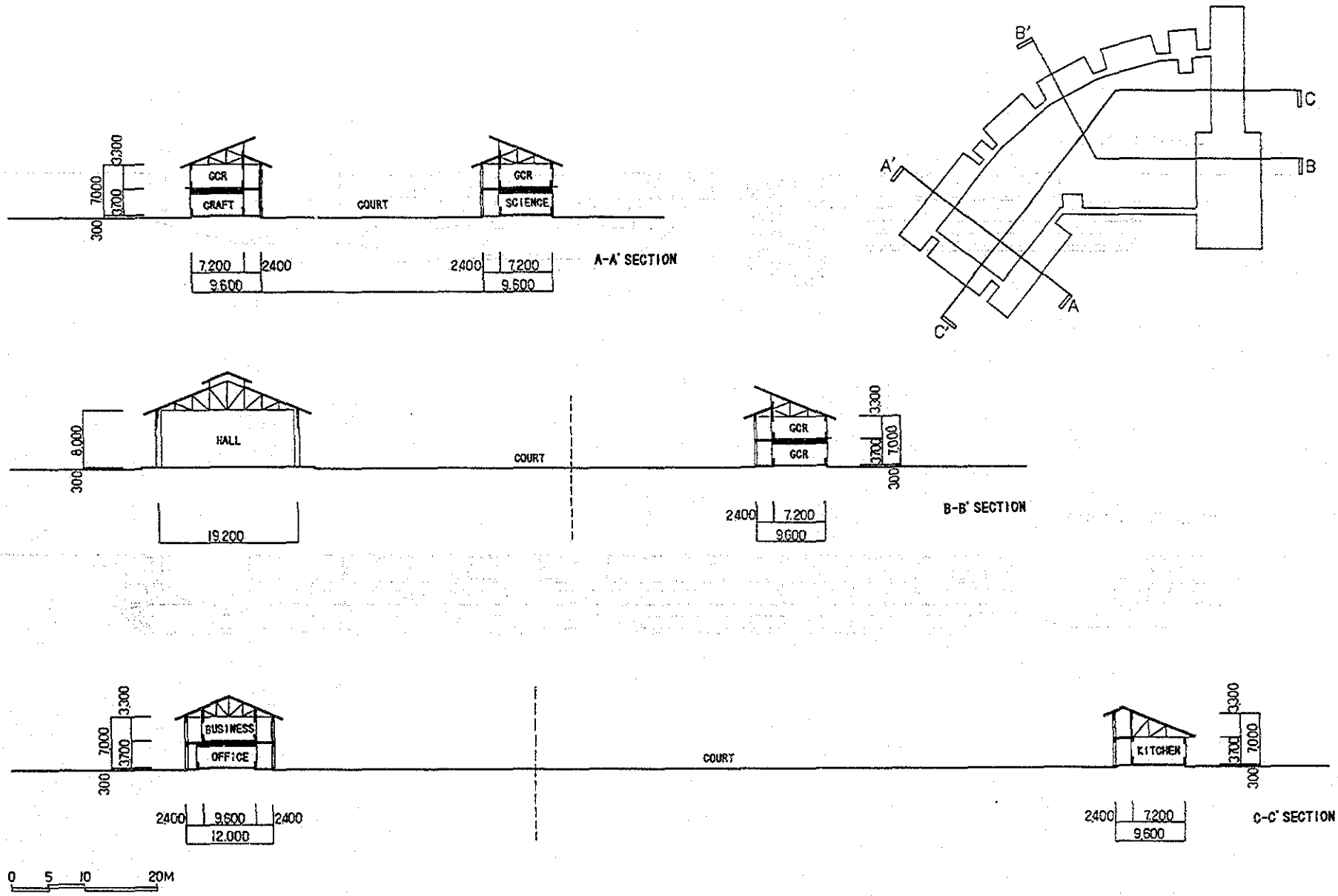
COURT NORTH ELEVATION



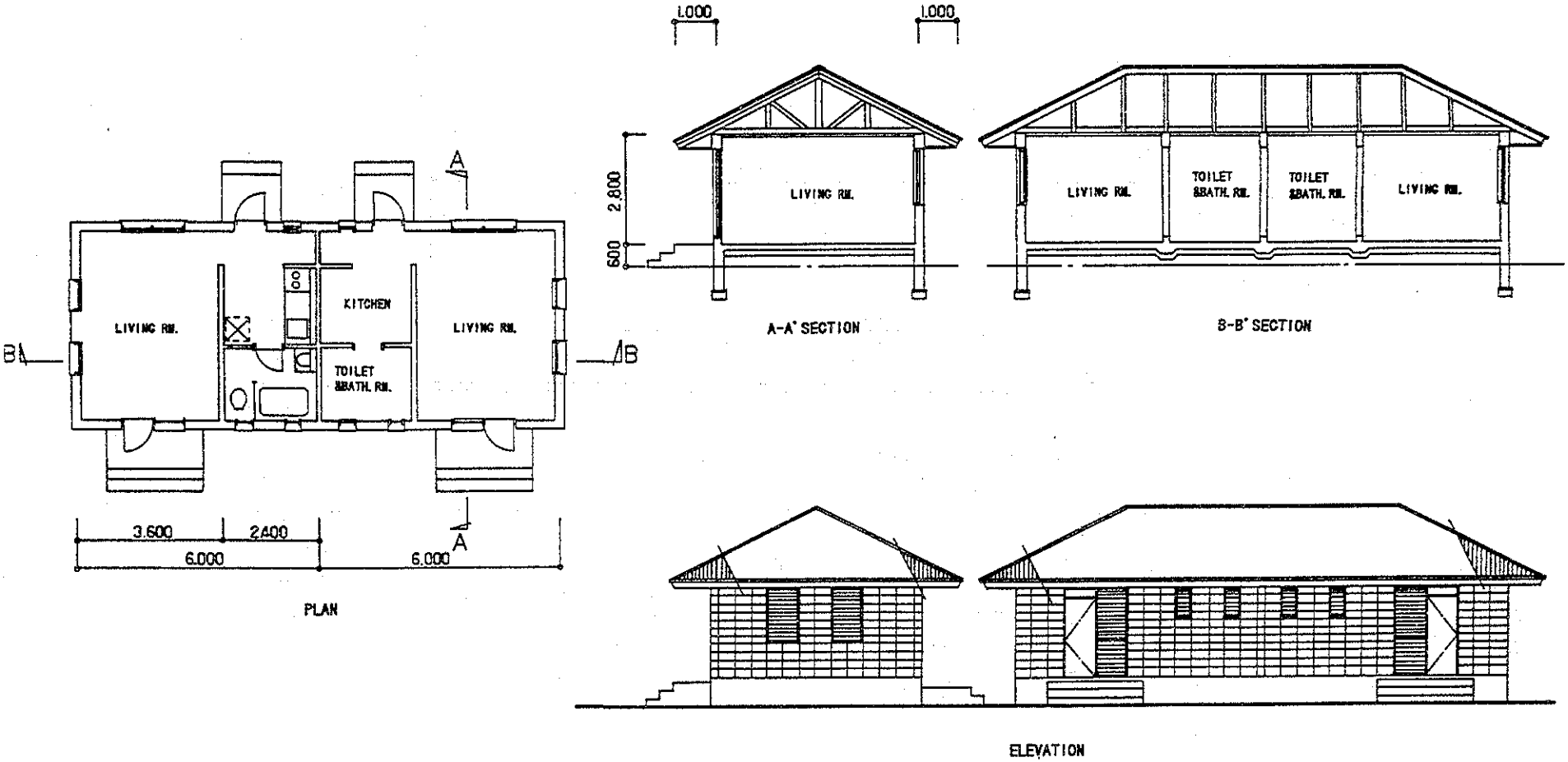
COURT SOUTH ELEVATION

0 5 10 20M

'EUA DISTRICT HIGH SCHOOL ELEVATION

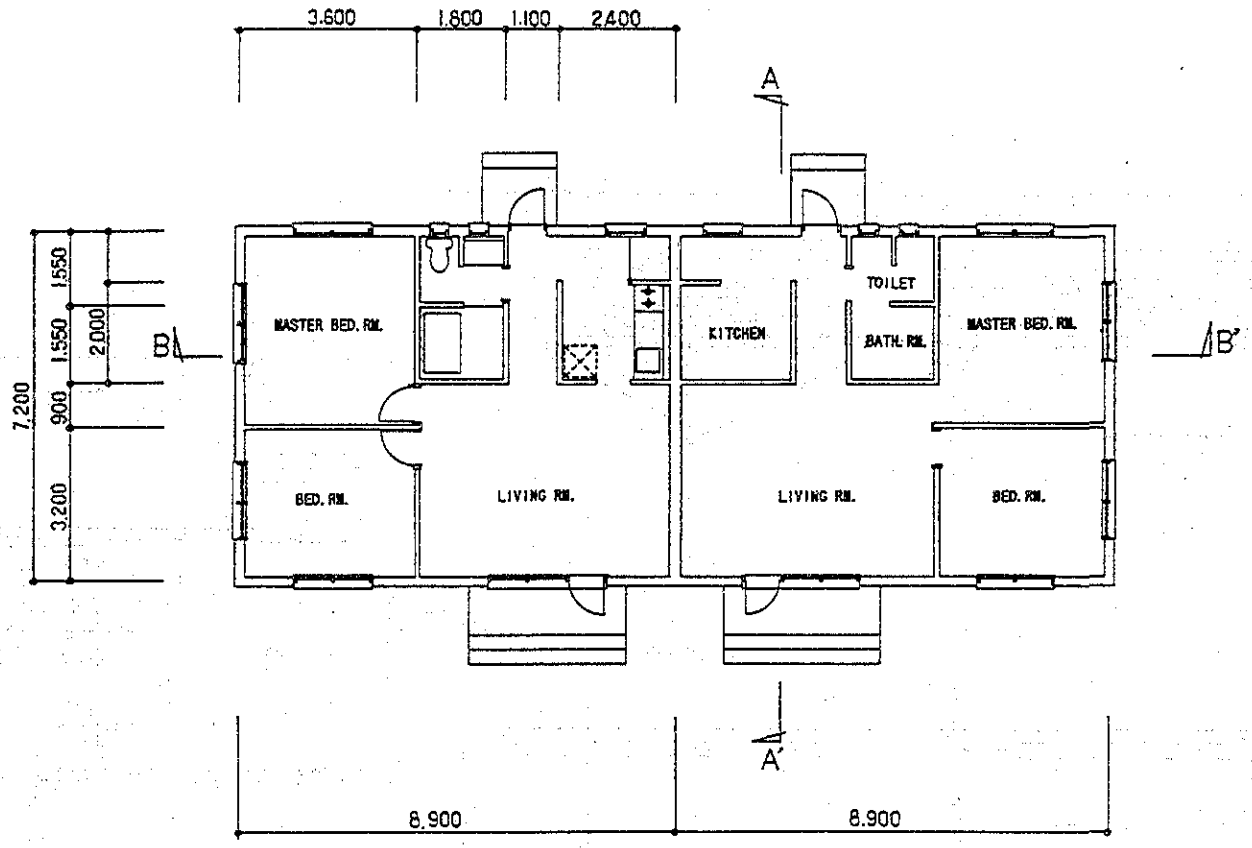


'EUA DISTRICT HIGH SCHOOL SECTION



0 1 2 3 4 5M

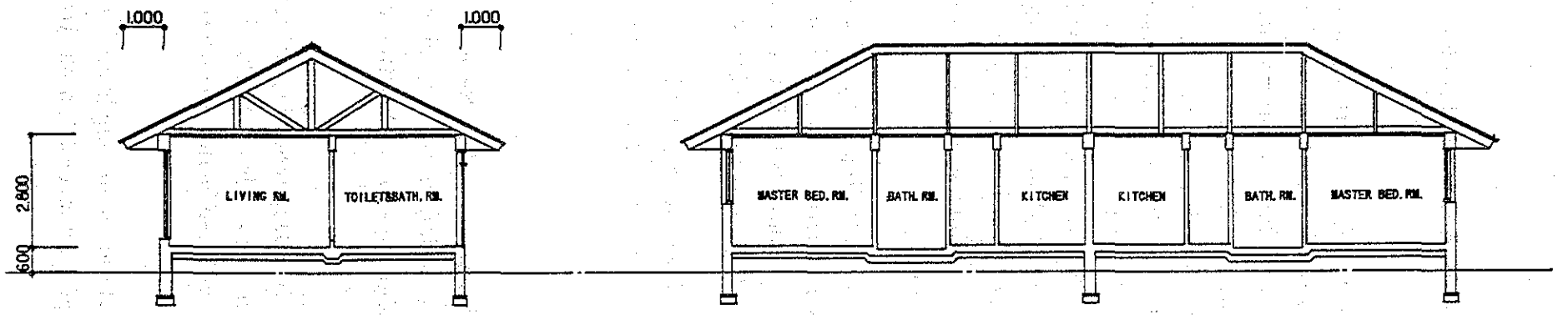
STAFF HOUSING (FOR SINGLE)



PLAN

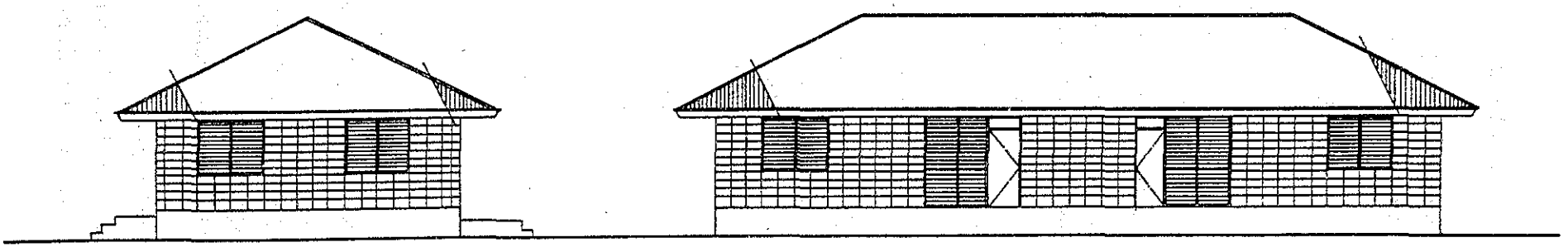
0 1 2 3 4 5M

STAFF HOUSING (FOR MARRIED)



A-A' SECTION

B-B' SECTION



ELEVATION

0 1 2 3 4 5M

STAFF HOUSING (FOR MARRIED)

4 - 4 Construction Plan

4 - 4 - 1 General Construction Situations and Points to be Considered for Construction work

In the central streets of the capital, Nukualofa, there are three-storied public buildings and commercial building of reinforced concrete construction, church and gymnasium of wood construction, and large steel construction buildings. The majority of the general housing is of single-storied wood construction, or single storied concrete block housing of well ventilated construction with consideration to sun shade and wind direction. The majority of roofs of these houses are covered with sheet iron. Traditional style buildings are of simple, plain form with elliptical sphere roof resting on pillars arranged in an oval shape and both the wall part and roof are covered with grass. The traditional form has almost disappeared due to the influence of West-European cultures and by damage from typhoons, etc., but the public buildings constructed recently follow the traditional form in their external appearance.

The Kingdom of Tonga does not have its own building laws or standards and conforms to New Zealand laws and standards. There is no determined form for authorizations, but the consent of the authorities concerned, after meetings, is required. In this project, design conforms principally to New Zealand standards.

The available contractors directly by the Government, public companies, private contractors, are the following, which are mainly located in the capital Nukualofa:

(1) Directly by the Government

- The Construction Division of the Ministry of Public Service mainly carries out the designing and construction work, principally for government-related buildings and designing and construction work for civil works, such as road and port works.
- Besides, the Water Department, Police Department, Ministry of Agriculture and Forestry and Fisheries, etc. also directly carry out designing and construction work for small-size facilities concerned.

(2) Public Companies

The construction Division of Consumable Services, having branch office in each area to cover all of tonga, is the biggest construction organization in

the Kingdom. It deals not only with designing and construction work but also with construction equipment, materials, aggregates, concrete blocks, etc. It carries out construction work for the private sector.

(3) Private Construction Companies

Owing to the large-scale and advanced technology of construction work in recent years, the activities of foreign constructors are remarkable. This is because of the local contractors' lack of opportunities to accumulate know-how in large-scale construction work as well as their small funding abilities. Also, the limited volume of general construction work available throughout Tonga makes it difficult to receive a consistent volume of order and local companies thus remain small in size. However, there are no problems in normal timber work, reinforced concrete work, civil work, etc., though labor efficiency is not very good.

Main Private Contractors

- Fua & Lawton Construction Ltd.
- Oceanic Industrial Enterprise Ltd.
- Moana Trading Co., Ltd.
- Loumaile Constructions PTY Limited
- Tafisi Construction Ltd.
- Others

4-4-2 Execution Policy

The construction work of this project will be carried out by Tongan local construction companies employed as subcontractors to Japanese construction corporation. However, as local construction companies in the project lands, namely, Vava'u and 'Eua are considered lacking technical abilities to carry out the project construction work, it is appropriate to select companies in Nuku'arofa for subcontractors. For making up of such insufficiency in technical abilities, specialized technicians will be sent from Japan with a view to assuring economical procedure and architectural standard.

The technical transfer which will be done through the work procedure to the construction workers of Vava'u and 'Eua will be useful for the enhancement of the standard of the local manpower.

During the construction period, it is necessary to hold close meetings with the Ministry of Education, Youth, Sports and Culture, Ministry of Construction

and Fire station for the inspection to be carried out by local inspector in charge of this matter of these authorities concerned at the end of each process.

With the exception of those procured from Japan, construction materials will be procured from Tonga or New Zealand and materials imported from Japan or New Zealand, are exempted from tax for the nature of the project, i.e., with Grant Aid from Japan. For the customs clearance procedures, it is necessary to cooperate in the procedures, communicating with the Ministry of Education, Youth, Sports and Culture. Further, clearing and arrangement of the project site must be completed prior to the starting of the construction at the cost of the government of Tonga.

(1) Considerations for Construction Work

1) For the expansion work of the Vava'u High School, and the construction work of 'Eua District High School which is adjacent to the primary school, it is necessary to take safety measures, especially with regard to third persons, and schedule the construction work including temporary facilities so as not to hinder daily school activities.

2) When bringing in construction materials, it is necessary to provide exclusive entrance gate and site entrance, with regard to the above.

3) The method of receiving electricity and the tie-in methods for water and drainage will be consistent with the existing facilities and the timing of the construction work will be discussed with persons concerned and carried out so as not to hinder school activities in the existing facilities.

4) Relating to item 3) above, it is necessary to carry out elaborate studies before the start of the construction work, to prevent existing underground pipes, etc., from being damaged.

5) As it often rains during the period from December through March, this must be borne in mind.

6) As schools in Tonga, in general, are closely associated with meetings of regional people, public events, religious events, etc., it is necessary to carry out construction work management with consideration to the

utilization of the school facilities for such activities as well as normal school events.

4-4-3 Division of Work

In the execution of the work under grant aid from Japan, the division of the scope of work between the Japan side and the government of tonga is shown in Table 4-15.

Table 4-15

Japan Side	Kingdom of Tonga
1. Construction Work Structure, architectural finishing	1. Construction Work Within the site, removal of obstacles
2. *Electrical Work* Power receiving and transforming station, main power and main line facilities, lighting, outlet facilities, interphone facilities, broadcasting facilities, lightning protection facilities	2. *Land Preparation Work* Deforestation of existing trees, removal of roots, and land preparation
3. Water, sewage, sanitary and ventilation facilities Water supply facilities, sewage and ventilation facilities, hygiene equipment facilities	3. Exterior Work Gardening, planting, external fence
4. Exterior facilities Roads within the area, external lighting facilities	4. Infrastructure, incoming line and tie-in work Water, Electricity, Telephone
5. Educational and office equipment Testing equipment for laboratory, office equipment	5. Fixtures, instruments Curtains, blinds, general furniture, fire extinguishers
6. Part of educational furniture Test bench	6. Others Procedures for construction project notification, customs clearance and tax exemption
	7. Cost for the bank agreement
	8. Maintenance, management and operating cost

4-4-4 Project Supervising Plan

After the Exchange of Notes (E/N), the Consultant and the Ministry of Education, Youth, Sports and Culture will sign a consultation contract, discuss and coordinate full details of the project execution plan, bidding, subcontracting of construction work.

As for the execution plan, execution procedures will be studied between persons in charge on Japanese side and the Ministry of Education, Youth, Sports and Culture in order to determine the scope of work of each side, plan the detailed

schedule of works such as electricity connection, etc., communication of delivery time of construction materials which are subject to exemption of tax to the Ministry, etc. It is important to coordinate adequate cooperative relationship between Japanese construction company and local construction companies. Japanese side must properly clarify the scope of the work between contractor and subcontractors and establish a personnel organization for smooth execution of the project.

(1) Guideline of Supervising Plan

1) Maintain a close communication with the Ministry of Education, Youth, Sports and Culture and other organizations of both countries and report thereto properly so that the work progresses to its completion in accordance with the construction schedule.

2) Give appropriate and smooth instructions and advise to persons related to the construction work with a view to realization of the objectives of this project.

3) Give appropriate advise and instructions to Tongan side for smooth operation of the facilities after the completion.

4) Supervise the work in the spot method, dispatching properly specialized technicians in a timely manner in accordance with the work progress.

(2) Construction Work Supervising Services

1) Assistance relating to work contract
Selection of contractors, determination of work contract method, preparation of draft of work contract, checking of detailed breakdown of work, witnessing of work contracting.

2) Dispatch of supervisor to the site
Dispatch properly specialized technician in a timely manner in accordance with the work progress (spot supervision).

3) Inspection and approval of construction drawings
Inspection of construction drawings, materials, completion models, and equipment and materials of facilities to be supplied by contractors.

4) Instructions on construction

Construction planning, study of procedures, instructions to contractors and reporting of work progress to Owner.

5) Assistance in Payment Approval Procedures

Assistance in procedures for checking bills, etc., relating to the payment of construction cost and completion inspections.

The Consultant will complete its services after confirming proper execution of the contractual conditions after the completion of work, attending the delivery of the objectives of the Contract, and obtaining the acceptance certificate. The Consultant will also report the work progress during the construction period and details relating to payment procedure and delivery of the work after the completion for authorities concerned of the government of Japan.

4 - 4 - 5 Equipment and Material Procurement Plan

The plan is prepared considering the fact that the Kingdom of Tonga relies on import for most of the materials except concrete aggregate.

(1) Construction

1) Construction material

Although sand, gravel, cement, etc. are locally available, being sand from the sea and coral macadam containing salt, they must be carefully treated. Construction materials manufactured in the Kingdom of Tonga are of the concrete block level. Others are all imported from New Zealand, Australia, Fiji and Korea, etc. The quality of concrete blocks available on the market is not good and they need to be manufactured a the site under quality control. As quality timber, metal fittings, glass, waterproof materials, foundation plywood, sheet metal for roofing, etc., are costly as well as not readily available locally in the quantities required for the project, they will be mainly imported.

Under such situations, construction materials necessary for the projected construction will be mainly imported from Japan and New Zealand, excluding sand, gravel and cement.

2) Construction Equipment

Advanced construction equipment are not locally available. Concrete mixer, vibrator, concrete placers, etc., necessary for manufacturing fresh concrete, and construction transportation vehicles will be procured locally.

(2) Electrical Facilities

Distribution panels, lighting appliances, electric cables, electric conduits, etc. are imported partly from New Zealand, Fiji, etc. but they have problems in types and quality, including rust-prevention treatment. Further, telephone facilities, communication appliances, and so on, are not readily available locally. Consequently, electrical equipment will be Japanese products, which are superior from the durability point of view.

(3) Mechanical Facilities

PVC pipes, sanitary equipment, overhead tank, etc. will be Japanese products considering the quality, but those which require daily maintenance and repair, etc. will be New Zealand products.

Table 4 – 16 Procurement Situation relating to each Material

Name of Material	Locally Procured	From Japan	From Third Country	Remarks
1. Sand/Gravel	○			
2. Cement	○		○	Products from New Zealand are superior in quality.
3. Timber			○	No timbers are locally produced.
4. Re-bar		○	○	No re-bars are locally produced.
5. Concrete block	○			
6. Tile		○	○	No tiles are locally produced.
7. Wood Fittings	○			To be imported raw mateial
8. Metal Fittings			○	To be imported from New Zealand.
9. Glass			○	"
10. Water-proof Material			○	"
11. Sheathing Plywood			○	"
12. Roof Sheet Metal			○	"
13. Plastic Tile			○	"
14. Ceiling Board			○	"
15. Paint			○	"
16. Miscellaneous Hardware			○	"
17. Distribution Panel Board		○		
18. Lighting Appliance		○		
19. Telephone Facilities		○		
20. Electric Cable/Conduit		○		
21. Wiring Equipment		○		
22. Transformer		○		
23. Communication Appliance		○		
24. PVC Pipe			○	To be imported from New Zealand
25. Sanitary Fixture			○	
26. Elevated Reservoir Tank		○		
27. Pump		○		

(4) Construction Site Management

Contractor will send Japanese engineers for the following assignment.

1) Site resident staff

① One Site representative
General director for
(Director of Construction site): One for both Vava'u and 'Eua sites

② Two engineers in charge of construction : One each for Vava'u and 'Eua sites

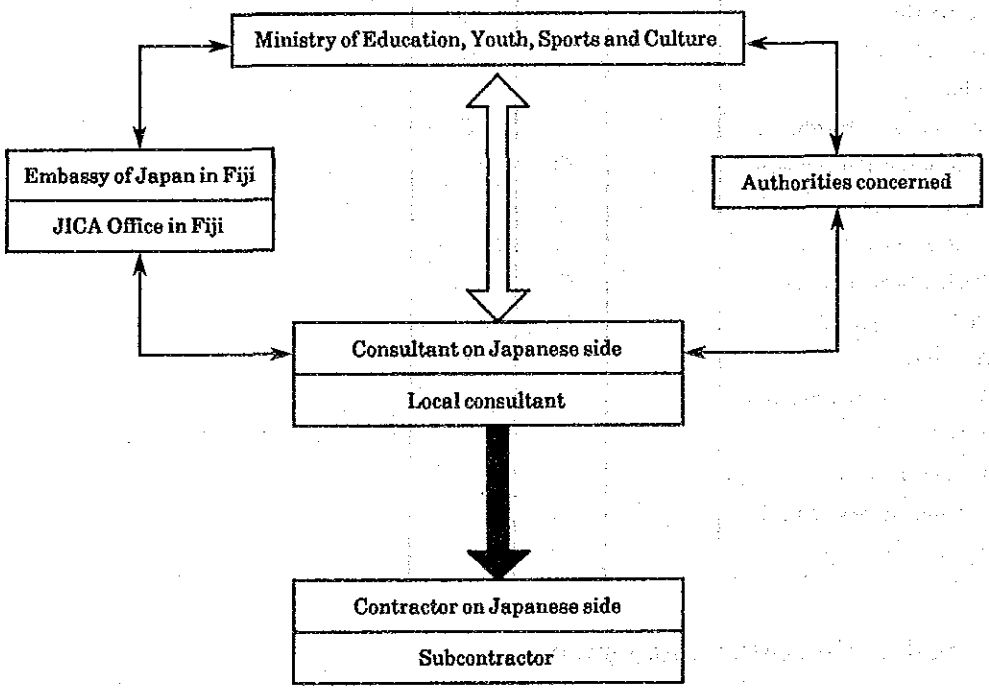
③ Two engineers in charge of administrative work : "

2) Site visiting staff for short period

① Two construction engineer : One for both Vava'u and 'Eua sites

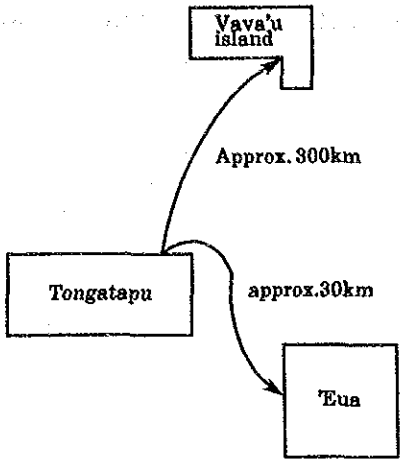
② Two facility engineers : One each for Vava'u and 'Eua sites

Table 4 – 17 Project Executio Control System



4 - 4 - 6 Inland Transportation Schedule

(1) Transportation Route



※ Both sites are located within 800 m from each port, their routes of inland transportation are omitted her.

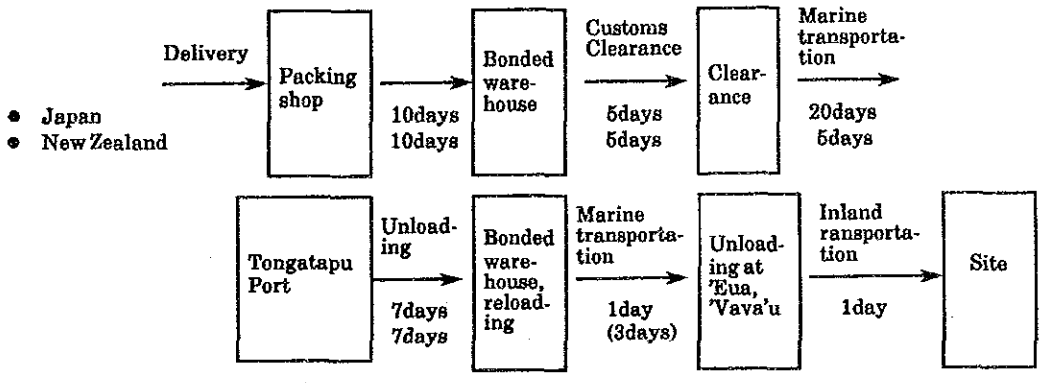
There are two modes of inlnd transportation of materials from Japan and New Zealand.

A. Change at Tongatapu —Marine→ 'Eua Vava'u —Inland→ Construction site

B. Direct 'Eua Vava'u —Inland→ Construction site

As the mode of transportation B is not adopted for transportation of materials except special cases, mode A, normally used, will be adopted for this project.

The required number of days from carrying into material packing shops of Japan and New Zealand, to arrival at the site are estimated as follows:



Fro Japan: Approximately 44 days
From New Zealand: Approximately 29 days
* For Vava'u, 2 days more than the above are required.

Table 4 – 18 Time Required for Domestic Transportation

(2) Packing

In principle, construction materials normally will be transported in containers for certainty and safety with regard to quantity and quality.

4 - 5 Project Execution Plan

4 - 5 - 1 Project Execution System

(1) Project Executive Organization

The Ministry of Education, Youth, Sports and Culture is the main organizer of this project on the side of the Kingdom of Tonga, and the Japanese consultant and construction company will be the contracting parties. The Government of Tonga will undertake the procedures relating to documents to be exchanged between both governments and agreement with the bank as well as procedure for tax exemption.

The following are the services to be carried out by Tongan side relating to this project.

After the E/N with the government of Japan, Tongan side will:

1) Sign a design supervising service contract with the Consultant (Japanese company) and have the Consultant prepare the execution plan and tender documents.

2) Carry out bid after announcement in newspapers and prequalification based on the tender documents and select contractor (Japanese company).

3) Sign a contract with the selected contractor and obtain approval of the Government of Japan.

4) Execute and control the work items within the scope of Tongan side prior to the starting of the construction work.

5) Issue certificates of each inspection conforming to the contract after the starting of the construction work.

6) Issue certificates of completion.

7) Carry out bank related services regarding payments.

Without proper systematization to carry out these services in smooth and assured manner, it will be difficult to complete the project in accordance with the conditions of Grant Aid programme.

(2) Consultant

The services will be carried out by Japanese Consultant. The services will consist of the following:

1) Execution design services
Preparation of tender documents such as execution plan documents, specifications, etc.

2) Bid contracting services
Prequalification of bidders, bid services, attendance to contract signing

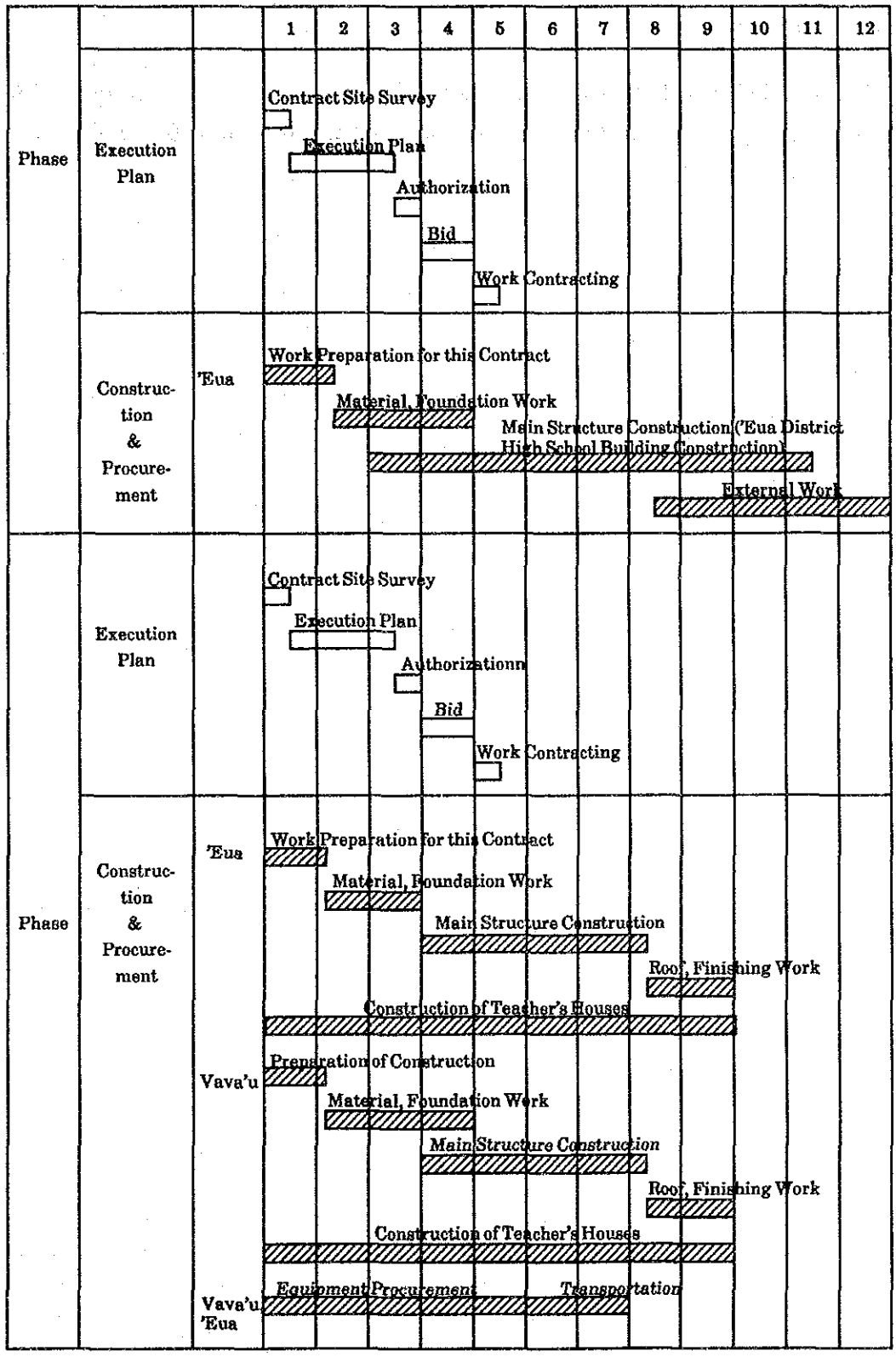
3) Supervising of construction work

(3) *Contractor*

The services will be carried out by Japanese constructor. Consequently, the priority must be given to the conformity with this system and the delivery schedule, especially, must be observed.

4 - 5 - 2 General Project Schedule

Table 4 – 19 General Project Schedule



4 - 5 - 3 Estimated Project Cost

The following is the estimated cost for the execution of the project with grant aid from Japan.

The total estimated cost for the execution of the project on Tongan side is approximately 4 million yen (Tie-in work for incoming lines of infrastructures and land preparation, etc.)

CHAPTER 5

EFFECTS AND CONCLUSION OF THE PROJECT

CHAPTER 5 EFFECTS AND CONCLUSION OF THE PROJECT

5 - 1 Effects of the Execution of the Project

This project will improve the accommodating capacity of the facilities from 500 students to 700 at the Vava'u High School and 200 students to 630 at the 'Eua District High School. It will also enhance the educational standard in accordance with uniform curriculum and upgrade the scholastic achievement of the students. After the completion of the project, the children of Vava'u and 'Eua will be provided with the opportunity to receive the same standard of education as that of schools in the capital where the standard of scholastic achievement is high without having to move to the capital. We can further expect from this project such effects as redressing the regional gaps, relaxation of the concentration of the student population in the capital, etc.

Education being the base of social and economic development, if objectives such as relaxation of people moving away from the outer islands to elsewhere, education and accumulation of human resources within outer islands, it will contribute to the activation of regional society and economy and regional promotion, and further bring about the social and economic development and stabilization of the Kingdom of Tonga as a whole.

Direct Effects

1. An increase in opportunities for children of the Vava'u and 'Eua areas to attend public-run secondary schools locally.
2. A decrease in number of children moving away from the islands for admission to higher educational institutions elsewhere, and an accumulation of human resources within the islands.
3. Enhancing of the standard of education in regional secondary schools, in the Vava'u and 'Eua areas.

Indirect Effects

1. A decrease in the labour population moving away from the islands (easing of concentration of population in larger cities).
2. Enhancement of the quality and quantity of local manpower in the Vava'u and 'Eua areas.

3. Regional promotion along with the activation of regional society and economy.

4. Redressing of regional gap, in Tonga.

5 - 2 Conclusion

This project will not only contribute to the improvement in the educational sector as mentioned hereinabove but also the regional promotion from a wider point of view, bringing about large effects. Therefore, we consider that it is appropriate to carry out this project within the scope of Grand Aid programme.

The project will be carried out more smoothly and effectively, if the following improvements are ensured. Therefore, we strongly request you to ensure the following:

1. Enhance school management and operation system.
2. Upgrade and secure more teachers.
3. Develop and supply educational materials.
4. Reinforce and rearrange educational equipment.
5. Reform and enhance the maintenance control systems of the facilities.

APPENDICES

CONTENTS
(Appendices)

<APPENDIX - 1>

MEMBER LIST OF BASIC DESIGN STUDY GROUP

(1) Basic Design Study (Sep. 3, 1990~Oct. 2, 1990)

Leader	Mr. Masahiko SUZUKI	Japan International Cooperation Agency (JICA) Institute for International Cooperation Development Planning Specialist
Project Coordinator	Mr. Satoru WATANABE	Japan International Cooperation Agency (JICA) Grant Aid Study & Design Department Second Basic Design Study Division
Architectural Planning	Mr. Yukimasa SANO	Ishimoto Architectural & Engineering Firm, Inc.
Architectural Design	Mr.Tomoyuki MINAMI	"
Mechanical Planning	Mr. Akira HIWASA	"
Equipment Planning	Mr. Yasumichi DOI	"

(2) Basic Design Study (Jan. 14, 1991~Jan. 26, 1991)

Leader	Mr. Yoshio YABE	Japan International Cooperation Agency (JICA) Deputy Director Study Review and Coordination Division Grand Aid Study and Design Department
Architectural Planning	Mr. Yukimasa SANO	Ishimoto Architectural & Engineering Firm, Inc.
Equipment Planning	Mr. Yasumichi DOI	"

<APPENDIX – 2>

SITE SURVEY SCHEDULE

(1) Site Survey Schedule (September 3~October 2, 1990)

Order	Date	Itinerary	Summary of Work
1.	9/3 Mon.	Dept. Tokyo	- Departure from Japan by FJ-303
2.	4 Tue.	Arv. Nadi Nadi → Suva → Nadi	- Courtesy visit to JICA Fiji Office - Courtesy visit to the Embassy of Japan in Fiji
3.	5 Wed.	Nadi → Tongatapu	- Internal meeting
4.	6 Thu.	Tongatapu	- Courtesy visit to the Ministry of Foreign Affairs - The first meeting with the Ministry of Education - Survey on similar facilities ('Atenisi Institute, Saint Andrew's High School)
5.	7 Fri.	Tongatapu	- Courtesy visit to the Ministry of Education - The second meeting with the Ministry of Education - Study on similar facilities (Tonga High School) - The third meeting with the Ministry of Education
6.	8 Sat.	Tongatapu → Vava'u	- (Travel to Vava'u Island) - Meeting with JOCV
7.	9 Sun.	Vava'u	- Study on construction situation on Vava'u Island - Internal meeting
8.	10 Mon.	Vava'u	- Courtesy visit to the Governor of the Vava'u State - Study on similar facilities (Tailulu College, Mailefihi College) - Meeting on the questionnaire regarding the Vava'u High School - Survey on existing facilities, equipment, and site topographic survey at the Vava'u High School
9.	11 Tue.	Vava'u → Tongatapu	- (Messrs. Suzuki, Group Leader, Watanabe and Sano traveled to Tongatapu) The fourth meeting with the Ministry of Education - Study on similar facilities (The Teachers' Training Center of Tonga)
		Vava'u	- (Messrs. Minami, Hiwasa and Doi stayed in Vava'u until 12th) - Study on existing facilities and equipment at the Vava'u High School - Estimation and Study on the construction situation

			- Meeting on details of equipment
10.	12 Wed.	Tongatapu	(Travel to 'Eua Island was canceled due to the cancellation of liner due to the rain) - Study on similar facilities (The Tonga Maritime Polytechnic Institute, Tonga National Center) - The fifth meeting with the Ministry of Education
		Vava'u → Tongatapu	- Survey on existing facilities - Meeting on details of equipment - Survey on infrastructures - Estimation and study on the construction situation (Messrs. Minami, Hiwasa and Doi traveled to Tongatapu.)
11.	13 Thu.	Tongatapu	- Internal meeting - The sixth meeting with the Ministry of Education
12.	14 Fri.	Tongatapu	- The seventh meeting with the Ministry of Education (Signing of the minutes of meeting) - Study on similar facilities - Internal meeting (Study group)
13.	15 Sat.	Tongatapu	- Estimation and study on the construction situation - Internal meeting (Messrs. Suzuki, group leader, Watanabe reported the result of study to Suva.)
14.	16 Sun.	Tongatapu	- Study on similar facilities (Kolonga Primary School) - Internal meeting
15.	17 Mon.	Tongatapu	- The eighth meeting with the Ministry of Education - Estimation and study on construction situation (Ministry of Construction and Land Development Agency) - Meeting on details of equipment (Messrs. Suzuki and Watanabe traveled to Suva→Nadi→Auckland)
16.	18 Tue.	Tongatapu → 'Eua	(Travel to 'Eua Island) - Meeting at the 'Eua District High School - Study on facilities of the 'Eua District High School - Confirmation on the site at the 'Eua regional office building - Site survey and measurement (Messrs. Suzuki and Watanabe returned to Tokyo via Auckland.)

17.	19 Wed.	'Eua	- Site survey and measurement - Study on infrastructures, estimation and study on construction situation - Meeting on details of equipment - Study on similar facilities (Hango College, etc.)
18.	20 Thu.	'Eua → Tongatapu	(Travel to Tongatapu) - Study on infrastructures, estimation and study on construction situation - Meeting on details of equipment - Review on facilities plan for the Vava'u and 'Eua District High Schools
19.	21 Fri.	Tongatapu	- The ninth meeting with the Ministry of Education - Study on infrastructures, estimation and study on construction situation - Meeting on details of equipment
20.	22 Sat.	Tongatapu	- Estimation and study on construction situation - Visit to the Fua'amotu International Airport Construction Site - Preparation of facilities plan for the Vava'u and 'Eua District High Schools - Internal meeting and sorting out of collected data
21.	23 Sun.	Tongatapu	- Internal meeting
22.	24 Mon.	Tongatapu	- The tenth meeting with the Ministry of Education - Estimation and study on construction situation - Revision of facility plan for the Vava'u and 'Eua District High Schools - Sorting out of collected data
23.	25 Tue.	Tongatapu	- Estimation and study on construction situation - Sorting out of collected data - Revision of facility plan for the Vava'u and 'Eua District High Schools
24.	26 Wed.	Tongatapu	- The eleventh meeting with the Ministry of Education (Explanation of facility plan) - Estimation and study on construction situation - Data Collection from the Ministry of Education
25.	27 Thu.	Tongatapu →Nadi →Auckland	- Visit to the Fua'amotu International Airport Construction Site - Departed from Tongatapu by FJ-401 Arrival at Auckland by TE-57 via Nadi

26.	28 Fri.	Auckland	- Estimation and study on construction situation - Weather Data collection at the Auckland Meteorological Agency - Collection of data relative to New Zealand Construction Regulations, etc.
27.	29 Sat.	Auckland	- Estimation and study on construction situation - Visit to Auckland Construction Material Exhibition Center, etc. - Internal meeting
28.	30 Sun.	Auckland	- Internal meeting
29.	10/1 Mon.	Auckland	- Estimation and study on construction situation
30.	2 Tue.	Auckland → Tokyo	- Return to Japan by TE-33.

(2) Site Survey Schedule, Draft Confirmation (Jan. 14~26, 1991)

Order	Date	Itinerary	Summary of Work
1.	1/14 Mon.	Tokyo → Nadi	- Travel (FJ-303)
2.	15 Tue.	Nadi → Suva	- JICA Office - Embassy of Japan
3.	16 Wed.	Nadi → Tongatapu	- Travel (FJ - 401)
4.	17 Thu.	Tongatapu	- Meeting with the Ministry of Education - Survey on similar facilities
5.	18 Fri.	Tongatapu	- Meeting with the Ministry of Education
6.	19 Sat.	Tongatapu	- Survey on similar facilities - Complemental Study
7.	20 Sun.	Tongatapu	- Internal Meeting
8.	21 Mon.	Tongatapu	- Courtesy visit to the Ministry of Foreign Affairs - Meeting with the Ministry of Education - JOCV Office
9.	22 Tue.	Tongatapu	- Meeting with the Ministry of Education
10.	23 Tue.	Tongatapu	- Meeting with the Ministry of Education - Signing of minutes of meeting
11.	24 Thu.	Tongatapu →Nadi→Suva	- Survey on similar facilities - Travel (FJ - 401)
12.	25 Fri.	Suva → Nadi	- Embassy of Japan, JICA office Travel to Nadi
13.	26 Sat.	Nadi → Tokyo	- Travel (NZ - 023)

<APPENDIX – 3>

LIST OF INTERVIEWED PEOPLE (TONGAN SIDE)
(September 3~October 2, 1990)

1.	DR. HU'AKAVMEILIKU	MINISTER OF EDUCATION, YOUTH, SPORTS AND CULTURE MINISTER OF CIVIL AVIATION MINISTER OF WORKS
2.	MR. PAULA SUNIA BLOOMFIELD	DIRECTOR OF EDUCATION
3.	MR. VILIAMI TAKAU	DEPUTY DIRECTOR OF EDUCATION (PROFESSIONAL SERVICES)
4.	MR. VISESIO PONGI	ACTING DEPUTY DIRECTOR OF EDUCA-TION *(ADMINISTRATION)*
5.	DR. 'ANA MAUI TAUFE'ULUNGAKI	DEPUTY DIRECTOR OF EDUCATION (POLICY AND PLANNING)
6.	MRS. TUPOU TAUFA	PRINCIPAL OF TONGA TEACHER'S TRAINING COLLEGE
7.	MR. VAINGA TONGA	*ACTING DEPUTY PRINCIPAL OF COMMUNITY DEVELOPMENT* AND TRAINING CENTER
8.	MR. S. 'OTOLOUTA POLONIATI	CHIEF EDUCATION OFFICER (SECONDARY SCHOOLS)
9.	MR. SIONATANE TU'A TAUMOEPEAU	SECRETARY OF FOREIGN AFFAIRS
10.	MR. 'ILAISA FUTA-I-HA'ANGANA HELU	*DIRECTOR OF 'ATENISI INSTITUTE*
11.	MR. COLIN LUTUI	PRINCIPAL OF TONGA HIGH SCHOOL
12.	MR. AFA YAKA	ACTING PRINCIPAL OF ST. ANDREWS SCHOOL
13.	HON. TU'IAFITU	ACTING GOVERNOR OF VAVA'U
14.	MR. 'IKANI FIFITA	ACTING PRINCIPAL OF VAVA'U HIGH SCHOOL
15.	MISS MANU PULOKA	ACTING DEPUTY PRINCIPAL OF VAVA'U HIGH SCHOOL
16.	MRS. LESIELI K. MANU	AREA ORGANIZER (VAVA'U PRIMARY SCHOOLS)
17.	MR. 'AKAU'OLA	HEADMASTER OF TAILULU COLLEGE
18.	DR. KAIAPORI PAONGO	PRINCIPAL OF MAILEFIHI/SIULIKUTAPU COLLEGE
19.	MRS. 'EVALINE HA'ANGANA	ACTING PRINCIPAL OF 'EUA HIGH SCHOOL
20.	MR. TANIELA TOKIA	PHYSICAL PLANNER OF LAND AND SURVEY
21.	*MR. AMANAKI PUNIANI*	*DEPUTY SECRETARY OF LAND AND SURVEY*
22.	MR. LES MATTHEWS	CHIEF ARCHITECT OF MINISTRY OF WORKS
23.	MR. LEVENI 'AHO	ARCHITECT OF MINISTRY OF WORKS
24.	MR. PAUL AHMAD	MANAGER OF CONSTRUCTION DEPARTMENT: COMMODITIES BOARD
25.	MR. PENAIA MOA	ACTING HEALTH PLANNING OFFICER: MINISTRY OF HEALTH
26.	MR. KASIMILA A. VAIHU	ACTING CHIEF FIRE OFFICER: MINISTRY OF POLICE
27.	MR. PAEA HAVEA	CHIEF METEOROLOGICAL OFFICER: *TONGA METEOROLOGICAL SERVICE*
28.	MR. SOANE KAUTAI	GENERAL MANAGER OF TONGA ELECTRIC POWER BOARD
29.	MR. FILIPE KOLEI	MANAGER-ENGINEER OF TONGA WATER BOARD
30.	MR. TIMOTE TUIFAVUKI	CONTROLLER OF EXCHANGE SECTION: TONGA TELECOMMUNICATION COMMISSION

(Japan Side)

Yasuo TAKAHASHI	Minister, Embassy of Japan in Fiji
Takeshi TANABE	Special Assistant, Embassyof Japn in Fiji
Tomoki NITTA	Second Secretary (AID), Embassy of Japan in Fiji
Yoshio YOSHIDA	Second Secretary, Embassy of Japan in Fiji
Shun-ichi MIZUOCHI	Assistant Resident Representative, JICA Fiji Office
Masahiro KURAMATA	JOCV Coordinator in Tonga

JOCV staff in Vava'u

Tadashi KIMURA	Ocean Culture (Fisheries Bureau)	
Motoyasu ISHII	Vegetables (Ministry of Agriculture)	
Hisao SAWAI	Teacher, Crafts Art(Vava'u High School, Ministry of Education)	
Kaname NAKAHATA	Teacher, Sciences and Mathematics	(")
Tomime INOUE	Teacher, Japanese	(")
Etsuko MURAKAMI	Teacher, Home Economics	(")
Yuko OTSUKA	Teacher, Japanese	(")
Takashi SUZUKI	Car Mechanics	(Ministry of Agriculture)
Hideo AKIWA	Teacher, Sciences and Mathematics	(")
Joji KURUME	Freezing Equipment	(Fisheries Bureau)

JOCV staff in Tongatapu

Tomoyuki NAKANO	Clinical Examination Engineer	(Vaiola Hospital)
Takahiro OITATE	Electrical Work	(Tonga Electric Power Board)
Hirohide NAKAMURA	Medical X-ray Engineer	(Vaiola Hospital)
Kazuhide ITO	Music	('Atenisi Institute)
Masako YOKOYAMA	Teacher, Sciences and Mathematics	(Tonga High School, Ministry of Education)
Setsuko MOMOHARA	Teacher, Sciences and Mathematics	(")
Junko YASUDA	Teacher, Sciences and Mathematics	(Saint Andrew's High School)
Satoru SAITO	Forestry Management	('Atenisi Institute)
Naoko NAKAJO	Home Economics (Ministry of Agriculture, Forestry and Fisheries, Diffusion Bureau)	
Masahito YANO	Teacher, Sciences and Mathematics	('Atenisi Institute)
Hiraku KITAMURA	Phycal Therapist	(The Red Cross Society)
Yuko OKA	Secretary to Coordinator	

(2) List of Interviewed People
(Basic Design Study, Confirmation on Draft January 14~January 26, 1991)

(Tongan Side)

1.	MR. SIONATANE TU'A TAUMOEPEAU	SECRETARY OF FOREIGN AFFAIRS
2.	MR. SIONE KITE	DEPUTY CHIEF SECRETARY & DEPUTY SECRETARY TO CABINET
3.	MR. PAULA SUNIA BLOOMFIELD	DIRECTOR OF EDUCATION
4.	MR. VILIAMI TAKAKU	DEPUTY DIRECTOR OF EDUCATION
5.	MR. VISESIO PONGI	ACTING DEPUTY DIRECTOR OF EDUCATION
6.	MRS. TUPOU TAUFA	PRINCIPAL OF TONGA TEACHERS'S TRAINING COLLEGE
7.	MR. S. 'OTOLOUTA POLOMIAMTI	CHIEF EDUCATION OFFICER

(Japan Side)

1.	Yasuo TAKAHASHI	Minister, Embassy of Japan in Fiji
2.	Takeshi TANABE	Special Assistant, Embassyof Japn in Fiji
3.	Tomoki NITTA	Second Secretary (AID), Embassy of Japan in Fiji
4.	Hideaki ITOH	Second Secretary, Embassy of Japan in Fiji
5.	Shun-ichi MIZUOCHI	Assistant Resident Representative, JICA Fiji Office
6.	Yasuko OZAKI	JOCV Medical Coordinator, JICA Fiji Office
7.	Masahiro KURAMATA	JOCV Coordinator in Tonga