MINISTRY OF EDUCATION, TRAINING AND TECHNOLOGY
THE REPUBLIC OF KIRIBATI

NO 1

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
UPGRADING AND DEVELOPMENT
OF
KING GEORGE V & ELAINE BERNACCHI SCHOOL
IN
THE REPUBLIC OF KIRIBATI

MARCH 1996

JAPAN INTERNATIONAL COOPERATION AGENCY
FUKUNAGA ARCHITECTS-ENGINEERS
&
RAYMOND ARCHITECTURAL DESIGN OFFICE INC.

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR UPGRADING AND DEVELOPMENT OF KING GEORGE V & ELAINE BERNACCHI SCHOOL IN THE REPUBLIC OF KIRIBATI
MARCH 1996

MINISTRY OF EDUCATION, TRAINING AND TECHNOLOGY
THE REPUBLIC OF KIRIBATI

NO

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
UPGRADING AND DEVELOPMENT
OF
KING GEORGE V & ELAINE BERNACCHI SCHOOL
IN
THE REPUBLIC OF KIRIBATI

MARCH 1996

JAPAN INTERNATIONAL COOPERATION AGENCY
FUKUNAGA ARCHITECTS-ENGINEERS
&
RAYMOND ARCHITECTURAL DESIGN OFFICE INC.

PREFACE

In response to a request from the Government of the Republic of Kiribati to the Government of Japan decided to conduct a basic design study on the Project for Upgrading and Development of King George V and Elaine Bernacchi School and entrusted the study to the Japan International Cooperation Agency (JICA).

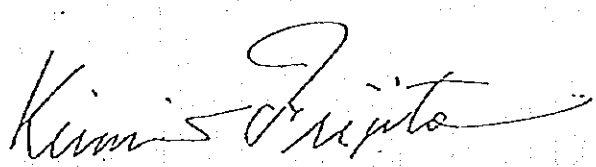
JICA sent to Kiribati a study team from November 27 to December 25, 1995.

The team held discussions with the officials concerned of the Government of Kiribati, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Kiribati in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Kiribati for their close cooperation extended to the teams.

March 1996



Kimio Fujita
President
Japan International Cooperation Agency

March 1996

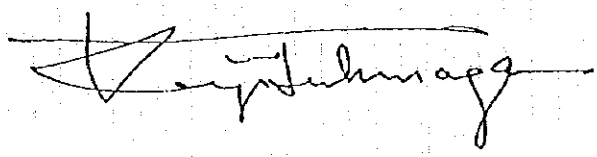
LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Upgrading and Development of King George V and Elaine Bernacchi School (KGV/EBS) in the Republic of Kiribati.

This study was conducted by Fukunaga Architects-Engineers and Raymond Architectural Design Office Inc., under a contract to JICA, during the period from November 24, 1995 to March 29, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Kiribati and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

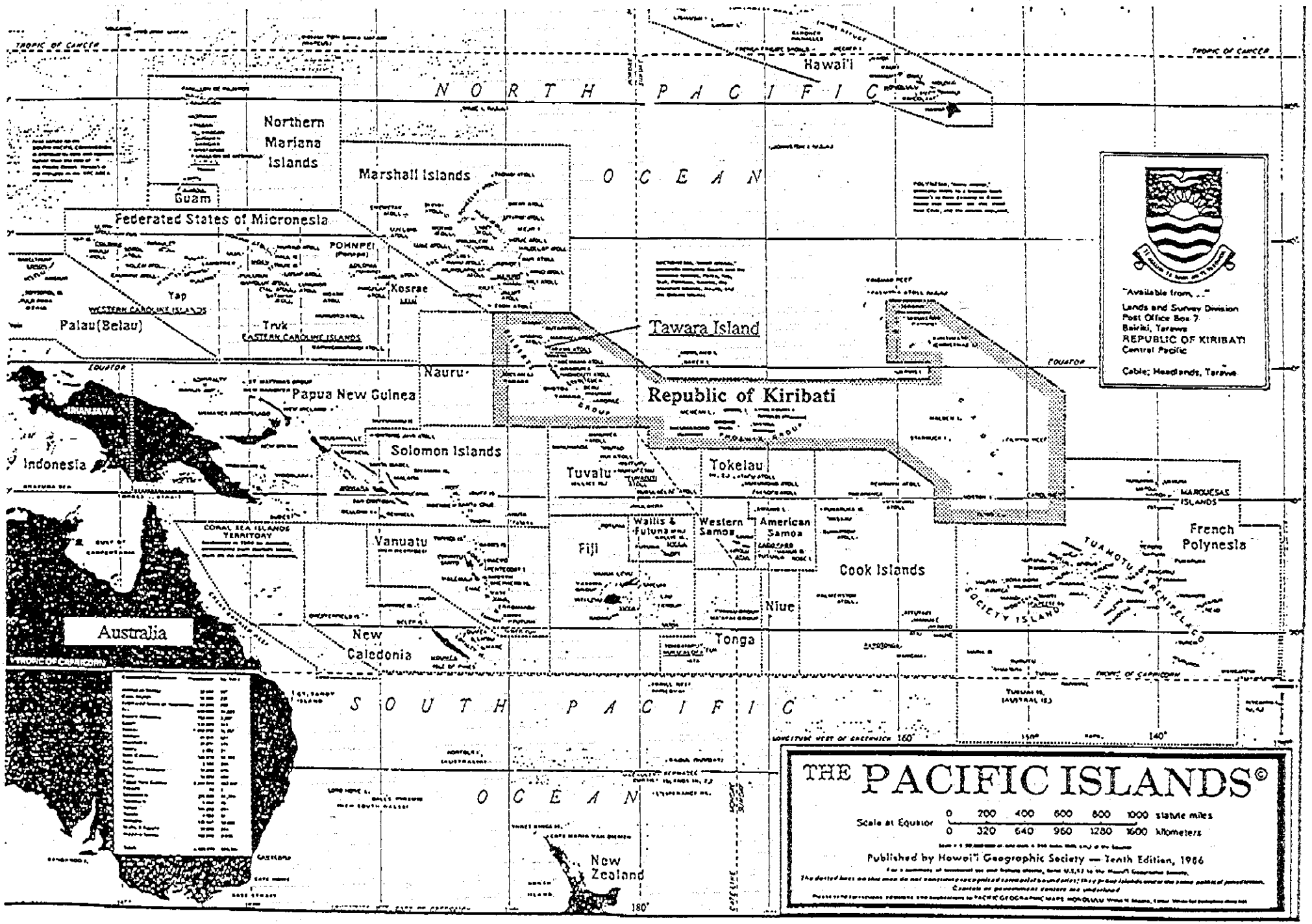
Finally, we hope that this report will contribute to further promotion of the project.

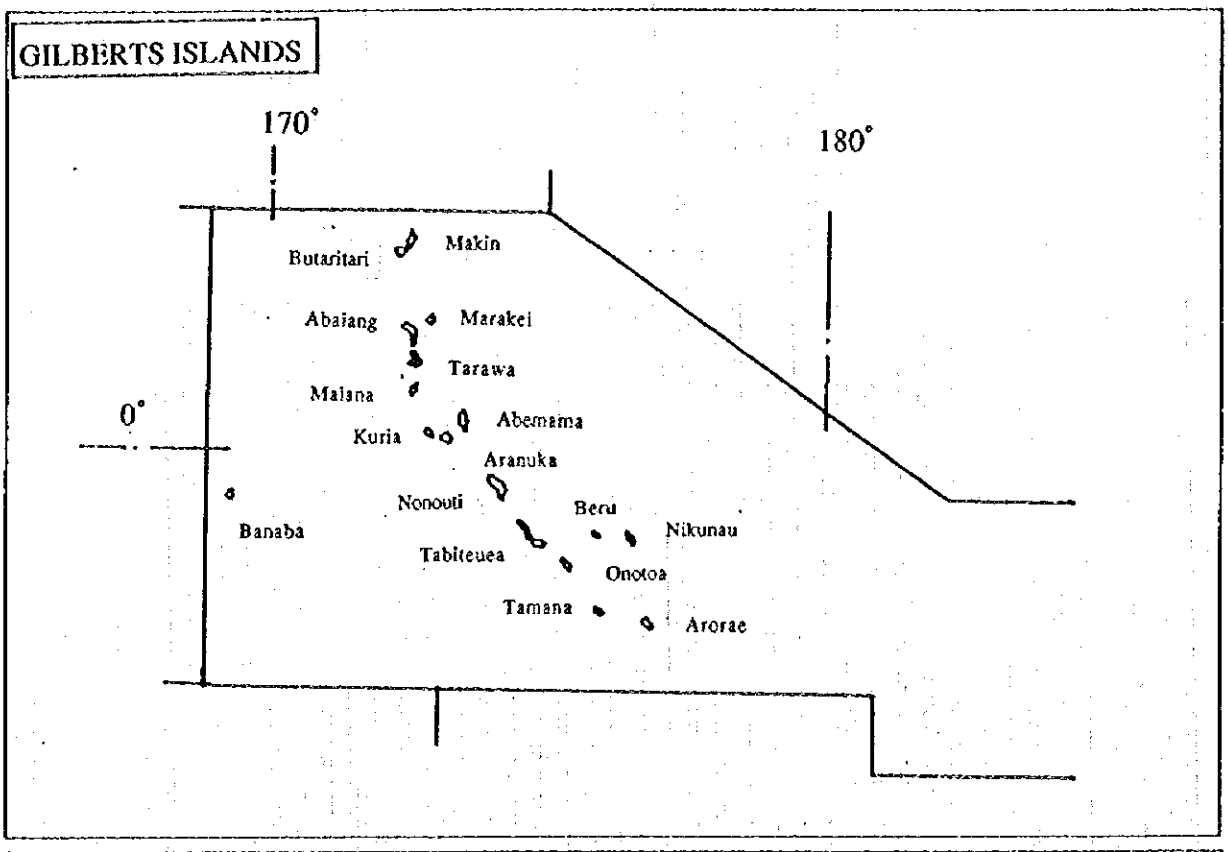
Very truly yours,

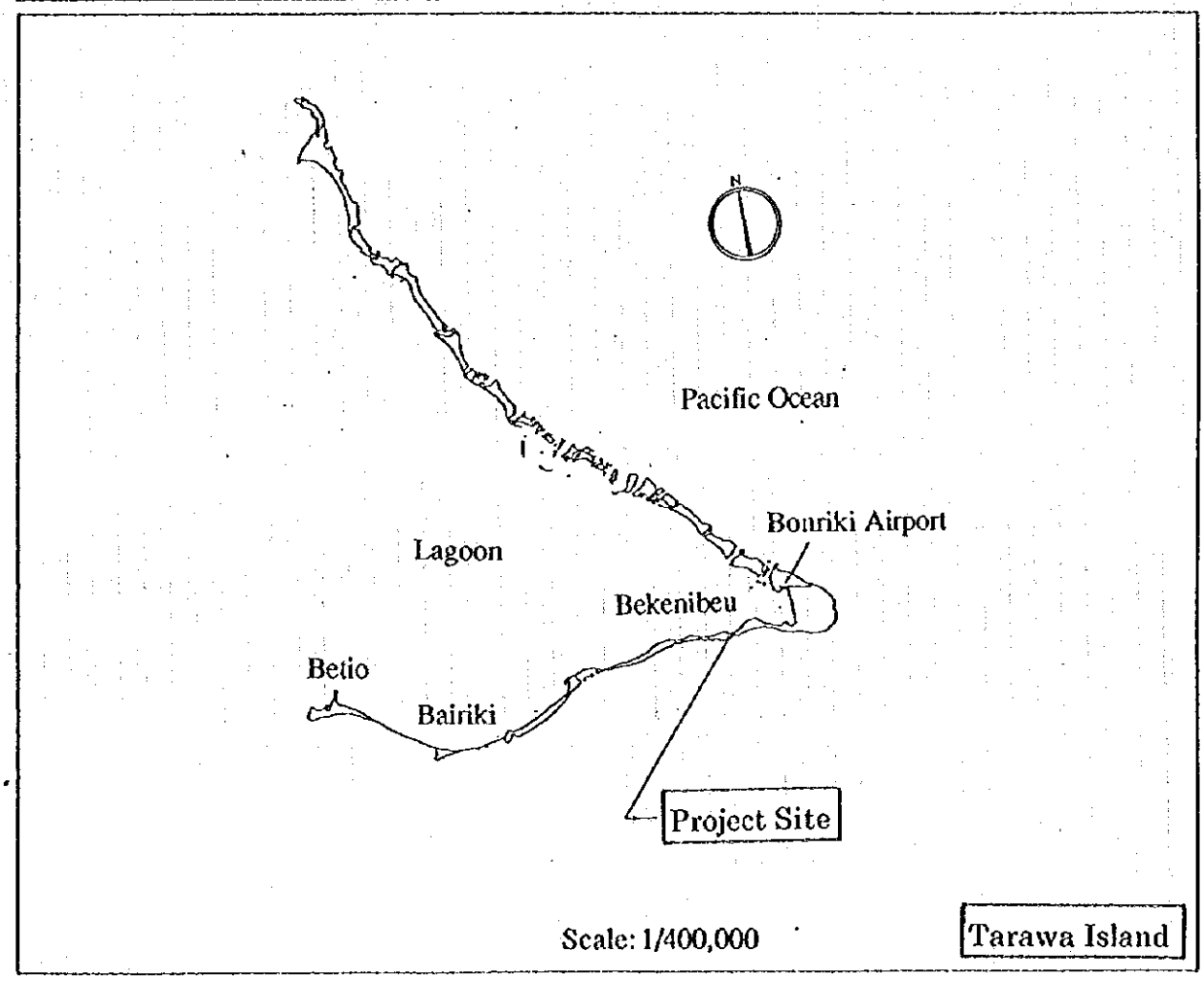


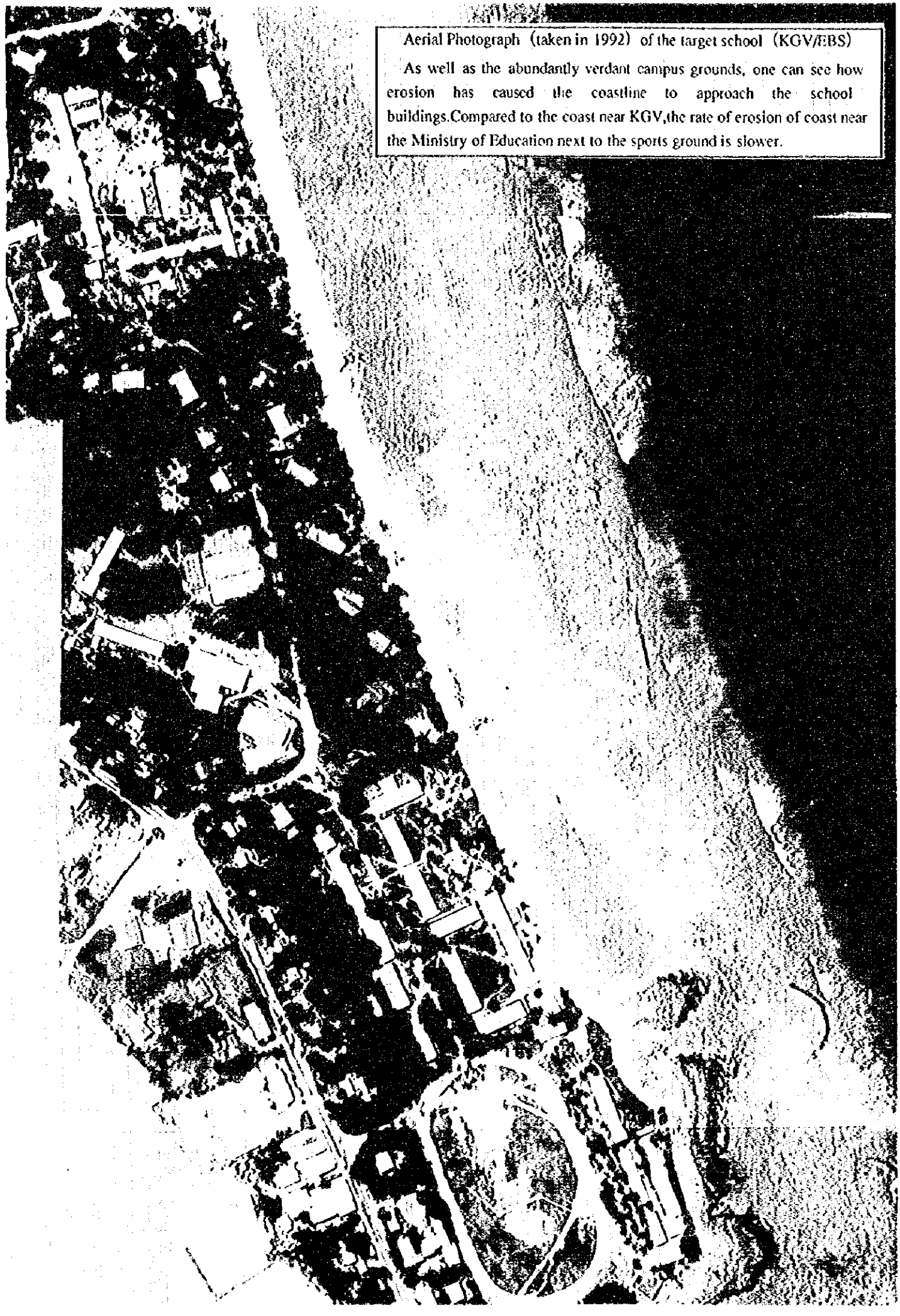
Kenji Fukunaga
Project manager,
Basic design study team on
The Project for Upgrading and Development
of KGV/EBS in the Republic of Kiribati

Fukunaga Architects-Engineers &
Raymond Architectural Design Office Inc.


NORTH PACIFIC OCEAN
SOUTH PACIFIC OCEAN
TROPIC OF CANCER
TROPIC OF CAPRICORN
EQUATOR
Hawai'i
Northern Mariana Islands
Guam
Marshall Islands
Federated States of Micronesia
POHNPEI
Kosrae
Yap
WESTERN CAROLINE ISLANDS
Palau(Belau)
Truk
EASTERN CAROLINE ISLANDS
Tawara Island
Nauru
Papua New Guinea
Republic of Kiribati
Solomon Islands
Indonesia
Tuvalu
Tokelau
Wallis & Futuna
Western Samoa
American Samoa
MARQUESAS ISLANDS
French Polynesia
Vanuatu
Fiji
Cook Islands
Niue
Tonga
New Caledonia
Australia
New Zealand
"Available from, ..."
Lands and Survey Division
Post Office Box 7
Bairiki, Tarawa
REPUBLIC OF KIRIBATI
Central Pacific
Cable; Headlands, Tarawa
THE PACIFIC ISLANDS©
Scale at Equator
0 200 400 600 800 1000 statute miles
0 320 640 960 1280 1600 kilometers
Published by Hawai'i Geographic Society — Tenth Edition, 1986

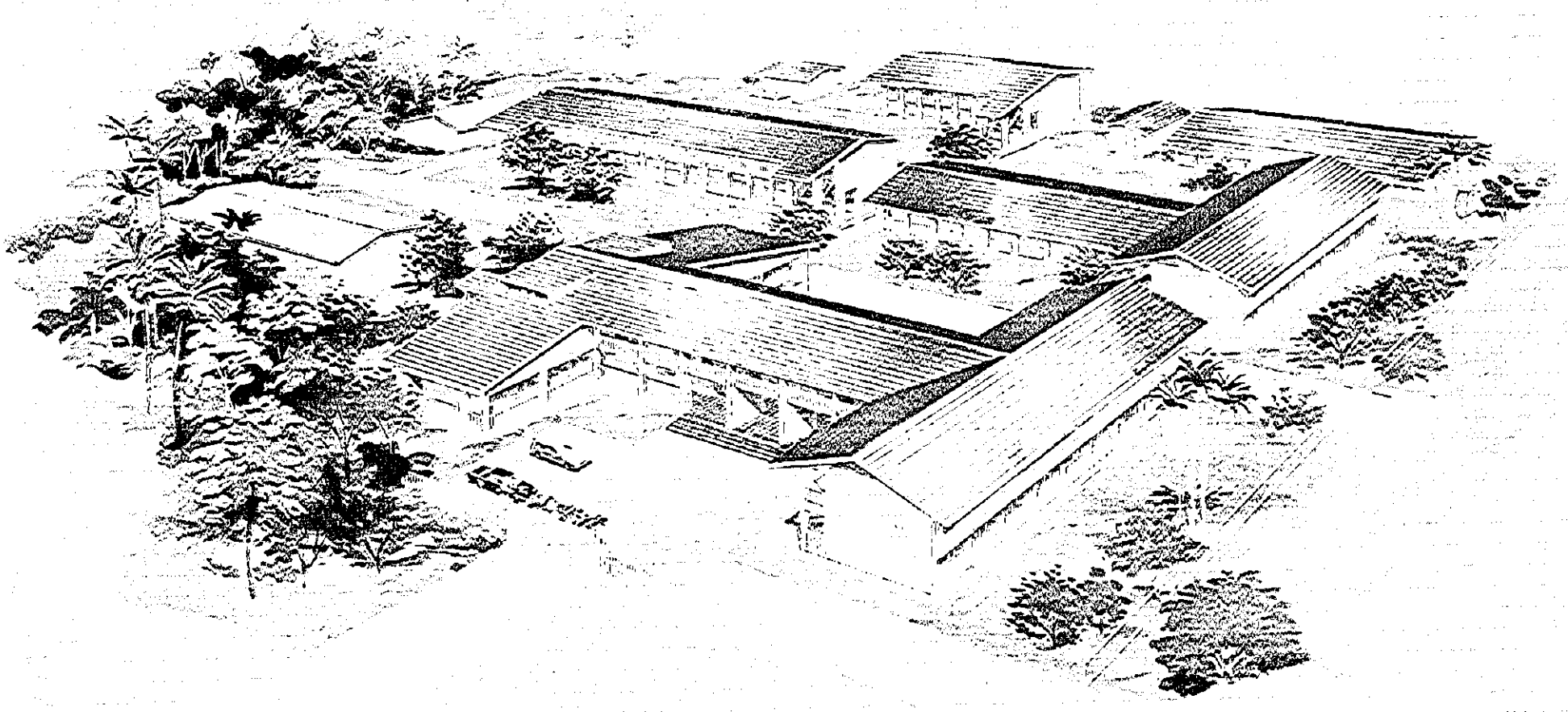

GILBERTS ISLANDS
170°
180°
0°
Butaritari
Makin
Abaiang
Marakei
Tarawa
Maiana
Kuria
Abemama
Aranuka
Nonouti
Beru
Nikunau
Banaba
Tabiteuea
Onotoa
Tamana
Arorae


N
Pacific Ocean
Lagoon
Bonriki Airport
Bekenibeu
Betio
Bairiki
Project Site
Scale: 1/400,000
Tarawa Island



Aerial Photograph (taken in 1992) of the target school (KGV/EBS)

As well as the abundantly verdant campus grounds, one can see how erosion has caused the coastline to approach the school buildings.Compared to the coast near KGV,the rate of erosion of coast near the Ministry of Education next to the sports ground is slower.



Perspective of the Project for the Improvement of Secondary Education Facilities at KGV/EBS

ABBREVIATIONS

A$	:	Australian Dollar
A/P	:	Authorization to Pay
AS	:	Australian Standards
B/A	:	Banking Arrangement
BS	:	British Standards
E/N	:	Exchange of Notes
F$	:	Fijian Dollar
PUB	:	Public Utility Board
PVU	:	Plant & Vehicle Unit
PWD	:	Public Works Division
TTFC	:	Technical Task Force Committee
US$	:	U.S. Dollar
KGV/EBS	:	King George V and Elaine Bernacchi Schoole
CEE	:	Common Entrance Examination
KJC	:	Kiribati Junior Certificate
KNC	:	Kiribati National Certificate
PSSC	:	Pacific Senior Secondary Certificate
TTC	:	Tarawa Teachers College

CONTENTS

Appendices

CHAPTER 1

BACKGROUND OF THE REQUEST

CHAPTER 1 BACKGROUND OF THE REQUEST

The Republic of Kiribati (hereinafter referred to as Kiribati) consists of 33 islands which mainly belong to the Gilbert Islands, Phoenix Islands and Line Islands located around the meeting point of the equator and the International Date Line. The total land area of some 750 km^2 is scattered over a vast ocean area of 3,879 km in the east-west direction and 2,050 km in the north-south direction. Kiribati is the most isolated country from the international market among countries in the South Pacific and its geographical conditions, including the great distances between groups of islands, have comprised a major factor stumbling block to its socioeconomic development. Kiribati has an oceanic tropical climate and South Tarawa Island, i.e. the Project Site, has annual rainfall of 1,500 mm (the dry season is from May to October while the rainy season is from November to April) and a mean annual temperature of 22 - 30℃ with high relative humidity of 75 - 80% throughout the year.

The post-independence (1979) economy of Kiribati is characterised by a 50% decline of the GDP due to the depletion of phosphate rock, once Kiribati's main export item, and the search for a new economic structure through the promotion of agriculture and fisheries with foreign assistance, is still underway. The GDP per capita in 1992 was US$ 700, a decline of 2.8% from the 1991 figure, underlining Kiribati's status as a LLDC (least less developed country). In addition to the above-mentioned geographical problem, the population is another impediment to economic development. The population of Kiribati was 72,335 at the time of a national census in 1990, more than 93% of which lived on the Gilbert Islands which account for 40% of the national land area. Approximately 25% of the total population is concentrated in an urban area of some 16 km^2 on South Tarawa Island, resulting in a high population density of 1,610 persons/km^2. The population increase rate in this particular area of 3.2%/year is also high, exceeding the national average of 2.4% (for the period from 1985 to 1990). The demographic composition shows a high percentage of people aged 18 or younger of 46% with those between 19 and 49 accounting for 11%, suggesting that the number of people of the ages for either school life or working life will increase at an annual rate of more than 3% for many years to come.

The 7th National Development Plan (1992 - 1995) is currently being implemented in Kiribati, aiming at achieving an annual real economic growth rate of 5%, diversification and promotion of economic activities to assist self-reliance and employment for cash earning, improvement of the national life and welfare and stabilisation of the economy and government finance. The Plan's highest priority items are stable development of the economy and the development of human resources (education and health).

General education in Kiribati consists of 9 years of primary education (Class 1 - Class 9) and 7 years of secondary education (Form 1 - Form 7) with the last 2 years of primary education (Class 8 and Class 9) and the first 2 years of secondary education (Form 1 and Form 2) overlapping in terms of pupil age. Primary education is compulsory and all schools are public schools. There are several vocational colleges, i.e. Tarawa Teacher Training College (TTC), Tarawa Technical Institute (TTI), Maritime Training College (MTC), Fisheries Training College (FTC) and Tarawa Nurse Training College (TNTC). The Overseas Scholarship Programme (OSP) and USP (University of the South Pacific) Regional Branch provide access to higher education abroad.

There is a total of 92 primary schools in Kiribati. Despite problems of inefficiency, largely due to geographical reasons and a shortage of facilities and equipment, the attendance ratio of primary schools, which were completely nationalised in 1990, is quite high; and therefore the Government of Kiribati considers that, as far as primary education is concerned, it has reached almost satisfactory level.

The most pressing educational issue in Kiribati is, therefore, the development and consolidation of secondary education. Unlike primary education, secondary education is heavily dependent on the church. There are 3 public schools, including 2 fairly new ones, and 7 church-run schools with 730 pupils and 2,430 pupils respectively (ratio of 1: 3.3) as of 1993. The number of primary school leavers wishing to go on to secondary education has been steadily increasing as it has trebled in the last 10 years. Due to the limited government funding, admission to public schools is restricted with the result that church-run schools have absorbed 75% of the increase in this 10 year period. Public schools (the KGV/EBS is the only public school with a history as the other 2 schools were opened in 1992 and 1995) are open to anyone regardless of religious background. In contrast, church-run schools tend to only admit the children of their respective congregations. The educational contents and school system of public schools and church-run schools slightly differ although there is a common framework of standard tests for moving to the next form, etc. For example, a Catholic school will accept those who have completed Class 8 to start in Form 2.

Most secondary schools are concentrated in the Tarawa Island area, resulting in a regional gap between urbanised Tarawa and other parts of the country and also causing a population drift towards Tarawa. In 1991, the number of secondary school students on Tarawa Island was 2,172, of which 1,089 were from Tarawa Island itself. The number of students on other islands was 672. The above figures mean that almost half (much more than half at certain schools) of the students need to board, resulting in a great gap between the students from Tarawa Island and those from other islands in terms of the economic burden, including the

transport cost, on families. There is also a large gap between public schools and church-run schools in terms of the tuition fee.

Tuition Fee by School (1992)

(Unit: A$/year)

KGV	CSC	CJC	STL	SWHS	HBHS	SPAHS	MORONE
216	460	420	150	474	474	460	267
(135)	(250)						(147)

Note: Figures in brackets exclude the boarding cost.

While the government spends approximately A$ 1,200/students for public schools (KGV) (A$ 369 are used for the uniform and meals), it only spends some A$ 70/pupil for church-run schools. In short, public schools, which teach only some 20% of all secondary school students, account for 85% of the government expenditure. The average cost of secondary education per student in Kiribati was estimated to be approximately A$ 570 in 1991 which was equivalent to 79% of the GNP per capita. This level is more than double the common 32 - 37% among LLDCs.

According to a survey conducted in 1990, the general employment situation for secondary school leavers, including those who completed Class 9 of primary education, was that 1,453 school leavers sought jobs although only 340 jobs were on offer (the employment opportunity was one in four). The situation of over-supply, however, was in fact reversed for those with a higher educational level and qualifications. In the case of those who left school after completing Form 5, Form 6 or Form 7 for example, some 170 job vacancies were on offer for some 60 - 100 school leavers, a supply shortage of 50%. The same situation has been faced by the government drive to localise government staff, i.e. efforts to appoint Kiribati people to government positions. In short, the employment opportunities for job applicants improve with the higher educational background and there is still a shortage of manpower with a high educational background to achieve national development.

The inadequate budgetary allocation to the education sector is resulting in inadequate and poor state of facilities and equipment. In particular, many special classrooms, such as scientific laboratories, are below the required standard. The seating capacity of the facilities has not been increased in line with the growing number of pupils and now appears to have reached the point where additional intake is almost impossible. Hardly any teaching equipment is available and its shortage is a major cause of the qualitative decline of education.

Under these circumstances, the Government of Kiribati has requested to the Government of Japan provision of grant aid for the urgent improvement and expansion of the facilities and equipment of the KGV/EBS which is the only public school in Kiribati providing Form 7 education.

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2.1 Objectives of the Project

The Project aims to rebuild those facilities which are obsolete, cramped and badly rundown, and to provide education materials, which are both imperfect and lacking in absolute numbers.

The intention of this is to quantitatively expand secondary education and enable a high quality form of education to be carried out. This in turn will develop the human resources that are necessary to the national development of Kiribati and provide citizens with various opportunities for obtaining employment to give them a proper income level, thus making it possible for them to achieve an improved standard of living through the possession of ample knowledge and skills.

The Project will be implemented in line with the Educational Reform Plan, a superior plan in the education sector of Kiribati, and will play a key role in the consolidation of senior secondary education envisaged by the Educational Reform Plan.

2.2 Basic Concept of the Project

2.2.1 School Size

The original request of the Government of Kiribati envisaged that the new KGV/EBS would have 700 students. In order to determine an appropriate school size, the number of new senior secondary students in the year 2000 was estimated to be 816 throughout Kiribati, of which 196 would be accepted by the KGV/EBS. Coupled with the forecast student promotion rate of each form, the total number of students at the KGV/EBS in the year 2000 was estimated to be 500. The process of the above analysis is described in further detail below.

(1) Estimated Number of Students in Kiribati

The following conditions were used for the estimation.

1) The estimation bases were the number of students in Class 2 through Class 5 of primary education in 1992 who will be in Form 5 through Form 7 in the year 2000. The figures are 2,072, 2050, 1,885 and 1,724 for Class 2, Class 3, Class

4 and Class 5 respectively.

2) Under the new compulsory education system, it is assumed that all students will go to Form 3 without leaving school.

The school enrolment trend shows that the promotion rate to Form 4 increased by 19.3% in the 6 year period from 1986 (12.7%) to 1992 (32.6%), clearly illustrating a general increase. However, in view of fluctuation of the rate since 1990, it is estimated that the increase in the next 6 years will be 5.1% (32.6% - 27.5%) or 6.8% upto the year 2000 (5.1% - 6 × 8). As the rates for Form 6 and Form 7 have widely fluctuated, the average figures of 22.6% and 44.8% respectively were taken.

- Promotion rate from Form 3 to Form 4: 39.4% $2,072 \times 0.39 = 816$
- Promotion rate from Form 4 to Form 5: 100% $2,050 \times 0.39 = 799$
- Promotion rate from Form 5 to Form 6: 22.6% $1,885 \times 0.39 \times 0.22 = 161$
- Promotion rate from Form 6 to Form 7: 44.8% $1,724 \times 0.38 \times 0.22 \times 0.44 = 65$

Consequently, the estimated number of senior secondary school students in Kiribati in the year 2000 is as follows.

- Form 4: 816
- Form 5: 799
- Form 6: 161
- Form 7: 65

Table 1 Past Trends of School Enrolment and Promotion Rate

Year	1986	1987	1988	1989	1990	1991	1992	Grade
	16.2	33.3	60.9	56.2	66.7	38.5	42.3	
	30.3	16.5	14.7	15.5	22.5	26.4	32.3	
	73.5	84.8	46.7	72.6	61.0	56.8	77.1	
Promotion	12.7	21.8	16.7	25.5	27.3	25.6	32.6	
Rate (%)	76.7	125.5	73.8	83.5	82.5	72.4	73.0	
	87.7	104.9	99.2	93.5	107.0	98.9	99.0	
	99.8	133.7	136.7	110.1	164.6	120.3	128.3	
	22.8	25.9	30.1	27.4	33.3	33.5	35.1	
	6	9	14	8	20	20	30	Form 7
	27	23	32	30	52	71	85	Form 6
	139	218	193	231	269	263	333	Form 5
	257	413	318	441	463	432	528	Form 4
	329	431	528	561	597	723	692	Form 3
	411	532	600	558	731	699	748	Form 2
No. of	398	439	507	444	581	583	653	Form 1
Students	1,695	1,687	1,619	1,745	1,741	1,862	1,887	Class 7
			1,597	1,576	1,646	1,747	1,724	Class 6
			1,509	1,641	1,752	1,749	1,885	Class 5
			1,584	1,710	1,656	1,888	2,115	Class 4
			1,608	1,741	1,925	2,077	2,050	Class 3
			1,667	1,776	2,090	2,093	2,072	Class 2
			2,002	2,160	2,195	2,257	2,383	Class 1

(2) Estimated Number of Students of KGV/EBS

The number of students attending the KGV/EBS was estimated by subtracting the estimated number of students attending church-run private secondary schools and other state schools from the total number of students. In 1992, 440 students moved up from Form 3 to Form 4 in church-run secondary schools and the total number of students which moved up from Form 4 through Form 6 was 746. Assuming that the students increase rate is roughly in line with the population growth rate, the 440 students in Form 4 in 1992 will increase to 520 in 2000. The number of Form 6 students in 2000 will be 77 provided that the current promotion rate continues.

In addition to the KGV/EBS, there are also 2 other public secondary schools and these 2 schools should take some 100 (50 × 2) Form 4 students in 2000. Based on the above estimation, the number of students at the KGV/EBS and other schools in 2000 is estimated as shown in Table 2.

Table 2 Estimated Number of Senior Secondary School Students in 2000

	Form 4	Form 5	Form 6	Form 7	Total
Church-Run Schools	520	520	77	0	1,117
Other Public Schools	100	100	0	0	200
KGV/EBS	196	179	84	65	524
Total	816	799	161	65	1,841

(3) Calculation of Required Number of Classrooms for KGV/EBS

Based on the estimated number of students of the KGV/EBS and the assumption that the class capacities of Form 4/Form 5 and Form 6/Form 7 are 30 and 20 respectively, the number of classrooms required by the KGV/EBS is calculated as shown in the following table.

	Form 4	Form 5	Form 6	Form 7	Total
Estimated Number of Students	196	179	84	65	524
Class Capacity	30	30	20	20	-
No of Classrooms	6	6	4	3	19
Total Capacity	180	180	80	60	500

2.2.2 Outline of the Project

(1) Examination of Requested Contents

1) General Classrooms

Although the original request envisaged that the reorganized KGV/EBS would have 700 students, the appropriate size is set at 500 based on the assumed number of students in Kiribati in the year 2000.

2) Special Rooms

• Science Laboratories

Based on the expected curriculum and number of students of each form, 2 general science laboratories, one chemistry laboratory, one physics laboratory and one biology laboratory have been planned.

- Computer Room and Language Laboratory

  The computer room will have a capacity of 30 students as in the case of a general classroom. A language laboratory is omitted from the scope of the Project due to the difficulty of maintaining language training equipment.

- Domestic Science Room and Music Room, etc.

  These rooms for non-compulsory subjects have been planned in appropriate sizes, calculated on the bases of the past popularity, and in view of their essential provision for integrated education even though the number of students using these rooms is expected to be relatively small.

3) Shower Rooms, Locker Rooms, Washbasins, Toilets and Laundry, etc.

   In view that the existing ablution blocks for boy's dormitory out of order with the buildings old and unsafe; a new ablution facility has been planned.

4) Educational Equipment

   With regard to the requested items, screening has been carried out on the basis of the necessities and appropriateness during the field survey and the analysis work in Japan.

(2) Outline of Project Components

As a result of the survey on the education in Kiribati, and the present situation of KGV/EBS and examining the contents of the request, it has been decided that the following facilities should be included in the Project.

1) Facilities

• General Classrooms	: Type A (Form 4 and Form 5)
	Type B (Form 6 and Form 7)
• Special Rooms	
Science Laboratories	: General Science Laboratory
	Chemistry Laboratory
	Physics Laboratory
	Biology Laboratory
Domestic Science Rooms	: Sewing Room
	Cookery Room
Workshops	: Woodwork Workshop
	Metalwork Workshop
	Graphic Communication Workshop

Typing/Computer Room
Music Room
Dark Room

- Administration

Principal's Office
Deputy Principal's Office
Boy's Educational Counselor
Girl's Educational Counselor
Administration Office
Textbook Centre
Storage

- Staff Room
- Toilets and Corridors, etc.

2) Educational Equipment

- Common Use Equipment : Pocket Calculators
- Computer Room : PCs, etc.
- Domestic Science Rooms : Cookery Equipment, etc.
- Applied Technology : Tools, etc.
- Art : Easels, etc.
- Music : Keyboards, etc.
- Science : Microscopes, etc.
- Physical Training : Tennis balls, etc.

(3) Continued Use of Existing Facilities

Of the existing facilities of the KGV/EBS, the library, assembly hall, canteen, boys' dormitory and girls' dormitory will continue to be used.

(4) Temporary Facilities Plan

With regard to the existing buildings which will be rebuilt under the Project, temporary facilities must be provided during the construction period.

1) Buildings to be Removed Prior to Commencement of Construction Work

- Physics and Chemistry Laboratory Building: approximately 269 m^2

General Classroom : 1
Physics Laboratory : 1
Preparation Room for the above : 1
Chemistry Laboratory : 1
Preparation Rooms for the above : 2

- Workshop Building: approximately 197 m^2
  Graphic Communication Workshop
  Woodworking Workshop
  Metalworking Workshop
- Administration Building: approximately 162 m^2
  Principal's Office
  Deputy Principal's Office
  Administration Office
  Toilet
  Storage
- Ladies Toilet

The total floor area of the existing facilities for which temporary facilities will be required is approximately 630 m^2.

2) Temporary Facilities

- All of the remaining school buildings are to be utilized, and in addition some of the old hospital buildings (the old outpatients block of approximately 200 m^2, the old surgery block of 200 m^2, and the old dining hall of 275m^2) may be renovated and used temporarily.

  Regarding the supply of water to the laboratories, a temporary elevated water tank shall be used in order to minimize costs.

- Women's toilets shall be temporarily provided in the area to the north of the library before the commencement of the works.

(5) Examination of Design Conditions

A technical examination of the scope of each type of facility and relevant equipment included in the Project has been conducted.

1) Calculation of Required Number of Special Rooms

The special rooms are largely classified into 2 groups, i.e. those for compulsory subjects and those for optional subjects. The required number of rooms has been calculated for each special room type.

a) Compulsory Subjects

- General Science Laboratory (for Form 4 and Form 5)

  Form 4: 5 periods/week × 6 classes = 30

  Form 5: 5 periods/week × 6 classes = 30

  Total: 60 class hours/week

  Maximum periods/week/laboratory: 6 periods/day × 6 days = 36

  60 ÷ 36 = 1.66 = 2 laboratories

- Physics, Chemistry and Biology Laboratories (Form 6 and Form 7)

  Form 6: 6 periods/week × 2 classes (for science course only) = 12

  Form 7: 4 periods/week × 2 classes

  (2 science course classes are formed) = 8

  Total: 20 class hours/week

  20 ÷ 36 = 0.55 = 1 laboratory each

- Typing/Computer Room (Form 4, Form 5 and Form 6)

  Form 4: 1 period/week × 6 classes = 6

  Form 5: 1 period/week × 6 classes = 6

  Form 6: 0.75 periods/week × 2 classes

  (for the liberal arts course only) = 1.5

  Total: 13.5 class hours/week

  13.5÷ 36 = 0.375 = 1 room

b) Optional Subjects

The number of students taking an optional subject significantly varies from one subject to another depending on popularity. For calculation of the required number of rooms for optional subjects, it is assumed that 180 students each from Form 4 and Form 5 and 40 Form 6 students (those choosing the liberal arts course) evenly take up the available optional subjects (10 subjects for Form 4 and Form 5 and 8 subjects for Form 6). The resulting number of students is 18 for each optional subject in Form 4 or Form 5 and 5 for each optional subject in Form 6.

The size of each room should at least be capable of absorbing the present variation of the number of students which reflects the varying popularity of each subject (see Table 3).

- Applied Technology

  Assuming that 18 students each from Form 4 and Form 5 are divided into 2 groups (woodwork and metalwork), the use of each workshop will be 10 periods/week.

  5 periods/week x 2 = 10
  10 ÷ 36 = 0.28 = 1 workshop each
  Workshop utilisation rate: 28% (class capacity: 9)

- Graphic Communication Workshop

  Form 4: 18 students
  Form 5: 24 students
  (reflecting the popularity of the subject; see Table 3)
  2 groups for Form 4
  3 groups for Form 5
  5 periods/week x 5 groups = 25 periods/week
  25 ÷ 36 = 0.69 = 1 workshop
  Workshop utilisation rate: 69% (class capacity: 9)

Table 3 Current Variation of Number of Students for Optional Subjects

	Form 4	Form 5	Form 6 (Liberal Arts)
Applied Technology	5.3%	8.9%	-
Graphic Communication	7.4%	**13.4%**	-
Cookery	**10.6%**	6.7%	**18.5%**
Sewing	2.1%	3.3%	3.7%
Art	2.1%	5.6%	0.0%
Music	8.5%	4.5%	11.0%
Average	(10 subjects) 10%	(10 subjects) 10%	(10 subjects) 10%
Planned Number of Students	180	180	40

Note: The thick figures means more than these average

- Cookery Room

  Form 4: 19 (reflecting the popularity of the subject)

  Form 5: 18

  Form 6: 7 (reflecting the popularity of the subject)

  Form 4 and Form 5 are divided into 2 groups each

  5 periods × 4 + 3 periods × 1 = 23

  23 ÷ 36 = 0.64 = 1 room

  Room utilisation rate: 64% (class capacity: 10)

- Sewing Room, Art Room, Music Room

  As the number of students taking these subjects is currently lower than the average figure, the average figure is used to calculate the room requirement.

  Form 4: 18

  Form 5: 18

  Form 6: 5

  Form 4 and Form 5 are divided into 2 groups each

  5 periods × 4 + 3 periods × 1 = 23

  23 ÷ 36 = 0.64 = 1 room each

  Room utilisation rate: 64% (class capacity: 10)

Table 4 Number of Class Periods/Week by Subject

SUBJECT	FORM-4	FORM-5	FORM-6 (ART)	FORM-6 (SCI.)	FORM-7 (ART)	FORM-7 (SCI.)	TOTAL (ART)	TOTAL (SCI.)
MATHEMATICS	5	5	6	6			11	11
MF-11, 21 (数学)					4	4	4	4
GENERAL SCIENCE	5	5					10	10
CHEMISTRY				6		7		13
PHYSICS				6		7		13
BIOLOGY				6		7		13
GEOGRAPHY	5	5	5		4		19	10
HISTORY	5	5	5		4		19	10
SOCIOLOGY					4		4	
ENGLISH	5	5	4	4			14	14
ENGLISH LITERATURE			3	3			3	3
LLF-11, 21					4	4	4	4
KIRIBATI STUDIES	(5)	(5)	(3)				(13)	(10)
APPLIED TECHNOLOGY	(5)	(5)					(10)	(10)
GRAPHIC COMMUNICATION	(5)	(5)					(10)	(10)
COOKERY	(5)	(5)	(3)				(13)	(10)
SEWING	(5)	(5)	(3)				(13)	(10)
COMPUTING	6/6	6/6	3/4				2.75	2
ACCOUNTING	(5)	(5)	(3)		3		3-(16)	(10)
ART	(5)	(5)	(3)				(13)	(10)
MUSIC	(5)	(5)	(3)				(13)	(10)
PHYSICAL EDUCATION	1	1	1	1			3	3
RELIGIOUS EDUCATION	(5)	(5)	(3)				(13)	(10)
TOTAL	32	32	27.75	31	23	29	114.75	124

Note: Those in brackets are optional subjects.

2) Room Details

[General Classrooms]

No.	Room	Details	Floor Area (m^2)
1	Type A	for Form 4 and Form 5 (30 students/class) 72.96 m^2 × 12 (2.43 m^2/pupil)	872.52
2	Type B	for Form 6 and Form 7 (20 students/class) 48.64 m^2 × 7 (2.43 m^2/students)	340.48
Total			1,216.00

[Special Rooms]

No.	Room	Details	Floor Area (m^2)
1	General Science Laboratory	for Form 4 and Form 5 97.28 m^2 × 2 Laboratory Tables: 5 Preparation Room: 24.32 m^2	218.88
2	Chemistry Laboratory	for Form 6 and Form 7 97.28 m^2 Laboratory Tables: 7 Preparation Room: 24.32 m^2	121.60
3	Physics Laboratory	for Form 6 and Form 7 97.28 m^2 Laboratory Tables: 7 Preparation Room: 24.32 m^2	121.60
4	Biology Laboratory	for Form 6 and Form 7 97.28 m^2 Laboratory Tables: 7 Preparation Room: 24.32 m^2	121.60
5	Sewing	72.96 m^2 Work Tables: 3 Preparation Room: 14.08 m^2	87.04
6	Cookery	72.96m^2 Sink Tables, Gas ranges Tables: 3, Preparation Room: 14.08 m^2	87.04
7	Woodworking Workshop	Machine Tools Work Tables: 3	92.16
8	Metalworking Workshop	Machine Tools Work Tables: 3	92.16
9	Graphic Communi-cation Workshop	Drawing Boards: 10	72.96
10	Typing/ Computer Room	PCs: 30	109.44
11	Music Room	10 - 15 desks 72.96 m^2 Preparation Room: 10.24 m^2	83.20
12	Art Room	10 - 15 Easels	72.96
13	Dark Room	Sink and Work Table	10.24
Total			1,290.88

[Administration]

No.	Room	Details	Floor Area (m^2)
1	Principal's Office	Similar to present office	36.48
2	Deputy Principal's Office	Similar to present office	36.48
3	Senior Master's Office	Similar to present office	18.24
4	Senior Mistress' Office	Similar to present office	18.24
5	Administration Office	Some 30 staff members, including 5 clerical staff members	72.96
6	Resource Center	Textbook distribution and sales counter	57.76
7	Staff Room	30 - 35 teachers (approximately 4.5 m^2/teacher)	145.92
Total			386.08

[Miscellaneous]

No.	Room	Details	Floor Area (m^2)
1	Toilets and Corridors, etc.	Corridor width: 2 m Storage : 24.32 m^2 Toilets: staff, boys' and girls' toilets	1,344.96

Shower and Toilet for Boy's Dormitory

No.	Room	Details	Floor Area (m^2)
	Toilet, shower, wash basin, laundry room	Showers : 10 Toilets : 8	72.68

(6) Size and Composition of Planned Facilities m^2

Category	Room	No.	Ground Floor	First Floor	Total
General Classrooms					1216.00
	- Type A (Form 4 and Form 5)	12	437.76	437.76	875.52
	- Type B (Form 6 and Form 7)	7		340.48	340.48
Special Rooms					1290.88
	- Science Laboratories				583.68
	General Science Laboratory	2	218.88		
	Chemistry Laboratory	1	121.60		
	Physics Laboratory	1	121.60		
	Biology Laboratory	1	121.60		
	Typing/Computer Room	1		109.44	109.44
	- Applied Technology				257.28
	Woodworking Workshop	1	92.16		
	Graphic Communication Workshop	1	72.96		
	Metalworking Workshop	1	92.16		
	- Home Economics				172.16
	Cookery	1	87.04		
	Sewing	1		85.12	
	- Others				168.32
	Music	1		85.12	
	Art	1	83.20		
Administration			240.16	145.92	386.08
	Principal's Office	1	36.48		
	Deputy Principal's Office	1	36.48		
	Senior Master's Office	1	18.24		
	Senior Mistress's Office	1	18.24		
	Office	1	72.96		
	Resource Centre	1	57.76		
	Staff Room	1		145.92	
Miscellaneous					1344.96
	Corridors and Staircases	1	720.4	492.16	1212.56
	Storage	1		24.32	24.32
	Toilets	1	108.08		108.08
	Total		2717.60	1720.32	4237.92

Toilet/Shower Unit for Boy's Dormitory

Toilet/Shower Unit			72.68
	TOTAL		4310.60

As described so far, the basic framework of the Project is the provision of new educational facilities and equipment (in addition to the continuous use of some of the existing facilities and equipment) for senior secondary education at the KGV/EBS, which is the only public senior secondary school in Kiribati providing Form 7 education, to accommodate some 500 students as required of the school based on the assumed senior secondary school enrollment in the year 2000.

2.3 Basic Design

2.3.1 Design Concept

(1) Design of Facilities

The following principles will be adopted for the design of the facilities.

1) The design must be practical. As the KBV/EBS will act as the highest educational institution in Kiribati, the building design should reflect its status and should fill the students with pride and give them an incentive to study hard. However, the main emphasis should be on durability and excessive decoration or unnecessarily high grade features should be avoided.

2) The intentions of the Kiribati side must be respected. The facilities must be planned so as to allow educational practices in line with the educational policies in Kiribati and to reflect the local lifestyle, etc.

3) The available land should be efficiently used. Land is extremely precious in Kiribati, particularly on South Tarawa Island and, therefore, efficient land use must be of the highest priority. It will be necessary to leave some empty space on the campus for possible extension in the future. Accordingly, the new building will have two stories in part.

4) The building specifications should be appropriate vis-a-vis the local climate. There is a popular building style in Kiribati which suits the country's sub-tropical climate. This style comprises open corridors, building layout which allows wind to pass through, much use of glass louvres, slanted roof and deep eaves, etc.

5) The building specifications must take the conditions of the local construction industry into consideration, particularly the supply prospect of construction materials.

6) One important planning consideration is the minimisation of the initial financial commitment on the part of the Government of Kiribati and the subsequent maintenance cost level. The present staffing strength and budget size should be appropriate vis-a-vis management of the new facilities.

7) The composition of the facilities should conform to the educational system in Kiribati.

8) Flexible use of the facilities should be ensured.

(2) Basic Principles for Equipment Selection

1) The requested order of priority should, in principle, be respected.

2) Those items which appear unnecessary should be omitted from the scope of procurement and duplication of the existing equipment should be avoided.

3) The training and laboratory equipment should be fully compatible with the curriculum and syllabus.

4) The equipment to be selected should be compatible with the ability and numerical strength of the teaching staff.

5) Priority should be given to basic tools and equipment.

6) One key selection principle is easy handling and maintenance, including storage.

7) Equipment requiring the mass supply of expendables and regular maintenance visits by outside engineers should not be selected.

8) A power supply stabilisation unit for the personal computers will be introduced to combat voltage fluctuations in view of the steady operation of these computers.

(3) Principles to Determine Equipment Quantity

1) Given the maximum class size of 30 students (20 for Form 6 and Form 7 and 20 for optional subjects), the maximum number of tools/equipment to be provided is 30 per item if used individually.

2) Equipment of which the use by a group of students is desirable will be provided at a rate of one piece of equipment per 4 - 5 students.

3) One piece of equipment will be provided for the teacher for demonstration to the entire class.

4) One piece of equipment each to be used for demonstration purposes will be provided.

5) Spare parts for equipment and materials procured will be set at 2-5% of the initial procurement.

2.3.2 Basic Design

(1) Layout Plan

The basic principles for planning the facility layout are that the building foundations must be at least 30 m from the coastline in consideration of coastal erosion, that a playground area should be secured and that, if possible, the existing buildings should not be affected (to minimise the cost of providing temporary facilities during the construction period). In addition, the existing large trees will be kept in order to create a matching landscape for the buildings and the campus roads. The functional integrity of the new building and old buildings will also be maintained. The selected site which best meets all these planning principles covers part of the existing school buildings, including the administration building, and part of the playground. Replacement of the administration building is included in the scope of the Project.

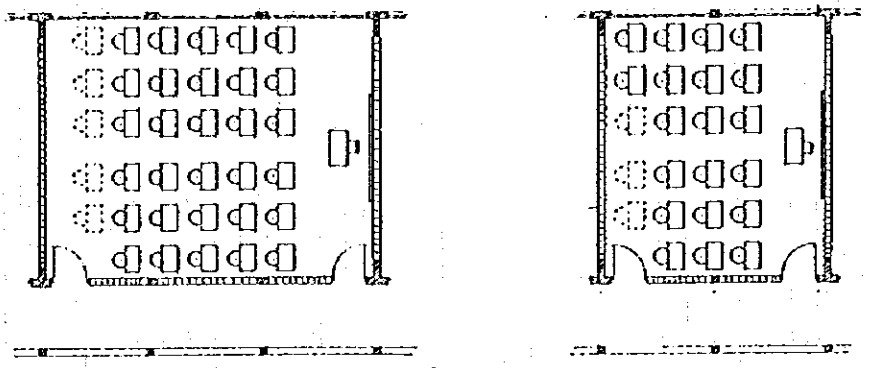
Functional zoning is introduced in the layout of the new facilities based on the separation of general classrooms and special rooms and the separation of students of different forms. As the existing access road to the campus is far from the Project Site, the existing road linking the playground will be made into a new access road. The new administration building will be located near this new access road.

(2) Building Plan

1) Floor Plan

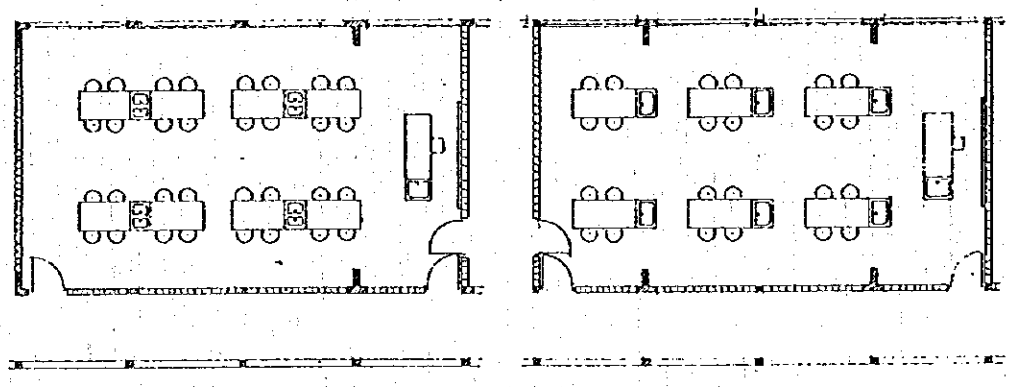
The unit module size for the new facilities to be constructed under the Project is 9.6 m × 9.6 m (inclusive of corridor width). The minimum structural unit is 7.6 m (9.6 m - corridor width of 2 m) × 3.2 m (9.6 ÷ 3) and all room sizes are determined based on this minimum structural unit. The floor size and shape of each room are decided based on the purpose of use and type and quantity of the equipment to be installed. The furniture layout of the main rooms, reflecting the purpose of use of each room, is shown below.

Fig. 2 General Classrooms



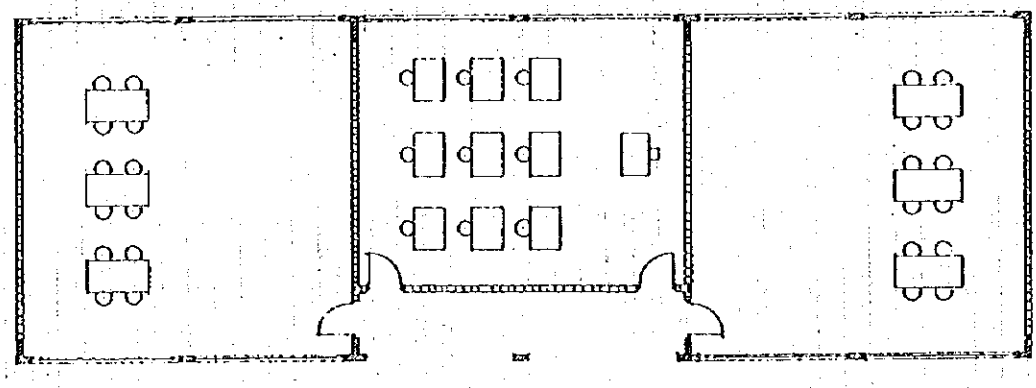
Type A Type B

Fig. 3 Science Laboratories



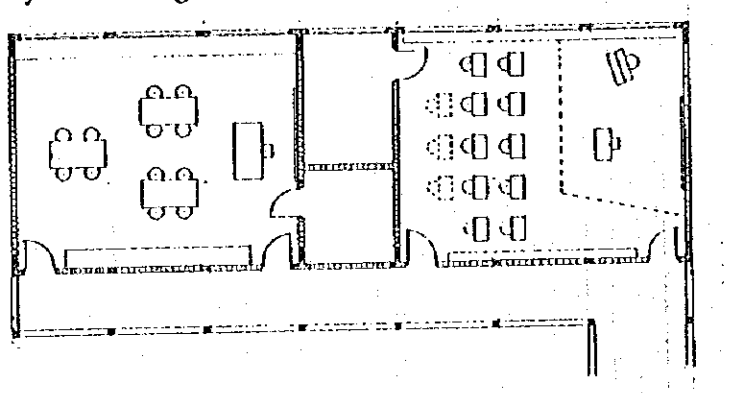
General Science Chemistry, Physics and Biology

Fig. 4 Workshops for Applied Technology



Metalworking Graphic Comm. Woodworking

Fig. 5 Cookery and Sewing Rooms



Cookery Room Sewing Room

Fig. 6 Room

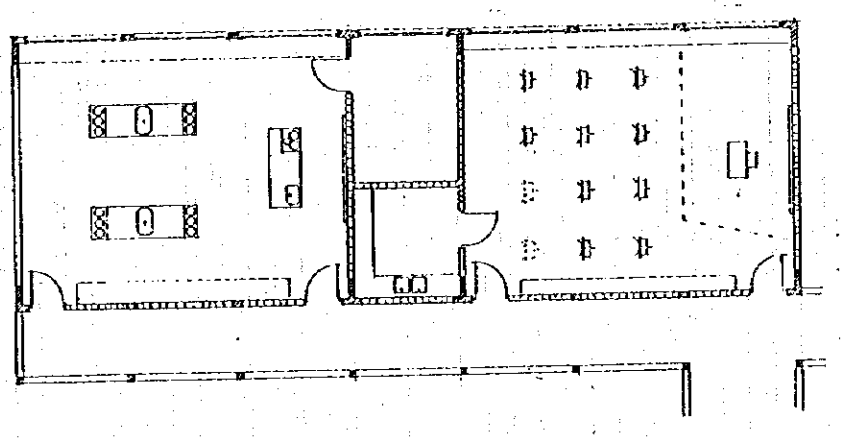
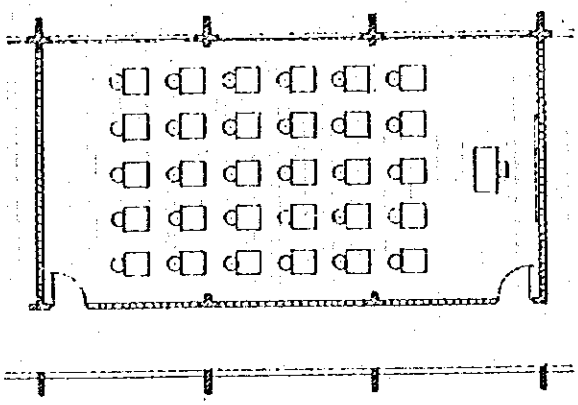


Fig. 7 Typing/Computer Room



The general classroom size is decided on the grounds that the desks (45 cm × 75 cm) and chairs currently used at the KGV/EBS will continue to be used. The resulting floor area per student is larger than the Japanese standard but is deemed appropriate in view of a possible increase of the class size of upto 15% in the future, the larger pupil body than the Japanese equivalent and the necessity to ensure a sufficient air volume in the face of high temperatures.

The planned size of the science laboratories is slightly larger than that of the existing laboratories (92.2 m^2) but is deemed appropriate in view of the inclusion of an observation table on the window side and specimen shelves on the corridor side.

Although the floor sizes of the existing sewing room and cookery room are 84.9 m^2 and 105.5 m^2 respectively, the floor sizes of the new rooms are decided based on the appropriate distribution of the work tables. The floor size of the typing/computer room is similarly decided based on the distribution of the work desks. While the existing music room and art room have a floor area of 86.1 m^2 each, the floor size of the new music room and art room, which is slightly smaller than the previous floor size, is decided based on the distribution of desks in the case of the music room and easels in the case of the art room.

2) Cross-Section

Given the precious nature of land in general in Kiribati (where most of the land used by public buildings is rented, making its efficient use essential) and the requirements at the site (provision of a playground, etc.), a two storey building which is single storey in part is planned.

The slanting roof will have a wooden framework covered by sheet iron. Plenty of loft space will be provided and efficient ventilation is promised by air vents installed in the gable walls and below the eaves to efficiently suppress a rise of the room temperature. The deep eaves should effectively deal with strong sunshine and rain. The high ceiling (H = 2.8 m) inside will provide a large internal air volume. Together with large window openings on 2 sides to facilitate natural ventilation, pleasant room conditions should be achieved.

The ground floor height is set at approximately 0.7 m above ground level to nullify slight land undulations and also to prevent the incursion of sand into the building. A rainwater storage tank will be introduced under part of the building using the foundation beams. Fig. 7 shows the standard cross-section of the planned new school building.

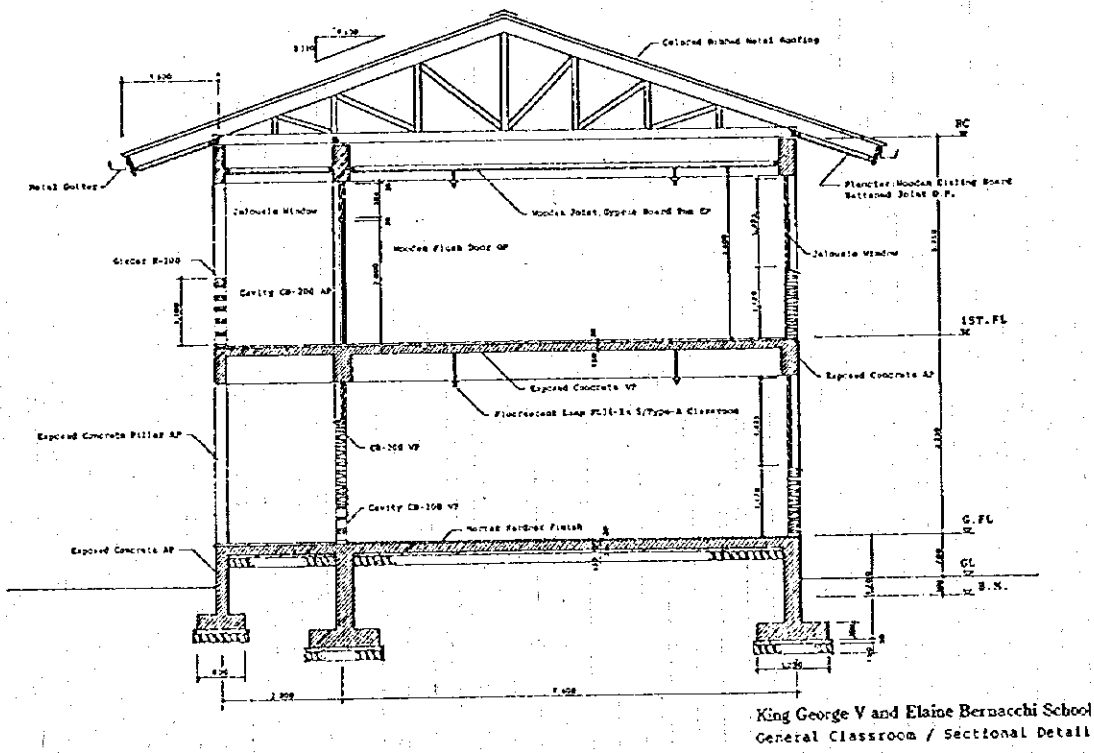


Fig. 8 Standard Cross-Section

3) Structural Plan

As the Project Site is located along the coast, it is essential that the structural materials to be used have strong resistance to salt damage. The main structure will be reinforced concrete (RC) with a wooden roof truss to provide reliability, durability and economy of the construction work as well as easy maintenance.

The foundations will be spread foundations, the reliability of which is confirmed by test drilling data as well as plate bearing test data (allowable bearing capacity at GL -1 ~ 1.5 m: 18 tf/m^2 for long-term and 38 tf/m^2 for short-term). In regard to the use of walls as pillars and the use of concrete blocks as heavy outer walls and partition walls, the lower section of the underground beams will be made of continuous footing to continuously relay the wall load to the said beams.

In regard to loads which constitute the basis for the structural design, Australian Standards (AS) will, in principle, be used and such factors relating to natural conditions as the wind load and seismic load will be decided based on local observation data. The types of load considered for the structural design are as follows.

- Dead Load : Real load of structural members and finishing materials, etc. which are components of the building.
- Live Load : The live load for such ordinary rooms as the administration office and classrooms is decided based on the SAA Loading Code as given below.
  - General Classroom 230 kg/m^2
  - Workshop 300 kg/m^2
- Wind Load : Based on past observation data; using a maximum wind velocity of approximately 30 m/sec with a return period of 100 years, the design wind load is set at 90 km/m^2 (for a building of upto 10 m in height).
- Seismic Load : Minor seismic waves have been observed in the past. Although the sizes of the waves are negligible to be considered in the design of the structure of the buildings, the design load which is large enough to withstand seismic intensity of 2 has been employed in the calculation.

The type of concrete to be used as a structural material will be normal Portland cement. A concrete plant will be established on site to weight and mix the concrete. The use of an anti-rust agent will be considered in view of the use of coastal sand which contains salt.

4) Equipment Plan

i) Air-Conditioning and Ventilation Equipment

a) Air-Conditioning

The new school building will be located just less than 100 m from the coastline and will, therefore, be vulnerable to salt damage and the incursion of blowing sand into the rooms, making it essential that the utmost care be taken in the handling of very sensitive electronic equipment. In order to protect computers, the computer room will be a closed room equipped with the following air-conditioning.

- Air-conditioning System : wall-through type
- Conditions : 27℃ (temperature) and 60% (relative humidity)

b) Ventilation

The mean annual temperature and mean relative humidity on Tarawa Island are 28℃ and more than 70% respectively, frequently presenting a daunting daytime living (educational) environment of well over 35℃ and 80%. In order to combat such a negative environment, a propeller fan will be installed in the classrooms and administration office while a wall-mounted extractor fan will be installed in the cookery room as well as in the science laboratories. A specially designed extractor fan will be fitted in the dark room.

ii) Plumbing Work

Both fresh water and seawater will be supplied to the premises. There are 3 fresh water supply sources, i.e. municipal water, rainwater and groundwater. Municipal water will be directly supplied using pressure to underground water tank (A) located below the elevated water tank. The rainwater collected on the roof surface will be stored in underground water tank (B) located below the new school building via the roof gutter and will then be pumped to water tank (A) together with groundwater. The fresh water stored in water tank (A) will be pumped to the elevated water tank for subsequent distribution using the gravity system. (See Figure 9)

Seawater will be used to flush the toilets and will be stored in underground water tank (A'). It will then be pumped to an elevated water tank for distribution.

Fresh water will be supplied to various rooms (science laboratories, cookery room, workshops and art room), the administration office and toilets (for washbasins).

a) Water Supply System

- Main underground water tank for rainwater storage (B) and elevated water tank capacities

Estimated consumption volume

Laboratories	: 60 times/day	× 0.5 tons	=	30.0 tons/day
Cookery Room	: 6.6 times/day	× 0.6 tons	≒	4.0 tons/day
Washbasins	: 0.005 tons/day	× 500 students	=	2.5 tons/day
	Total			36.5 tons/day

- Assuming that the period for fresh water to stay clean through circulation inside the tank without chlorination is 2 weeks and that the effective storage rate is 80%, the required capacity of water tank (B) is 450 tons as calculated below.

  36.5 tons/day × 10 days (school opening days in 2 weeks) ÷ 0.8 =
  456.25 tons = 450 tons

- The storage capacity of water tank (A) below the elevated water tank is decided to be 90 tons to deal with 2 days' consumption and the storage capacity of the elevated water tank for fresh water is decided to be 20 tons.

- The storage capacities of the underground water tank for seawater (A') and corresponding elevated water tank to distribute seawater for the flushing of toilets are as follows.

  Estimated consumption volume : 7.0 tons/day (0.014 tons/day × 500)

  Underground water tank (A') capacity : 14.0 tons

  Elevated water tank capacity : 5 tons

b) Sewer System

- Rainwater:

  Natural infiltration except for that stored in the underground water tank.

- General Waste Water Discharge:

  Miscellaneous waste water and sewage from other than the science laboratories and cookery room will be temporarily stored in the final discharge tank for pressurised drainage to the existing sewer system. Due to the use of seawater to flush the toilets, natural decomposition cannot be expected to take place. Accordingly, a septic tank will not be installed and the sewage will be directly pumped into the existing sewer system. Although the direct pumping of untreated sewage into the ocean has been a common practice in Kiribati for a long period of time, no signs of pollution have been detected by the regular surveying conducted by the WHO.

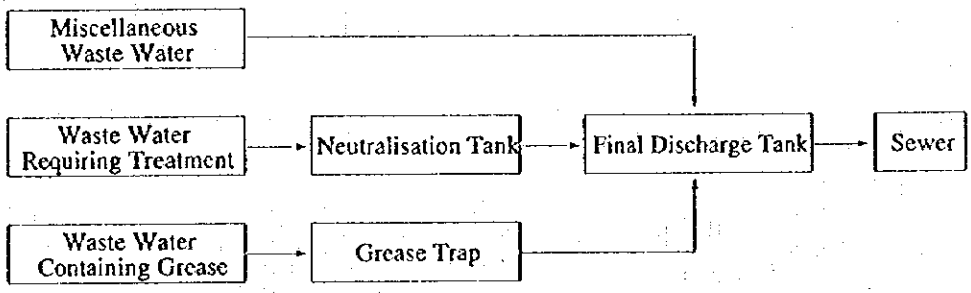
- Waste Water Requiring Treatment:

  Waste water from the chemistry laboratory containing heavy metals will be chemically neutralised or diluted in a neutralisation tank prior to discharge

to the above final discharge tank where it will join miscellaneous waste water and sewage for combined discharge.

- Waste Water Containing Grease:

  Waste water from the cookery room containing grease will pass through a grease trap for the separation of grease prior to discharge to the final discharge tank for combined discharge.



c) Plumbing Fixtures:

Plumbing fixtures will be installed in the science laboratories, cookery room, art room, workshops, administration office and toilets. As most fixtures are difficult to obtain locally, they will be procured from a third country to ensure quality and durability. With regard to water closets, it has been agreed through consultations with the Public Utility Board (PUB) that Arabian flat-type water closets will be installed in view of durability.

d) Incinerator:

An incinerator will be installed to burn garbage from the cookery room.

e) Gas Supply:

Electricity is currently used for cookery lessons. In line with the government policy of changing the heat source for cooking from electricity to LPG to reduce the electricity load of public buildings in Kiribati, however, gas will be used for cooking in the new cookery room. In addition, an LPG supply system will be installed in the science laboratories.

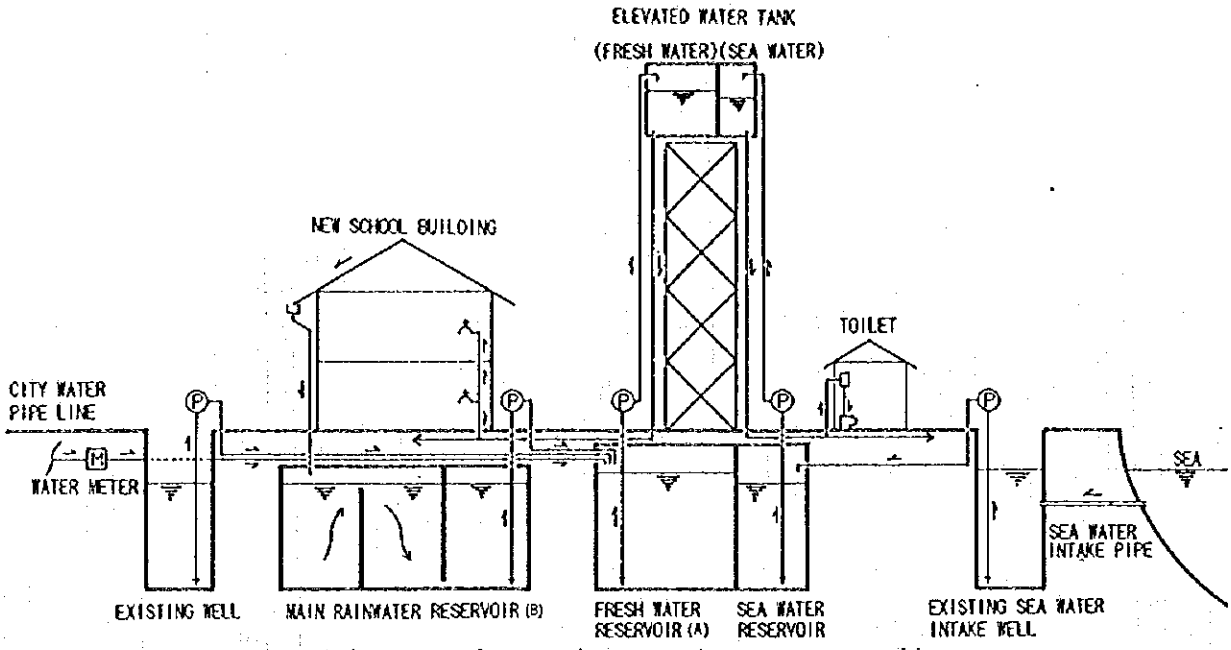


Fig. 9 Water Supply System

iii) Electrical Installations

a) Trunk Line:

The electricity supplied by the PUB will be received by a low voltage panel (3-phase, 4-wire, 240/415 V, 50 Hz), from which electricity will be supplied to the panel boards and power boards of each building via the distribution board. All power distribution cables will be buried underground.

b) Power Supply

Special power supply accompanied by a control panel will be made for such power equipment as storage pumps, etc. The control panel will be treated for salt-resistance in view of its outdoor installation.

c) Electricity Supply for Lighting, Plug Sockets and Fans

The electricity supply to lighting equipment, plug sockets and fans will be made from the distribution board in each building and circuit breakers will be installed to protect the branch circuits. Indoor lighting equipment will be the standard, salt-resistant type while outdoor lighting equipment will be the double salt-resistant type. Electricity supply to the ceiling propeller fans will be made from ceiling-mounted plug sockets while the wall-mounted extractor

fans will be connected to plug sockets on the walls. A switch with a pilot light will be installed at the entrance of each room.

d) Plug Sockets in Science Laboratories:

Plug sockets will be installed in the science laboratories in accordance with their necessity.

The design electricity capacity is 200 KVA as detailed below.

1. Lighting equipment	:	8,280 W
2. Plug sockets	:	19,800 W
3. Ceiling fans and laboratory plug sockets	:	70,000 W
4. Power equipment for practical education	:	15,000 W
5. Computer equipment	:	15,000 W
6. Air-conditioning equipment	:	5,000 W
7. Power equipment	:	15,000 W
		148,080 W (= 150 KW)

150 KW ÷ 0.8 (power factor) = 187.5 KVA = 200 KVA

e) Telephone System

In addition to a switchboard and terminal board, outlet boxes will be installed where required for telephone wiring and the installation of telephone equipment.

f) Lightning Rod

A lightning rod will be installed on the top of each elevated water tank to avoid damage due to lightning which frequently occurs in the transitional period between the dry season and rainy season.

5) Building Materials Plan

Table 6 Planning of Building Materials

Item	Factors for Consideration	Material/Specifications/Construction Method A	B	C	Final Selection and Reasons
Roof		zinc plated, colour steel plate	corrugated slate	bandanas leaves	C, the most common roofing material in Kiribati, has poor durability and requires renewal every 3 years or so. A is selected due to its good weatherability, workability and popular use in Kiribati.
	Salt Resistance	Δ	O	O	
	Weatherability	O	O	O	
	Workability	O	O		
	Cost	relatively high	relatively low	low	
	Local Availability	X	X	O	
	Application	entire building			
Internal/ External Walls		exposed concrete with paint finish	fair-faced concrete block work with paint finish	perforated concrete block with paint finish	B and C are selected due to their popular use in Kiribati and overall economy. A has good weatherability but is not selected due to its high cost, including the cost of forms. Low cost slates will be laid at the gable walls, etc. where it is difficult to lay blocks. * for lower section of classroom walls on corridor side
	Waterproofing	O	Δ	Δ	
	Salt Resistance	O	O	O	
	Workability	Δ	O	O	
	Cost	high	low	high	
	Local Availability	Δ	O	O	
	Application		entire building	*	
Window Frames		aluminium frame	jalousie	wooden frame	Although not produced locally, B is selected due to its popular use in Kiribati and low cost.
	Water-Tightness	O	Δ	Δ	
	Salt Resistance	O	O	O	
	Abrasion Resistance	Δ	O	Δ	
	Cost	high	low	high	
	Local Availability	X	X	X	
	Application		entire building		
Floor		long vinyl chloride sheeting	tiles	mortar with hardener	B is selected for the toilets and piloti due to its good abrasion resistance and appearance. C is selected for all other areas due to its excellent workability and cost even though its appearance is inferior.
	Appearance	O	O	Δ	
	Waterproofing	O	O	O	
	Abrasion Resistance	O	O	Δ	
	Local Availability	X	X	X	
	Cost	relatively low	high	low	
	Application		toilets/piloti	entire building	

Legend: O : Good
Δ : Conditional
X : Problems exist

(3) Educational Equipment Plan

High quality educational activities following the completion of building construction require the provision of educational equipment. Taking the contents of the request and the field survey findings into consideration, the provision of the following educational equipment and laboratory equipment for common use and exclusive use for different teaching subjects is planned.

1) Common Use Equipment

30 pocket size calculators will be provided. While the KGV/EBS currently has 70 such calculators, it has been decided that each form should have the required number of calculators for at least one class, resulting in a minimum requirement of 100 ($30 \times 2 + 20 \times 2$).

2) Personal Computers

At present, 8 personal computers are used in rotation by a special class of 15 students a time. The provision of an additional 22 personal computers will make it possible for each student in a standard class of 30 to have his/her own machine to learn computing. The availability of personal computers for purposes other than classroom teaching means that, for example, the data produced by the science laboratories can be analysed more efficiently.

3) Physical Education Equipment

As physical education has little connection with the facilities plan under the Project, the scope of providing the relevant equipment is very limited.

4) Home Economics Equipment

Given the uncertainty in regard to the number of students choosing optional domestic science subjects, the likely number of students/subject will be estimated and then divided into smaller groups in view of the more efficient use of equipment. The scope of the equipment to be provided will then be decided to meet the requirements of the smaller groups.

5) Applied Technology Equipment

As in the case of domestic science equipment described in 4) above, the

5) Applied Technology Equipment

As in the case of domestic science equipment described in 4) above, the scope of the equipment to be provided for applied technology subjects will be decided based on the estimated number of students and the operation plan. In addition, the existing equipment will also be taken into consideration.

6) Science Laboratory Equipment

The science subjects consist of general science for Form 4 and Form 5 and Physics, Chemistry and Biology for Form 6 and Form 7. The government emphasis on science subjects is apparent given the heavy allocation of teaching periods to these subjects. In view of the importance of science subjects, the items to be provided will be carefully selected to cover almost all basic experiments. This selection will be assisted by the list of priority A items in the original request which shows excellent consideration of the required items.

As much laboratory equipment is common for all subjects, the setting of rules on common use is highly desirable to achieve the maximum efficiency of equipment use instead of distributing equipment to each laboratory for exclusive use. The selection of equipment will, in fact, be made based on the assumption that many items will be commonly used.

(4) Basic Design Drawings

List

[Facilities]

1) Layout Plan
2) Ground Floor Plan
3) First Floor Plan
4) Elevation
5) Cross section and floor plan of Boy's Dormitory Shower/Toilet Room
6) Building Service Systems

Trunk Power Supply Diagramme

Water Supply Diagramme

Waste Water Discharge Diagramme

Water Supply and Discharge Diagramme for Boy's Dorm.

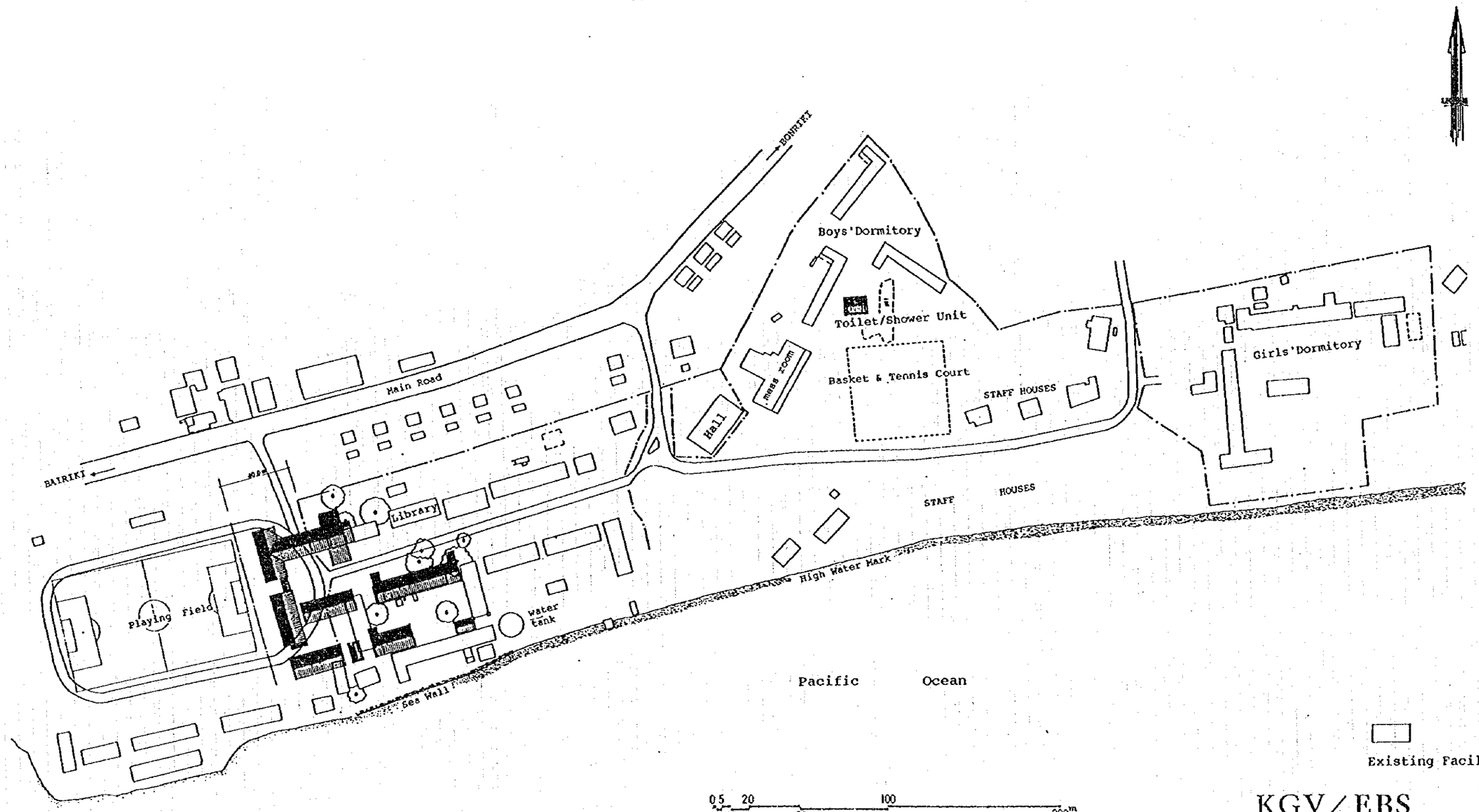
Showa/Toilet

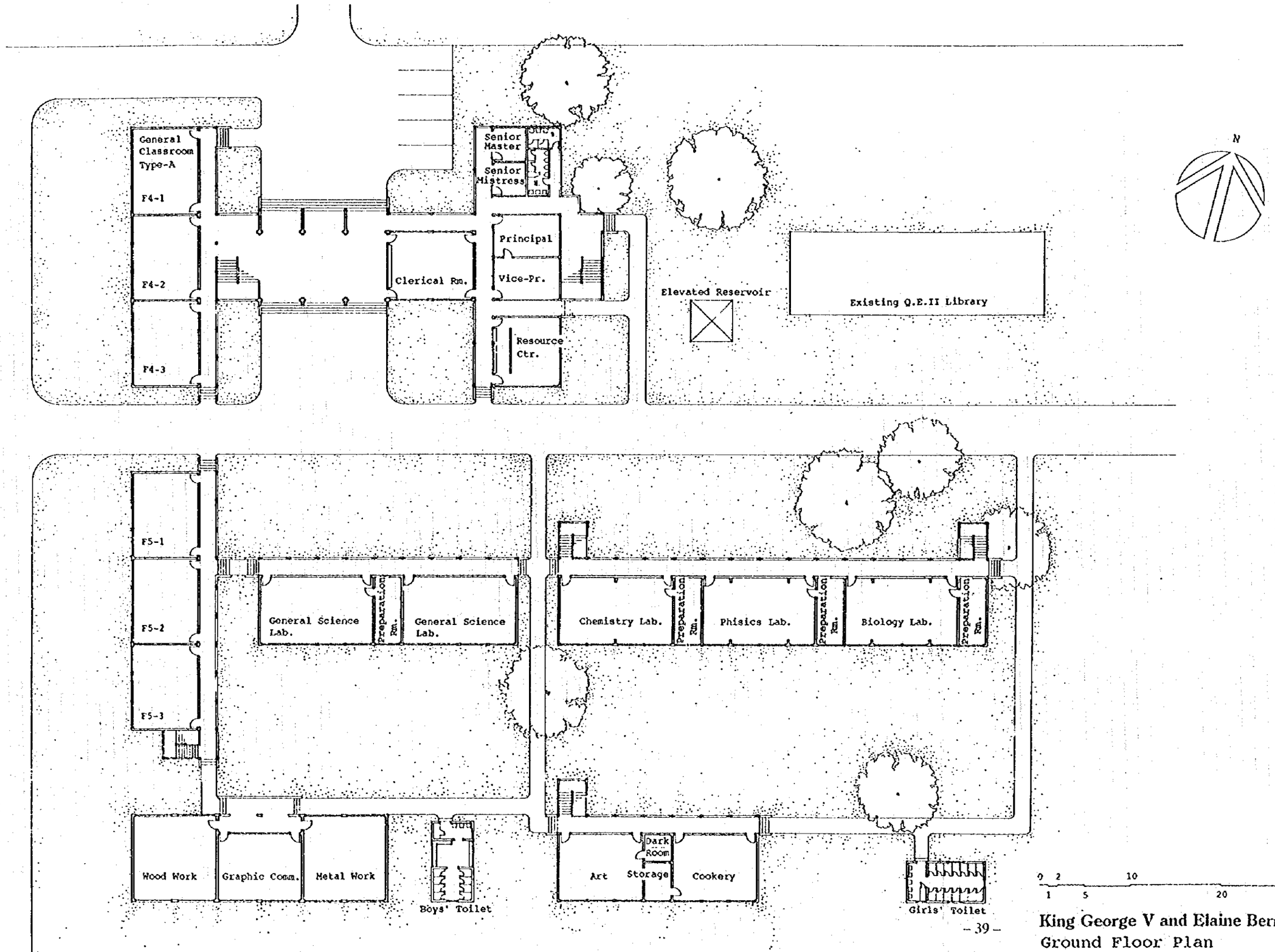
[Equipment]

1) Equipment List

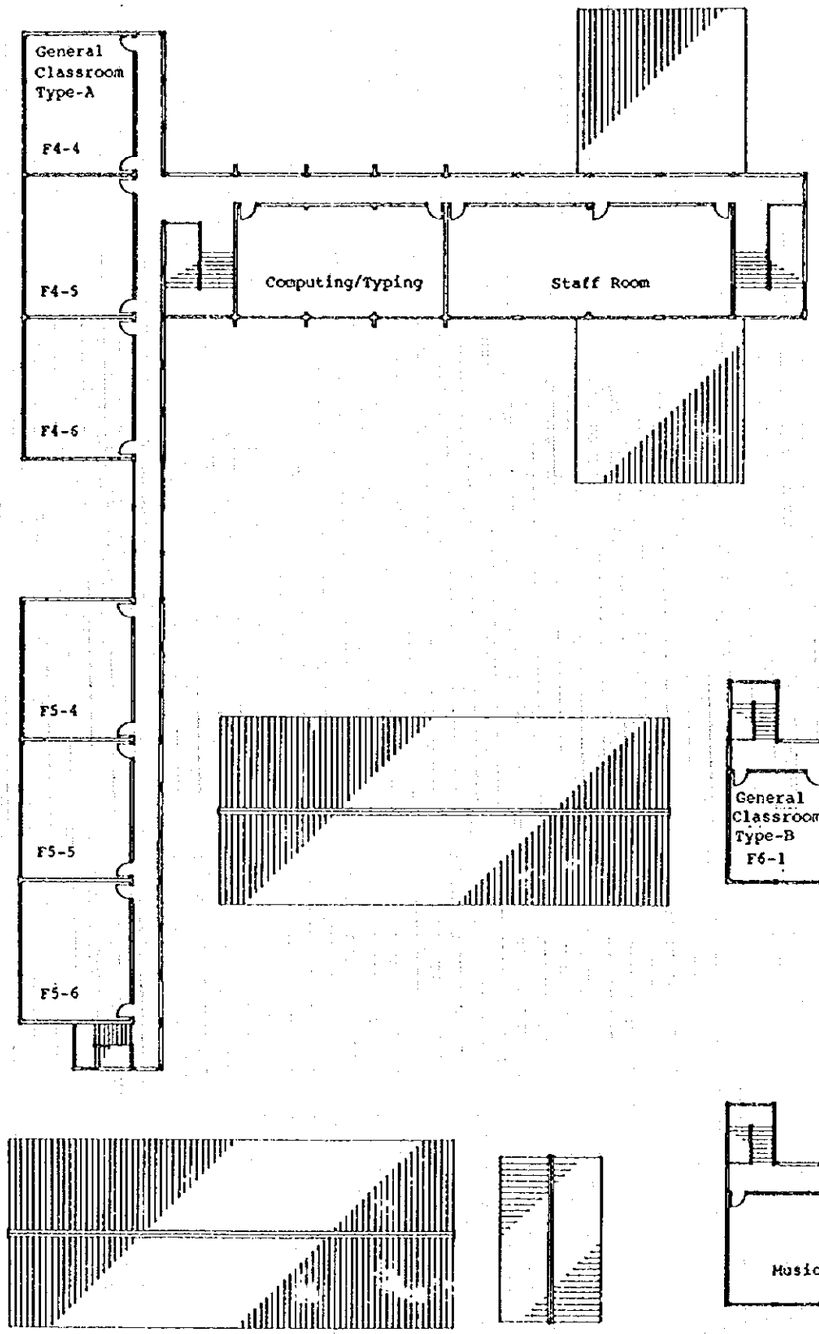
2) Detail of Equipment

KGV & EBS COMPOUND





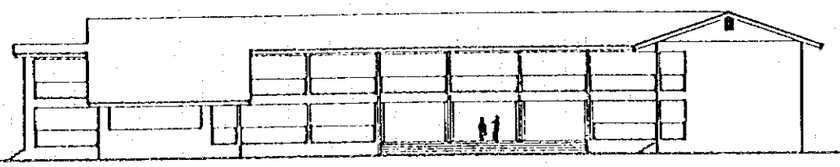
King George V and Elaine Bernacchi School
Ground Floor Plan



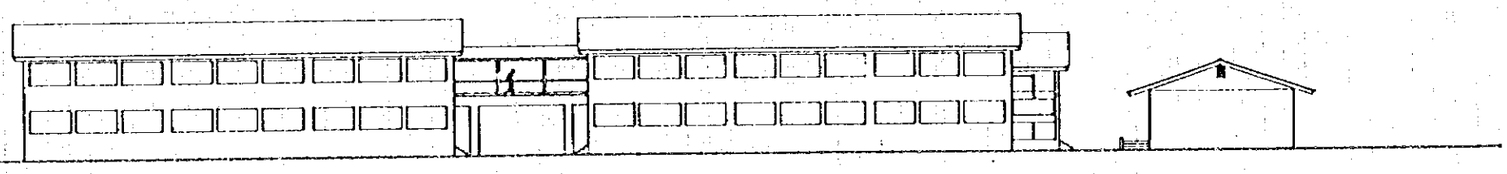
0 2 10 30m
1 5 20

King George V and Elaine Bernacchi School
1st.Floor Plan

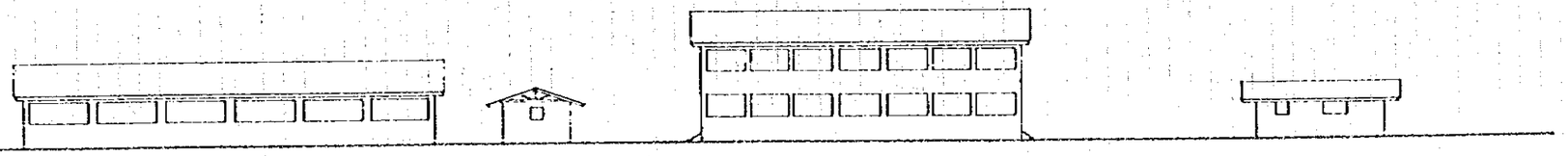
North Elevation



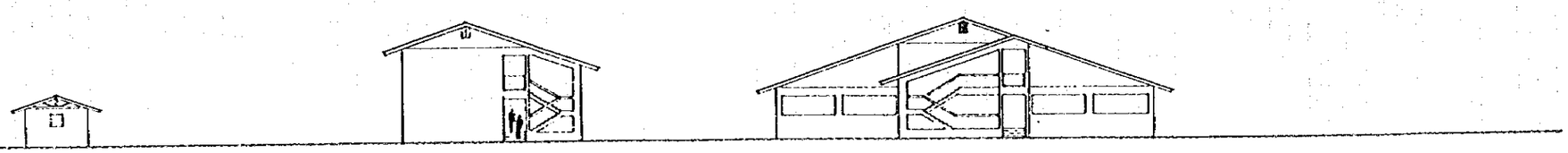
West Elevation



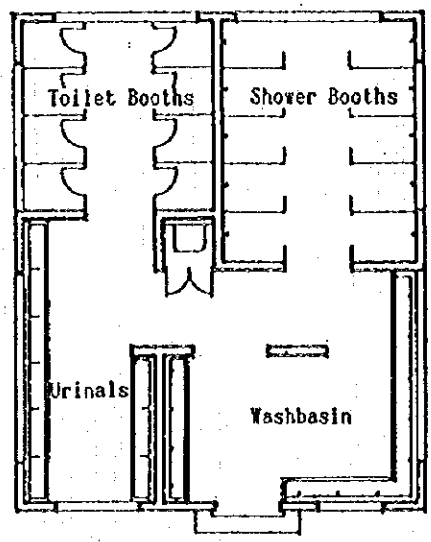
South Elevation



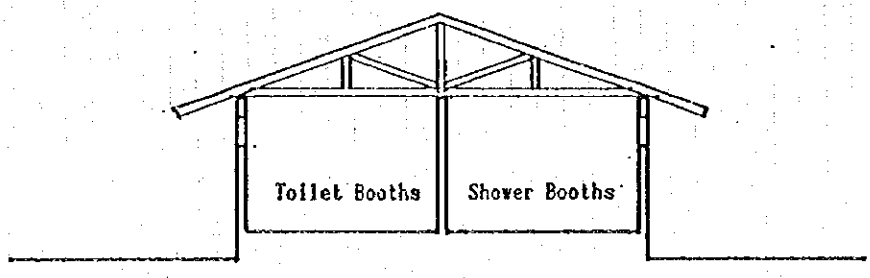
East Elevation



King George V and Elaine Bernacchi School
Elevation



Plan

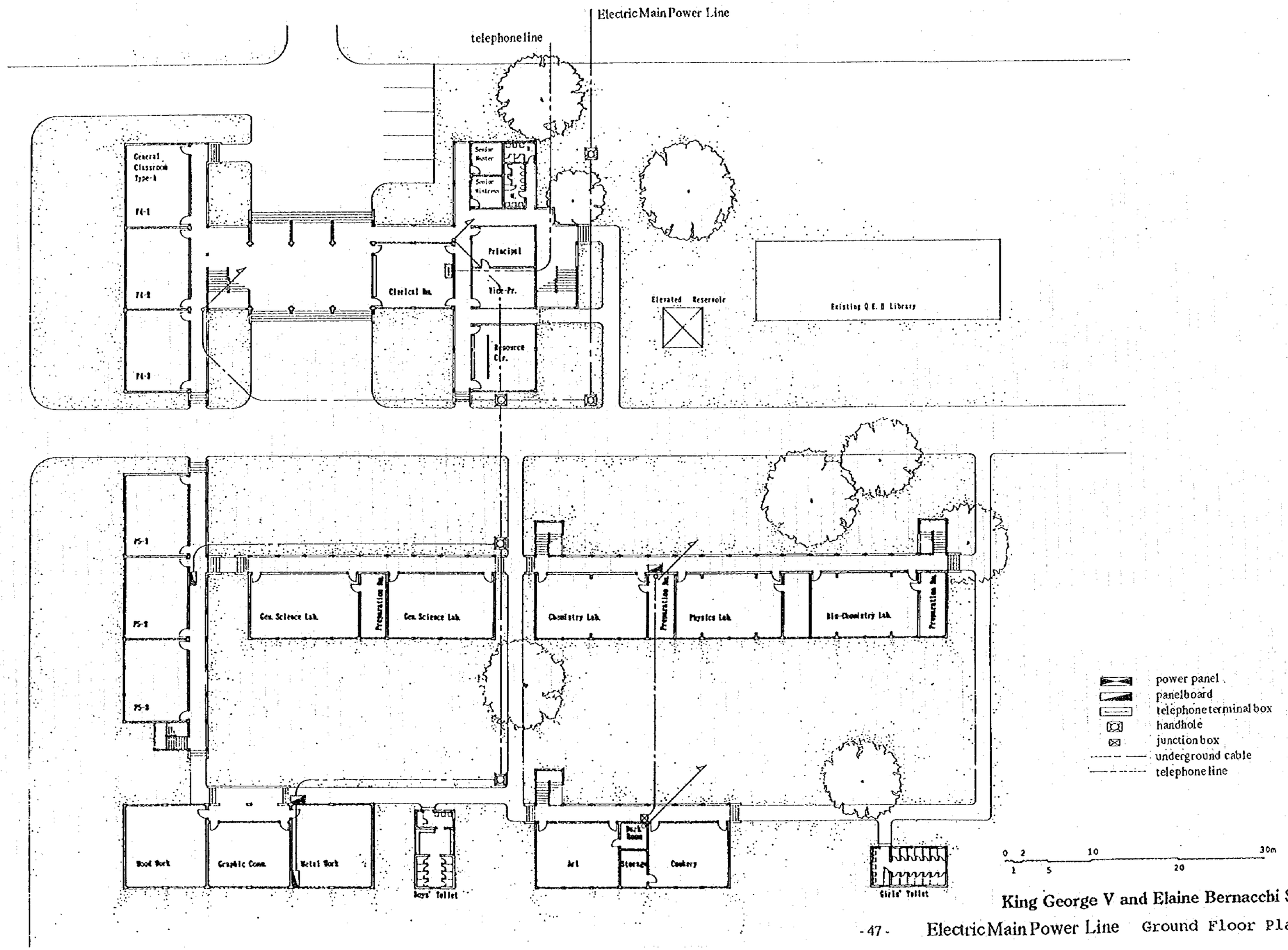


Section

King George V and Elaine Bernacchi School

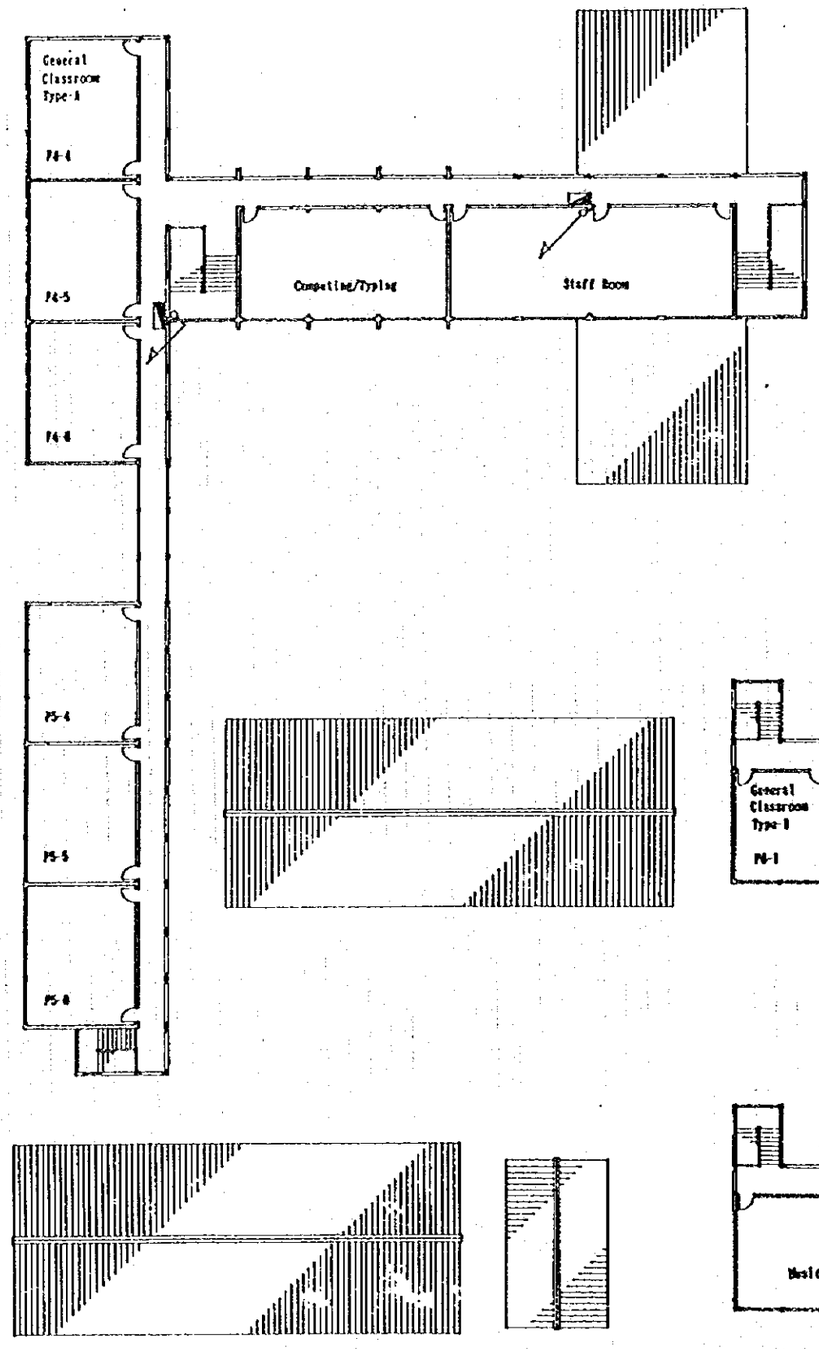
Toilet and Shower Unit for Boys' Dormitory

0 1 2 5 10m



King George V and Elaine Bernacchi School

Electric Main Power Line Ground Floor Plan



power panel
panelboard
telephone terminal box
handhole
junction box
underground cable
telephone line

0 2 10 30m
1 5 20

King George V and Elaine Bernacchi School

Electric Main Power Line 1st.Floor Plan

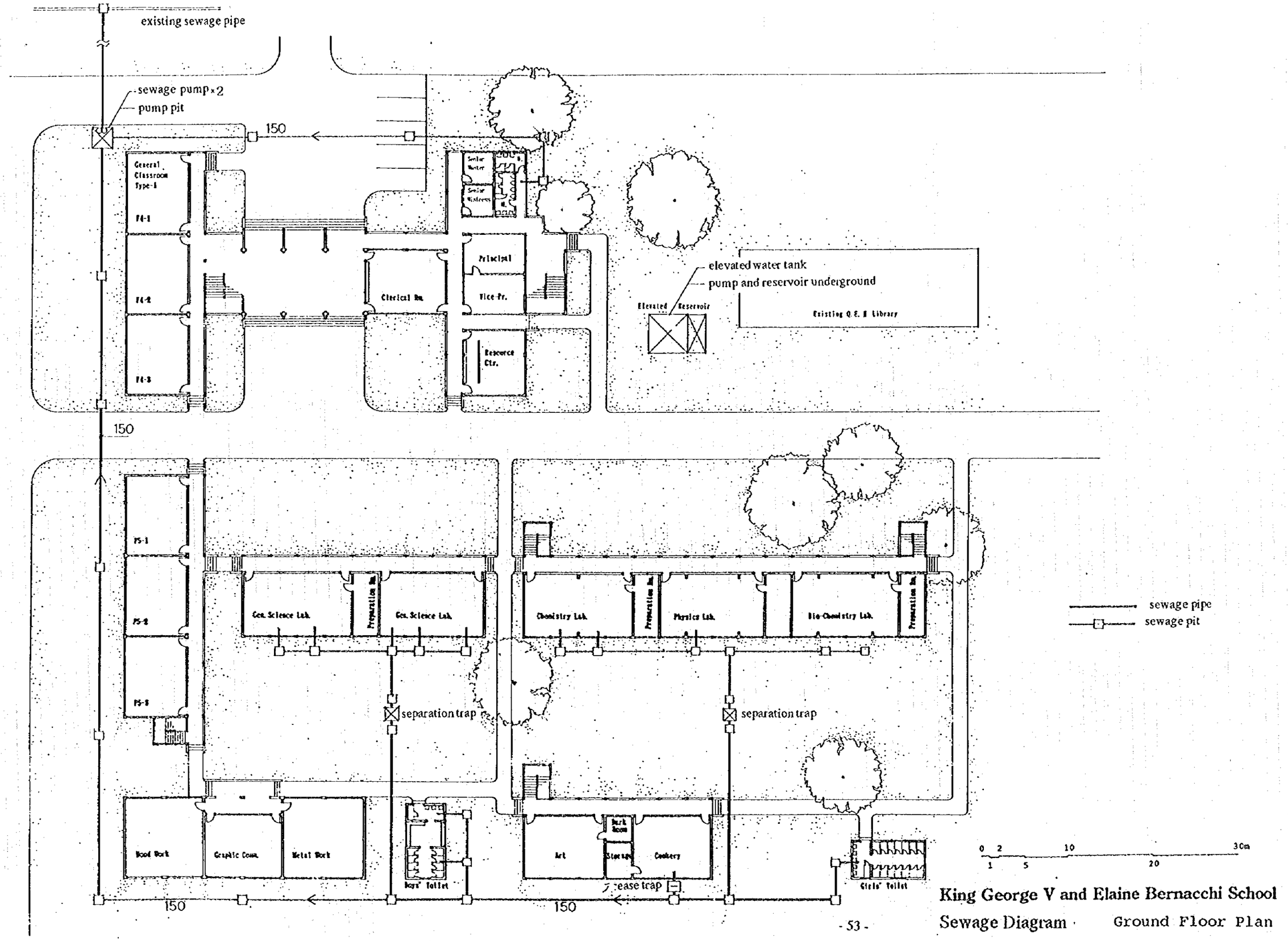
existing supply main pipe

city water supply pipe
sea water supply pipe
GV gate valve

50
over flow
General Classroom Type-A
F4-1
F4-2
F4-3
Senior Master
Senior Mistress
GV
32
32
Principal
Vice-Pr.
Clerical Rm.
rain water reservoir underground
elevated water tank
pump and reservoir underground
Elevated Reservoir
Existing O.E. II Library
80
Resource Ctr.
65
32
50
40
50
pump pit
pump pit
F5-1
F5-2
F5-3
pump pit
General Science Lab.
Preparation Rm.
General Science Lab.
Chemistry Lab.
Preparation Rm.
Phisics Lab.
Preparation Rm.
Biology Lab.
Preparation Rm.
GV
32
32
Wood Work
Graphic Comm.
Metal Work
Boys' Toilet
Art
Dark Room
Storage
Cookery
Girls' Toilet
existing pump station for sea water
sea water
0 2 10 30m
1 5 20

King George V and Elaine Bernacchi School

Water Supply and Rain Water Collecting Diagram Ground Floor Plan



King George V and Elaine Bernacchi School

Sewage Diagram · Ground Floor Plan

1) Equipment List

1. General				
No.	Description	New	Current	Total
1-1	Calculator	30	70	100

2. Computer Lab				
No.	Description	New	Current	Total
2-1	Computers	22	8	30
2-2	Dot matrix printers	2	4	6
2-3	Software	1	0	1
2-4	Software	1	0	1
2-5	Computer maintenance kits	5	0	5
2-6	Disk cleaners	10	0	10
2-7	Voltage regulators	6	2	8
2-8	White boards	2	0	2
2-9	Floppy disks (boxes of 10)	5	0	5

3. Physical Education Department				
No.	Description	New	Current	Total
3-1	Tennis balls	30	0	30
3-2	Soccer balls	5	8	13

4. Home Economics Department				
No.	Description	New	Current	Total
4-1	Refrigerator freezer	1	0	1
4-2	Electric kettles	2	0	2
4-3	Sets of pots and frying pans, etc.	2	0	2
4-4	Cooking utensil sets	2	0	2
4-5	Tableware sets	2	0	2
4-6	Sewing machines	1	0	1
4-7	Twin needle machines	1	0	1
4-8	Three dimensional mirror	1	0	1
4-9	Electric iron · Ironing board	4	1	4
4-10	Roulette	4	0	4
4-11	Scissors			
	Large shears	5	2	7
	Paper scissors	5	0	5
	Trimming scissors	5	0	5
	Pinking shears	4	0	4
4-12	Cutters	2	0	2
4-13	Pattern boards	5	0	5
4-14	Set pattern making rulers	5	18	23
4-15	Measuring tape	5	0	5
4-16	Thread clippers	5	0	5
4-17	Dress model			
	Male body	1	0	1
	Female body	1	0	1
	Child's body	1	0	1
4-18	Stitch unpicker	5	0	5
4-19	Measuring tape	5	0	5
4-20	Boxes of tacking pins	5	0	5
4-21	Gas Range	3	10	3
4-22	Cooking table	3	10	3

5. Industrial Arts Department				
No.	Description	New	Current	Total
5-1	Circular saw	1	1	2
5-2	Hand drill	1	1	1
5-3	Radial arm saw	1	1	1
5-4	Bench grinder	2	1	3
5-5	Bench drills	1	1	2
5-6	Die stop drills	2	0	2
5-7	Electric welders	1	2	2
5-8	Screw driver sets	5	0	5
5-9	Tool sets	10	0	10
5-10	Automotive tool sets	10	0	10
5-11	Micrometers	2	0	2
5-12	Feeler gauges	2	0	2
5-13	Piston ring compressors	2	0	2
5-14	Piston ring expanders	2	0	2
5-15	Valve spring compressors	2	0	2
5-16	Valve lifter	2	0	2
5-17	Gear pullets	2	0	2
5-18	Flywheel pullets	2	0	2
5-19	Spirit levels	2	1	3
5-20	Drafting utensil sets	10	0	10
5-21	Ruler sets	10	25	35
5-22	Drafting tables	10	0	10
5-23	Triangular scale	10	30	40
5-24	45° squares	10	35	45
5-25	60° 30° squares	10	28	39
5-26	Adjustable squares	10	11	21

6. Fine Art Department				
No.	Description	New	Current	Total
6-1	Painting board	10	5	15
6-2	Electric drills, cutting machines, bending machines	1	0	1
6-3	Electric welder	1	0	1
6-4	Sculpting chisel			
	for teacher	1	0	1
	for students	9	0	9
6-5	Black enlarger machine	1	1	1
6-6	Cameras	4	5	4
6-7	Zoom lens	1	0	1
6-8	Close up lens	1	0	1
6-9	All photographic accessories	1	1	1
6-10	Paper cutting machine	1	0	1

7. Music Department				
No.	Description	New	Current	Total
7-1	Keyboards	5	2	5

8. Science Department						
No.	Description			New	Current	Total
8-1	Microscopes			15	8	23
8-2	Electronic balances			4	1	5
8-3	Water deionizer			1	0	1
8-4	Power supplies			10	5	15
8-5	Dissecting kits			15	10	25
8-6	pH meters			5	4	9
8-7	Fire extinguishers			7	0	7
8-8	Atomic models			10	3	13
8-9	Human skeleton			1	0	1
8-10	Hot plate with magnetic stirrer			2	1	3
8-11	Ammeters			5	5	10
8-12	Voltmeters			5	5	10
8-13	Waterbaths			1	1	2
8-14	Dissicators			4	2	6
8-15	Dissecting dishes			15	0	15
8-16	Safety glasses			50	10	60
8-17	Bunsen burners			20	0	20
8-18	Pipette pumps	10ml	30ml	10	6	16
8-19	Spring scales	100g	500g	5	20	25
8-20	Marine aquarium kit			1	0	1
8-21	DNA model kits			1	0	1
8-22	Banana plugs, black and red			50	40	0
8-23	Galvanometer			5	1	6
8-24	Blood pressure kit			1	0	1
8-25	Rubber stoppers			20	0	20
8-26	Heart model			1	0	1
8-27	Pipettes			5	15	20
8-28	Thermometers			20	10	30
8-29	Spatulas			20	5	25
8-30	Tweezers			10	0	10
8-31	Retort holders			5	15	20
8-32	Filterfunnels			10	10	20
8-33	Switches			10	2	12
8-34	Wire			10	2	12
8-35	Clamps			10	10	20
8-36	Kidney model			1	0	1
8-37	Tripods			10	10	20
8-38	Scalpels			10	10	20
8-39	Filter paper			10	0	10
8-40	Wire gausses			20	10	30
8-41	Spouts			480	188	688
8-42	Microscope slides			4	0	4
8-43	Test-tube brushes			20	0	20
8-44	Test-tube holders			20	0	20
8-45	Flasks	100ml	250ml	20	0	20
8-46	Beakers	600ml	100ml	20	6	24
8-47	Triangular beakers			20	10	30
8-48	Cylinders	500ml	50ml	10	5	15
8-49	Burette			20	6	26
8-50	Test tubes			120	0	120
8-51	Power supplies			1	0	1

8. Science Department				
No.	Description	New	Current	Total
8-52	Magnetic coils	1	0	1
8-53	Nichrome wire for Ohm's law experiment	1	0	1
8-54	Pulley demonstration set	1	0	1
8-55	Lever experimental set	1	0	1
8-56	Collision balls apparatus	1	0	1
8-57	Buoyancy apparatus	1	0	1
8-58	Atmospheric pressure experiment set	1	0	1
8-59	Water calorianeter	1	0	1
8-60	Light diffraction and reflection experiment set	1	0	1
8-61	Balances electronic	1	0	1
8-62	Meter bridge	1	0	1
8-63	Mini generator	1	0	1
8-64	Leaf electrometer	1	0	1
8-65	Dymanic carts	1	0	1

2) Detail of Equipment

4-3 Set of Saucepans and Frying Pans, etc.
(one set each for group of 5 pupils)
1. Frying Pan
2. Saucepan (large)
3. Saucepan (medium)
4. Saucepan (small)
5. Wok

4-4 Set of Cooking Utensils	
(one set each for group of 5 pupils)	
1. Sieve	11. Potato Peeler
2. Mixer	12. Plastic Container
3. Baking Tray	13. Rolling Pin
4. Loan Pan	14. Vegetable Container
5. Cake Tin	15. Lemon Squeezer
6. Plastic Bowls (large, medium and small)	16. Biscuit Cutter
7. Cookie Maker	17. Bowl
8. Kitchen Gloves	18. Measuring Cup
9. Bucket	19. Measuring Spoon
10. Kitchen Scales	

4-5 Set of Tableware	
1. Casserole Dishes (glass and ceramic)	7. Spoons (wooden, soup, desserts and teaspoons)
2. Tray	8. Teapot
3. Plates (round and oval)	9. Set of Glasses (beer glasses, tumblers and wine glasses)
4. Teacups and Saucers	10. Plates (large, medium and small)
5. Knives (kitchen, fruit and plate knives)	11. Forks
6. Pitcher	

5-9 Tool Set			
Item	Number	Item	Number
High Frequency Driver (150 mm)	1	Radial Pliers (150 mm)	1
Phillips Type Screwdriver (100 mm)	2	Tweezers	1
Finger Screwdriver (100 mm)	1	Pliers (150 mm)	1
Insulated Screwdriver (100 mm)	2	Monkey Wrench (150 mm)	1
Nut Wrench (55 mm)	1	Flat File	1
Nut Wrench (7 mm)	1	Round File	1
Solder Stick	1	Vinyl Tape	1
Paste	1	Duster Cloth	1
Electric Soldering Iron	1	Cutter Knife	1
Nipper (150 mm)	1		

5-10 Tool Set for Car Maintenance		
Sockets (hexagonal)	5 types	Flat Chisel
Sockets (dodecagonal)	5 types	Centre Punch
Deep Sockets (hexagonal)	3 types	Scraper Knife
Plug Sockets (with magnet)	2 types	Clip Handle
Ratchet Handle		Hexagonal L-Shape Wrench
Extension Bar		Second-Cut File
Ball Joint		Point File
Spanner		Wheelstone
Ring Spanner		Stabiliser Screwdriver
Monkey Wrench		Through Screwdriver
Combination Pliers		Adjustable Tip Screwdriver
Radial Pliers		Socket Adapter
Super Nipper		Gauge
Power Screwdriver		Nut Spinner Handle
Hammer		Tool Box

6-9 DPE Accessories	
Photo-Development Set	7. Developing Solution
1. Plastic Cover	8. Manual Printer
2. Film Clips	9. Bromide Paper
3. Glass Bottles for Chemical Agents	10. Film
4. Sponge	11. Film Development Bottle
5. Print Dryer	
6. Gloves	

CHAPTER 3

IMPLEMENTATION PLAN

CHAPTER 3 IMPLEMENTATION PLAN

3.1 Implementation Plan

3.1.1 Implementation Concept

(1) In Kiribati, if a high level of construction accuracy is required, it is necessary to recruit a supervisor from a third country to supervise the skills and work of local workers in order to achieve the required technical level. It may, therefore, be necessary to dispatch skilled workers/engineers to Kiribati as supervisors depending on the types of work required.

(2) As hardly any construction materials are locally produced, almost all such materials must be imported. The accurate establishment of the delivery period for each type of material from the respective supplier is important.

(3) As the construction market in Kiribati is extremely small, it is necessary to pay careful attention to any possible adverse impacts of the recruitment of workers for the Project on the labour supply in the local construction market.

(4) The construction plan for the Project should be prepared based on the work capabilities of local workers, the period required to obtain foreign construction materials and the local weather conditions and the actual implementation schedule should be determined based on the construction plan.

3.1.2 Implementation Conditions

(1) As the construction work will take place on the existing school campus, proper care should be taken to prevent any adverse impacts of the work on the educational activities and also to prevent accidents.

(2) Given the very tight water supply situation in Kiribati, careful planning of the water supply to the construction site is necessary through close consultations with the competent authority and other related organizations.

(3) With regard to such locally available aggregate as stones and sand, careful attention should be paid to their salt content with a view to the possible use of a counter-agent if necessary.

3.1.3 Scope of Works

Table 8

		Japanese Side	Kiribati Side
Building Work	Land Preparation; Exterior Work	Road and carpark on planned site	The demolition and land preparation required by the layout plan and felling and uprooting should be completed prior to the commencement of the construction work; removal of existing infrastructure; gate control
	Water Supply	Construction of the water supply systems, including the underground water tanks, elevated water tanks and water distribution lines to the new facilities	Extension of the water main to the water tanks constructed by the Japanese side
	Waste Water Discharge	Waste water discharge system from each facility	Construction of a sewer system beyond the final discharge tank constructed by the Japanese side
	Electricity Supply	Construction of the substation and distribution to the new facilities	All necessary arrangements, including payment, and the construction of an extension line to the new substation
	Telephone System	All telephone extension work to the premises, including the provision of a new switchboard	
Facilities		Construction of all the facilities listed in 3.3.2 and auxiliary work	Construction of the facilities other than those to be constructed by the Japanese side and arrangement of temporary facilities
Equipment		Supply and installation of and operation guidance for the planned equipment	Relocation of the existing equipment
Furniture and Fixtures		Laboratory tables with sinks and gas ranges with sinks for the cookery room	Desks, chairs and work tables

3.1.4 Consultant Supervision

Following signing of the Contractor Agreement for the Project, a chief engineer and on-site supervisor will be dispatched to Kiribati to issue instructions to the local constructor, to confirm the construction schedule through consultations with the Kiribati side and to complete all necessary procedures. Upon arrival at the construction site, the on-site supervisor will stay at the site for the full-time supervision of the construction work and will report on the work progress to the Japanese Embassy in Fiji, the JICA Office and related organizations of the Government of Kiribati. He will also coordinate and liaise between all parties involved in the Project, including the local constructor. The chief engineer and those responsible for the structures, building services and equipment will visit the site when

appropriate for spot supervision purposes. The on-site supervisor will remain in Kiribati until all procedures relating to the handing over of the completed facilities and delivered equipment to the Kiribati side have been completed. Further details of the construction supervision work are given below.

(1) Advice and Guidance on Construction Agreement

Prequalification of bidders; preparation and execution of the tender process; evaluation of the tender documents; selection of the contractor; witnessing of the signing of the Construction Agreement.

(2) Inspection and Approval of Shop Drawings, etc.

Inspection and approval of the shop drawings, material samples and building service equipment, etc. submitted by the Contractor.

(3) Guidance on and Inspection of Construction Work

Examination of and guidance on the construction plan and processes; control of and guidance on the work progress; inspection of the completed work as required during the construction stage.

(4) Approval of Payments

Inspection to confirm the value of the completed work required for the interim and final payment of the construction cost and issue of a letter of payment approval.

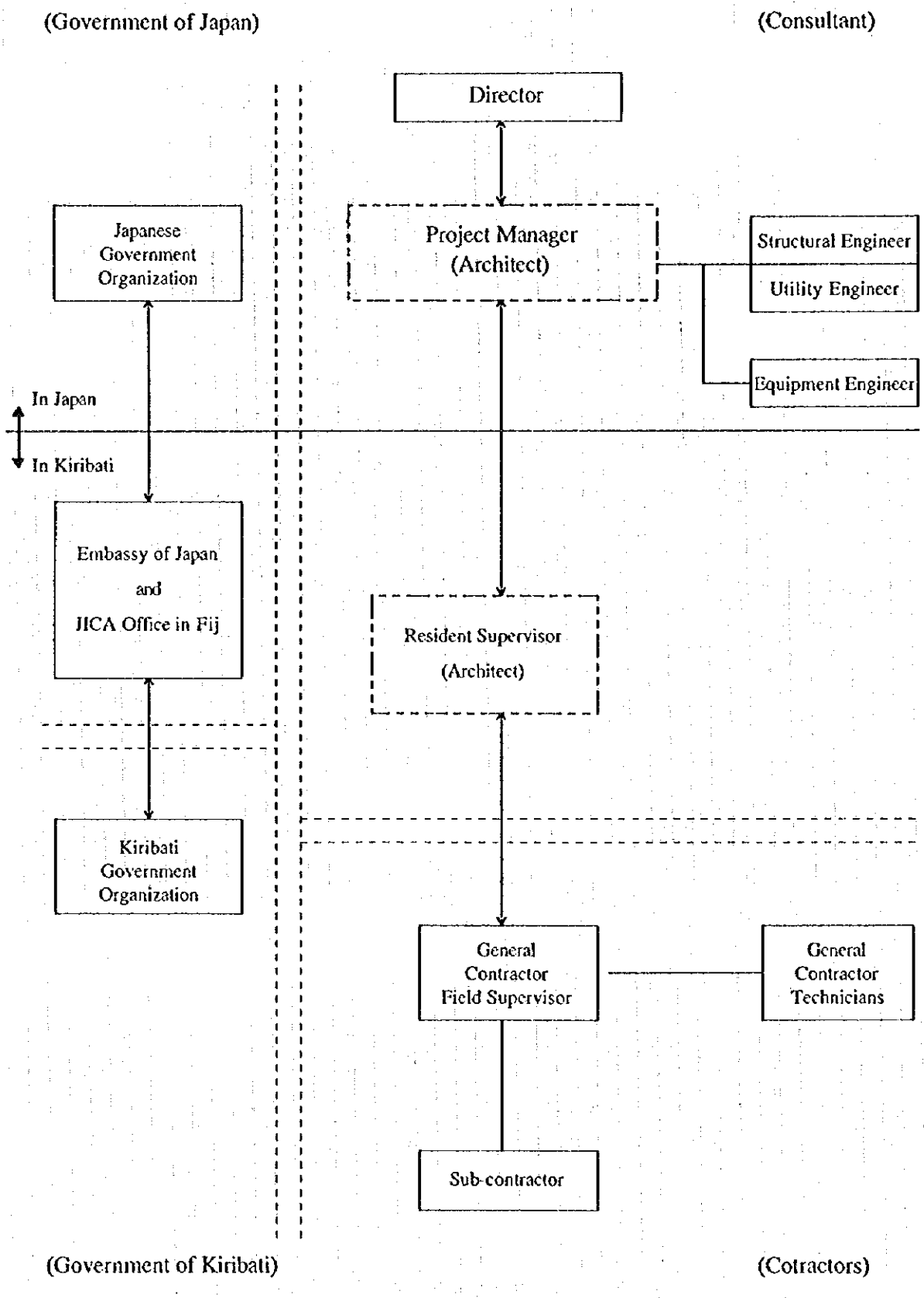
(5) Reporting of Work Progress

Regular reporting of the state of work progress to the Owner (Department of Education) and related organizations of the Government of Japan.

(6) Handing Over of Facilities and Equipment

Following completion of the construction work, confirmation of the fulfilment of the agreed conditions; witnessing of the handing over of the completed facilities and equipment pursuant to the Agreement; receipt of a letter of acceptance from the Owner to end the construction supervision work.

Fig. 10 Implementation System



3.1.5 Procurement Plan

The only construction materials available locally are crushed stones, sand and concrete blocks and all building service equipment is imported. The import of construction materials is handled by the Supplies Bureau of the Department of Trade, Industry and Labour which supplies to both the public and private sectors. The inventory level is usually adequate and those items in short supply are ordered. The sales prices of the Bureau are determined based on the procurement, transportation and customs clearance costs plus commission. As the construction of socioeconomic infrastructure in Kiribati is assisted, as well as guided, by Australia and New Zealand, most piping, lighting fixtures, switches, sanitary fixtures and other building service fixtures and equipment are regulated by the Australian standards. The fixtures and equipment for the facilities planned under the Project will, therefore, be imported from Australia in view of their proper connection with trunk lines and the ease of obtaining spare parts, etc. In regard to construction materials, movable louvre windows, timber and cement will be imported from third countries such as Australia and Fiji while other items will be imported from Japan. Those items to be procured from the third countries will be imported through the Supplies Bureau.

3.1.6 Implementation Schedule

The detailed design and work supervision for the Project will be conducted by the Japanese Consultant. Under the overall control of the Consultant, a Japanese construction company will be awarded an all-in contract, ranging from construction material procurement and building construction to manufacture/procurement, transportation, installation and test operation of equipment. The implementation of the Project will also be monitored by the Government of Kiribati and Government of Japan.

Upon signing of the E/N for the grant aid for the Project by the Government of Japan and Government of Kiribati, the Consultant will conclude a Consultancy Agreement with the Ministry of Education, Training and Technology of the Kiribati Government and will commence preparation of the tender documents, including the detailed design documents.

3.1.7 Obligations of Recipient Country

In addition to the assigned work described in Table 8, the Government of Kiribati is required to make the necessary banking arrangements, to bear the various banking costs arising from the banking arrangements, to provide facilities for the entry to and departure from as well as stay in Kiribati of project-related staff members of the Consultant and Contractor and their exemption from duties and domestic taxes, to obtain import permits for and to ensure the swift completion of the customs clearance of the equipment and materials for the Project and to exempt such equipment and materials from import duties and any other domestic taxes normally applicable.

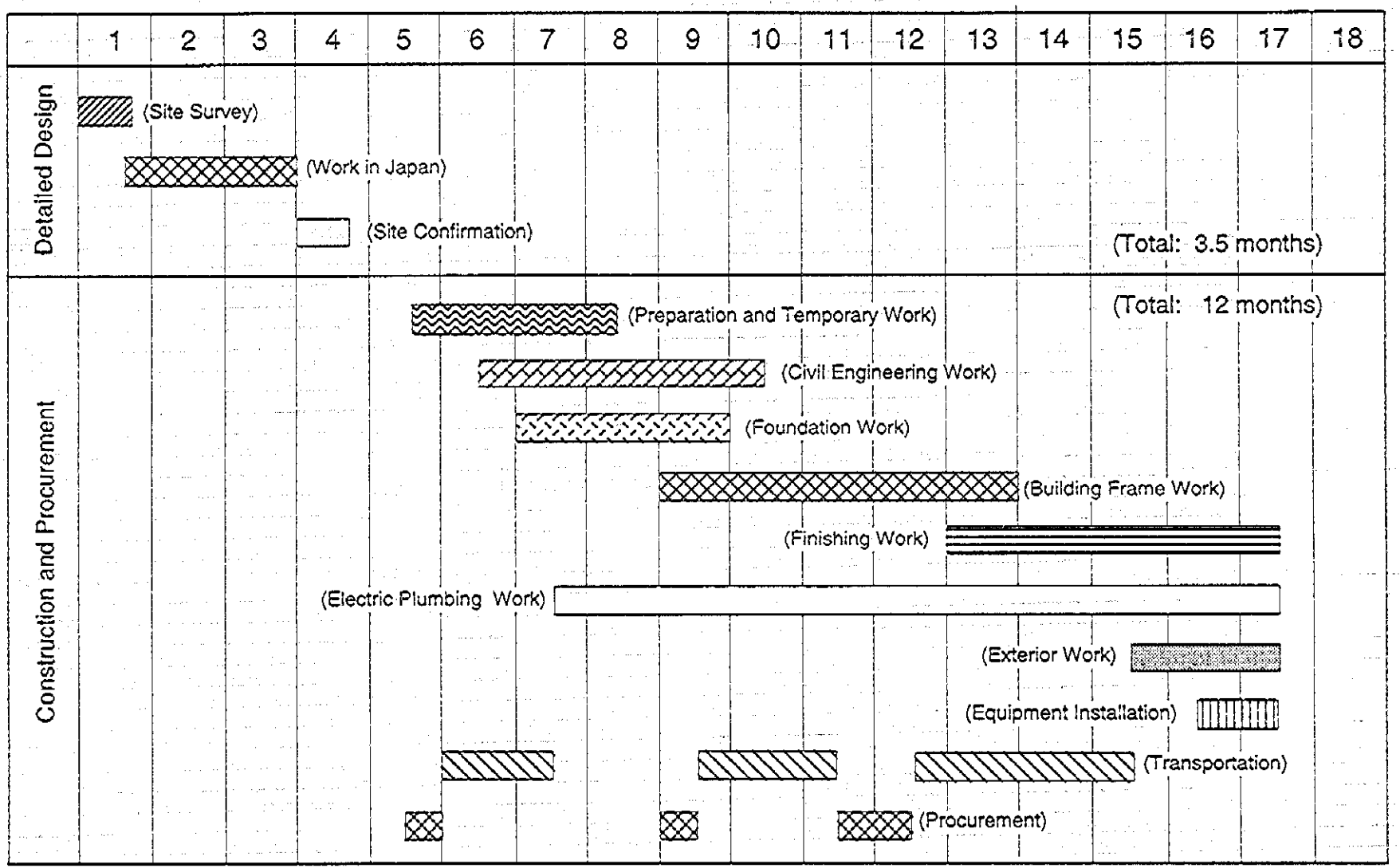
3.2 Project Cost Estimation

Portion		
a) Demolition and Land Preparation	:	A$ 59,980
b) Extension of Electricity Supply	:	A$ 4,288
c) Extension of Water Supply	:	A$ 2,517
d) Arrangement of Temporary Facilities	:	A$ 87,405
Total	:	A$ 154,190

Table-9 Procurement Plan

Work	Item	Country			Reason, Note
		Local	Japan	Other	
Prep	concrete mixer	○			Need for quick starting
	backhoe, etc.	○			〃
	dump truck etc.	○			〃
	bulldozer, etc.	○			〃
	preparation material		○		can't procure locally
	truck crain		○		no useable items locally
			○		〃
	belt conveyer		○		〃
Construction	pebbles	○			need quickly
	sand	○			〃
	C. blocks	○			〃
	cement			○	local bulk procurement diffic
	reinforcing steel			○	〃
	molding material		○	○	〃
	tyles			○	not produced locally
	wood			○	locally quality bellow standard
	jaroshi			○	local bulk procurement diffic
	metal joints			○	not produced locally
	wood construction material			○	local bulk procurement diffic
	paing			○	〃
	glass			○	〃
	interior materials			○	〃
	roofing			○	not produced locally
	interial and exterior, materials		○		good quality
electrical	lights, ceiling window			○	local bulk procurement diffic
	sanitary tool			○	〃
	cables, cable pipe material		○	○	not produced locally
	receiving equipment		○		considering quaility
	distribution board		○		
material	teaching material		○	○	not produced locally

Table-10 Work Implementation Schedule



3.3 Operation and Maintenance Plan

(1) Operation Cost

The size of the school facilities following completion of the Project is slightly more than 70% of the current size of the KGV/EBS and, therefore, it is assumed that no additional recruitment of teaching or administrative staff members will be necessary. The new tuition fee after introduction of the new educational system has not yet been decided.

(2) Operation and Maintenance Cost

The annual operation and maintenance cost following handing over of the new facilities and equipment upon completion of the Project is estimated below based on current prices (January, 1996).

Cost Item	First Year	Third Year
1. Operation of Facilities	A$ 33,650	A$ 33,650
2. Maintenance of Facilities	A$ _____	A$ 23,740
3. Maintenance of Equipment	A$ 12,500	A$ 12,500
4. Operation of Existing Facilities	A$ 28,000	A$ 28,000
5. Maintenance of Existing Facilities	A$ 96,070	A$ 96,070
Total	A$ 170,220	A$ 195,960

1) Operation Cost of Facilities

- Electricity Cost

Load - Lighting : 15 KVA
Ceiling Fans : 8 KVA
Sockets : 20 KVA
Air-Conditioning : 6 KVA
Pumps : 50 KVA

Lighting:
15 KVA × 8 hrs/day × 5 days/week × 35 weeks = 21,000 KVAH/year

Ceiling Fans:
8 KVA × 8 hrs/day × 5 days/week × 35 weeks = 11,200 KVAH/year

Sockets:
20 KVA × 1 hr/day × 5 days/week × 35 weeks = 3,500 KVAH/year

Air-Conditioning:
6 KVA × 8 hrs/day × 5 days/week × 35 weeks = 8,400 KVAH/year

Pumps:
50 KVA × 2 hrs/day × 5 days/week × 35 weeks = 17,500 KVAH/year

---

Total 61,600 KVAH/year

Annual Electricity Cost

61,600 KVAH/year × A$ 0.39/KVAH = A$ 24,024/year

- Water Cost

Unit Water Cost -Municipal Water : A$ 1.00/m^3

Water Wagon : A$ 2.75/m^3

Annual Water Cost

[(20 m^3 × 4 days/week × A$ 1.00/m^3) + (20 m^3 × 1 day/week × A$ 2.75 m^3)] × 35 weeks/year = A$ 4,725/year

- LPG Cost

A$ 0.35/litre × 400 litres/week × 35 weeks/year = A$ 4,900/year

2) Building Maintenance Cost

The building repair cost increases in accordance with time but is generally negligible upto 5 years of age. In the case of building service equipment, no cost will be incurred in the first year in relation to spare parts, overhauling and replacement of the equipment itself. From the third year onwards, the repair cost is believed to be an average of 3 - 5% of the equipment cost per year.

¥38,000,000 × 0.05 = ¥190,000

¥1,900,000 /80.05/A$ = A$ 237.35

3) Equipment Maintenance Cost

The equipment maintenance cost is generally believed to be 5% of the procurement cost of equipment which requires regular maintenance.

¥20,000,000 × 0.05 = ¥1,000,000
¥100,000 / ¥80.05/A$ = A$ 12,492

4) Operation Cost of Existing Facilities

Of the existing facilities, the boys' dormitory, girls' dormitory, canteen and library will not be affected by the Project and will continue to be used. Considering the existence of such high operation cost facilities as the dormitories and canteen, the new operation cost of these facilities is set at 70% of the current cost.

A$ 40,000 × 0.70 = A$ 28,000

5) Maintenance Cost of Existing Facilities

The existing facilities which will remain after the completion of the Project is 65%. Therefore, the maintenance cost would be required is assumed 65% of the average cost spent annually in the recent years.

A$ 147,800 × 0.65 = A$ 96,070

(3) Operation and Maintenance Plan

1) Operation Plan

• Personnel Plan

The KGV/EBS currently employs 32 general staff members (including 3 maintenance workers, i.e. a joiner, electrician and plumber) and this staffing strength will be unchanged for the new KGV/EBS. There is a total of 45 teachers (including 3 foreign volunteers teaching science, biology and geography). As of 1993, 16 teachers (including the 3 foreign volunteers) hold a master's degree, 9 hold a bachelor's degree and 28 teachers (65%) have undergone teacher training. Following the change of the educational system, teachers will be reclassified and will be required to undergo further training. In principle, however, the present teaching staff will be reinforced by those who have studied abroad.

• Curriculum

A new curriculum corresponding to the new educational system is now being developed by the Curriculum Development Research Centre (CDRC). It appears that announcement of the outline of the new curriculum will take some time as the CDRC is still at the discussion stage with the SPU.

2) Maintenance Plan

• Facilities

The expected life of a building can considerably vary depending on the degree of daily maintenance. Thorough cleaning and maintenance when conducted regularly lead to careful treatment of the facilities. In addition, the early detection of damage or breakdowns can minimise the repair cost. It is desirable that regular inspection and repair be conducted as described below.

Exterior	
Repair and repainting of exterior finishings	every 5 years
Inspection and repair of roofing materials	annually
Cleaning of gutters and drainage facilities	monthly
Inspection and repair of exterior doors and window sealing	annually
Inspection and cleaning of drainage ditches and manholes	monthly
Gardening	as required
Interior	
Repair and repainting of interior walls	as required
Replacement of ceiling materials as required	
Adjustment of doors and windows; replacement of hardware	annually

• Building Service Equipment

One of the essential requirements for the proper maintenance of building and service equipment is proper understanding of the functions and handling of such equipment. The KGV/EBS employs an electrician and a plumber as full-time staff members. Through providing these technicians with adequate guidance/training on the methods of handling and maintenance, proper operation, inspection and repair of the equipment will be possible.

As building service equipment requires regular inspection, maintenance and parts replacement, the preparation of a regular inspection schedule is necessary on which the actual inspection and maintenance work is based. The lives of

As building service equipment requires regular inspection, maintenance and parts replacement, the preparation of a regular inspection schedule is necessary on which the actual inspection and maintenance work is based. The lives of general building service equipment are listed below although these may considerably vary depending on the frequency and accuracy of inspection and maintenance as well as intensity of use.

Electricity	
Panel Boards	25 years
Fluorescent Lamps	5,000 - 6,000 hours
Incandescent Lamps	1,000 - 1,500 hours
Telephone Switchboard	25 years
Paging Equipment	15 years
Water Supply, Drainage and Sanitation	
Pumps	12 years
Tanks	17 years
Pipes and Valves	12 years
Sanitary Fixtures	7 years
Air-Conditioning	
Pipes	12 years
Ceiling Fans	12 years
Air-Conditioners	12 years

- Maintenance Plan for Educational Equipment

As the educational equipment to be provided under the Project is diverse and only a small number of each type of equipment will be provided, proper cleaning and storage will comprise essential parts of the maintenance work. Instructions should be provided on the required storage method for the educational equipment for each subject and regular cleaning after use will prolong the equipment life.

In the case of machine tools, etc., the manuals should be followed in terms of regular oiling and every-day maintenance. Many breakdowns tend to occur when users ignore the cautions given in the manuals. These aspects of

maintenance should be carefully explained to the Kiribati side at the time of handing over the equipment.

Of the educational equipment to be provided under the Project, the following equipment may well be repaired by the manufacturers or local agents.

- Personal Computers : agent in Fiji
- Laboratory Equipment : Japanese manufacturers or their agents in the region
- Machine Tools : Japanese manufacturers or their agents in the region

CHAPTER 4

PROJECT EVALUATION AND RECOMMENDATION

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4.1 Project Effect

As a project in the education sector, the Project conforms to the objective of the medium-term and long-term national development plans that the development of Kiribati be promoted through the development of capable, well-educated manpower. The benefits of the Project appear truly significant in that the KGV/EBS, as a state senior secondary school, will be open to application from any junior secondary school (to be upgraded to compulsory education) leaver and that the leading status of the KGV/EBS in Kirabati (the occupation of important political and business positions by many former students) will be enhanced. Given the nature of the Project, i.e. the replacement of the existing school facilities, coupled with a reduction of the number of students following the educational reform, no specific problems are anticipated in regard to the operation and management of the KGV/EBS. Based on the above implications and benefits of the Project, the Project's implementation with grant aid provided by the Government of Japan is judged appropriate.

The Project aims to quantitatively expand and qualitatively improve upper secondary education in Kiribati, and its implementation is expected to bring about the following effects.

(1) By increasing the number of students attending the project school of KGV (public school), the economic burden placed on parents and guardians will be lightened, thus allowing more people to obtain access to upper secondary education opportunities.

(2) The quantitative expansion in upper secondary education that will inevitably follow the improvements made in the quality of the education will lead to a larger supply of managerial personnel and engineers required by the state in advancing development and more entrepreneurs in the private sector. In specific terms, the Project will help advance the localization of staff in administrative departments, something which the Government of Kiribati has been planning to achieve. Moreover, in the private sector, it will become possible to turn out a wide range of human resources necessary for the development of domestic industries and other small enterprises.

(3) It will become possible to make effective use of scholarships to higher education organs (universities). Currently because the advanced level class has a small number of students and teaches only a limited number of optional subjects, it is unable to respond to the wide variety of scholarships that are available.

(4) The Project is in line with the Education System Reform which the Government of Kiribati plans to implement from 1997 and, as such, is expected to greatly encourage development of education in Kiribati. The said reform proposes to make Form 1 - Form 3 (lower secondary education) compulsory and regarding Form 4 - Form 7 (upper secondary education) to implement phased improvements centered around KGV and thus raise the level of education as a whole.

4.2 Recommendation

The above-mentioned numerous effects are expected from the Project and, as an education project, its implementation will contribute to satisfying the basic human needs of the people of Kiribati on a wide-ranging scale. Having said that, it is considered that the effect of the Project could be made even greater if the following issues were resolved.

(1) Maintenance of Facilities and Equipment

Compared to church-run schools, both the staff and students of the KGV/EBS appear to be less aware of the need for proper maintenance. The KGV/EBS currently has 3 maintenance staff (joiner, plumber and electrician) who conduct regular repair and cleaning, etc. When the facilities constructed under the Project are handed over to the Kiribati side, the respective maintenance manuals will also be provided in addition to lectures for the maintenance staff. It will be necessary for all administrative and teaching staff and for the students to be fully aware of the basic principle of maintenance that the careful handling and use of the buildings and equipment is the foremost important factor in prolongment of their lives.

(2) Improvement of Boarding Facilities

Kiribati is an island country comprised of 33 small islands with its population scattered over the islands. Although South Tarawa Island where KGV/EBS is located has the largest population of all the islands, it still only accounts for 25% of the total. Being the only public senior secondary school in Kiribati, more than 65% of the KGV/EBS students are from other islands and 60% are now actually boarding at the school. The existing facilities, however, are quite old with some facilities physically unsafe and unsanitary requiring renovation. As the students live most of their campus lives in the boarding facilities, improvement of those facilities is as important as improvement of the educational facilities and will create a suitable school environment as a whole and will contribute to achieving an improved quality of education which is the ultimate objective of the project.

APPENDICES

APPENDIX 1 MEMBER LIST OF THE SURVEY TEAM

Member List of the Survey Team (Basic Design Study)

1. Leader, Mr. Masatoshi TERAMOTO,
   First Management Division, Grant Aid Project Management Department, JICA
2. Project Manager and Architectural Planner, Mr. Kenji FUKUNAGA.
   Fukunaga Architects - Engineers
3. Facility Planner and Quantity Surveyor, Mr. Masayuki ASABUKI.
   Fukunaga Architects - Engineers
4. Utility Planner, Akihiro FUTAMI.
   Raymond Architectural Design Office Inc.
5. Equipment Planner, Mr. Takeo KIMURA.
   Fukunaga Architects - Engineers

Member List of the Survey Team (Draft Report Explanation)

1. Leader, Mr. Masaru TAKIMOTO
   Development Specialist, JICA
2. Grant Aid, Mr. Toshiyuki NISHIMOTO
   Grant Aid Division Economic Cooperation Bureau, Ministry of Foreign Affairs
3. Project Manager and Architectural Planner, Mr. Kenji FUKUNAGA
4. Facility Planner and Quantity Surveyor, Mr. Masayuki ASABUKI

APPENDIX 2 SURVEY SCHEDULE

1. Field Survey Schedule (Basic Design Study)

No.	Date	Day	Schedule	
1	11/27	Mon.	20:00	Narita－(FJ-303)
2	11/28	Tue.		－Nandi－Suva
3	11/29	Wed.	09:00	JICA Fiji Office: Courtesy Visit、Discussion
			10:00	Embassy of Japan in Fiji: Courtesy Visit、Discussion
				Suva—Nandi
4	11/30	Thu.	11:00	Nandi—(CW-012)—Tarawa
5	12/1	Fri.	09:00	Kiribati M.O.F.Courtesy Visit、Discussion
			10:00	Kiribati M.O.F.Courtesy Visit、Discussion
			11:00	Observation of KGV/EBS High School and
				TTC、Moronai High School、TTI
6	12/2	Sat.	09:00	Tungaru Hospital Observation
			13:00	Survey of Betio Port
7	12/3	Sun.	10:00	FTCSurvey、organization of data
8	12/4	Mon.	09:00	Discussion at Kiribati MOETT
			11:00	Team Meeting
			15:00	Site Survey
9	12/5	Tue.	09:00	Site Survey
			11:00	Research at Kiribati M. of Public Works
			13:30	Team Meeting
10	12/6	Wed.	09:00	Kiribati MOETT Discussion of draft of M/D
			10:00	Discussion at Kiribati M. of Interior
			13:00	St. Louis High School Survey
11	12/7	Thu.	10:00	St. Louis High School Survey
			12:30	Signing of M/D
			14:00	Site Survey
12	12/8	Fri.	10:00	Mr. Teramoto Team leader returns to Japan Tarawa－(CW-011)－Nandi
			09:00	Discussion at KGV/EBS High School
			10:00	Discussion at Kiribati MOETT
			13:00	Site Survey
13	12/9	Sat.	10:00	Site Survey
			15:00	Team Meeting
14	12/10	Sun.		organization of data

No.	Date	Day	Schedule	
15	12/11	Mon.	10:00	Logistics Survey at Betio Port
			12:00	Team Meeting
16	12/12	Tue.	10:00	Mr. Kimura returns to Japan Tarawa－(CW-011)－Nandi
			10:00	Discussion at KGV/EBS High School
			11:00	Discussion at Kiribati M. of Public Works (PWD)
			11:45	Discussion at Kiribati M. of Public Works (PUB)
			14:00	Discussionam at USP
			16:00	Survey of Former Tungaru Hospital existing building
17	12/13	Wed.	09:00	Discussion at Kiribati MOETT (PWD)
			11:00	Discussion at Kiribati M. of Public Works (PWD)
			11:30	Survey at KIRIBATI SHIPPING SERVICES
			13:00	Site Survey
18	12/14	Thu.	10:00	Tungaru Hospital Medical Equipment Survey
			14:00	Discussion at KGV/EBSHigh School
19	12/15	Fri.	10:00	CDRC Discussion
			13:00	Site Survey
20	12/16	Sat.	09:00	Final Discussion at Kiribati MOETT
21	12/17	Sun.	11:00	(North Tarawa) Taborio High School Survey
22	12/18	Mon.	0930	Final Discussion at Kiribati M. of Interior
			10:30	KGV/EBS High School
			11:30	Site Survey (ground survey)
23	12/19	Tue.	10:00	Mr. Fukunaga, Mr. Asabuki and Mr. Futami return to Japan, Tarawa－(CW-011)
24	12/20	Wed.	09:00	Courtesy Visit to JICA Fiji Office、Report of Survey
			10:00	Market Survey (Suva)
				Suva－Nandi
25	12/21	Thu.	02:40	Nandi－(FJ-512)－Sydney
			09:00	Market Survey (Sydney)
26	12/22	Fri.	09:00	Market Survey (Sydney)
27	12/23	Sat.	09:00	Market Survey (Sydney)
28	12/24	Sun.		organization of data
29	12/25	Mon.	10:30	Sydney (JK-772)－Narita

2. Field Survey Schedule (Draft Report Explanation)

No.	Date	Day	Schedule	
			Government Officials	Consultant Members
1	2/26	Mon.	2000 Dep. Narita (FJ3030)	
2	27	Tue.	0725 Arr. Nandi to Suva	
3	28	Wed.	Courtesy Visit to Embassy and JICA Office to Nandi	2045 Dep. Narita (NZ024)
4	29	Thu	1100 Dep. Nandi (CW012) 1255 Arr. Funafuti Courtesy Visit, Discussion at MOETT	0800 Arr. Nandi 1100 Dep. Nandi (CW012) 1555 Arr. Tarawa
5	3/1	Fri.	To Widop Island	Visit MOETT
6	2	Sat.	Site Observation	organization of data
7	3	Sun.	To Funafuti	organization of data
8	4	Mon.	1340 Dep. Funafuti (CW012) 1555 Arr. Tarawa	Discussion at MOETT
9	5	Tue.	Site Survey, Courtesy Visit & Discussion at MOETT	
10	6	Wed.	Site Survey, Discussion at MOETT, Visit Moroni H.S. St. Louis H.S.	
11	7	Thu.	Discussion of M/D at MOETT	
12	8	Fri.	1000 Dep. Tarawa (CW011) 1455 Arr. Nandi Report of Survey to Embassy, JICA Office	
13	9	Sat.	Team Leader Mr. Takimoto 0815 Dep. Nandi (FJ440) 1215 Arr. Awkland	Mr. Nishimoto, Mr. Fukunaga, Mr. Asabuki
14	10	Sun.	0800 Dep. Auckland (NZ101) 0925 Arr. Sydney 1030 Dep. Sydney (JL772) 1800 Arr. Narita	0700 Dep. Nandi (FJ914) 1035 Arr. Sydney
15	11	Mon.		0850 Dep. Sydney (NH914) 1620 Arr. Narita