Japan International Cooperation Agency

No. 1

Ministry of Education
Republic of the Marshall Islands

SUPPLEMENTARY REPORT
FOR
BASIC DESIGN STUDY
ON
THE PROJECT FOR
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT
IN
THE REPUBLIC OF THE MARSHALL ISLANDS

JULY 1994

SYSTEM SCIENCE CONSULTANTS INC.

JICA SUPPLEMENTARY REPORT FOR BASIC DESIGN STUDY ON THE PROJECT FOR MARSHALL ISLANDS HIGH SCHOOL UP-GRADING/DEVELOPMENT IN THE REPUBLIC OF THE MARSHALL ISLANDS JULY 1994 SYSTEM SCIENCE CO

Japan International Cooperation Agency

Ministry of Education
Republic of the Marshall Islands

SUPPLEMENTARY REPORT FOR BASIC DESIGN STUDY ON THE PROJECT FOR MARSHALL ISLANDS HIGH SCHOOL UP-GRADING/DEVELOPMENT IN THE REPUBLIC OF THE MARSHALL ISLANDS

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PREFACE

In response to a request from the Government of the Republic of the Marshall Islands, the Government of Japan decided to conduct a supplementary study for the basic design on the Project for Marshall Islands High School Up-Grading/Development and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Marshall Islands a study team headed by Mr. Eiichiro Cho, First Project Management Division, Grant Aid Management Department, JICA and constituted by members of System Science Consultants Inc., from April 4 to April 17, 1994.

The team held discussions with the officials concerned of the Government of the Marshall Islands, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as the 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 the Marshall Islands for their close cooperation extended to the teams.

July 1994

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

July 1994

Mr. Kensuke Yanagiya,
President
Japan International Cooperation Agency
Tokyo, Japan

LETTER OF TRANSMITTAL

We are pleased to submit to you the supplementary report for the basic design study on the Project for Marshall Islands High School Up-Grading/Development in the Republic of the Marshall Islands.

This study was conducted by System Science Consultants Inc., under a contract to JICA, during the period of March 31, 1994 to July 9, 1994. In conducting the study, we have examined the feasibility and rationale of the Project with due consideration to the present situation of the Marshall Islands and formulated the most appropriate basic design for the Project under Japan's grant aid scheme.

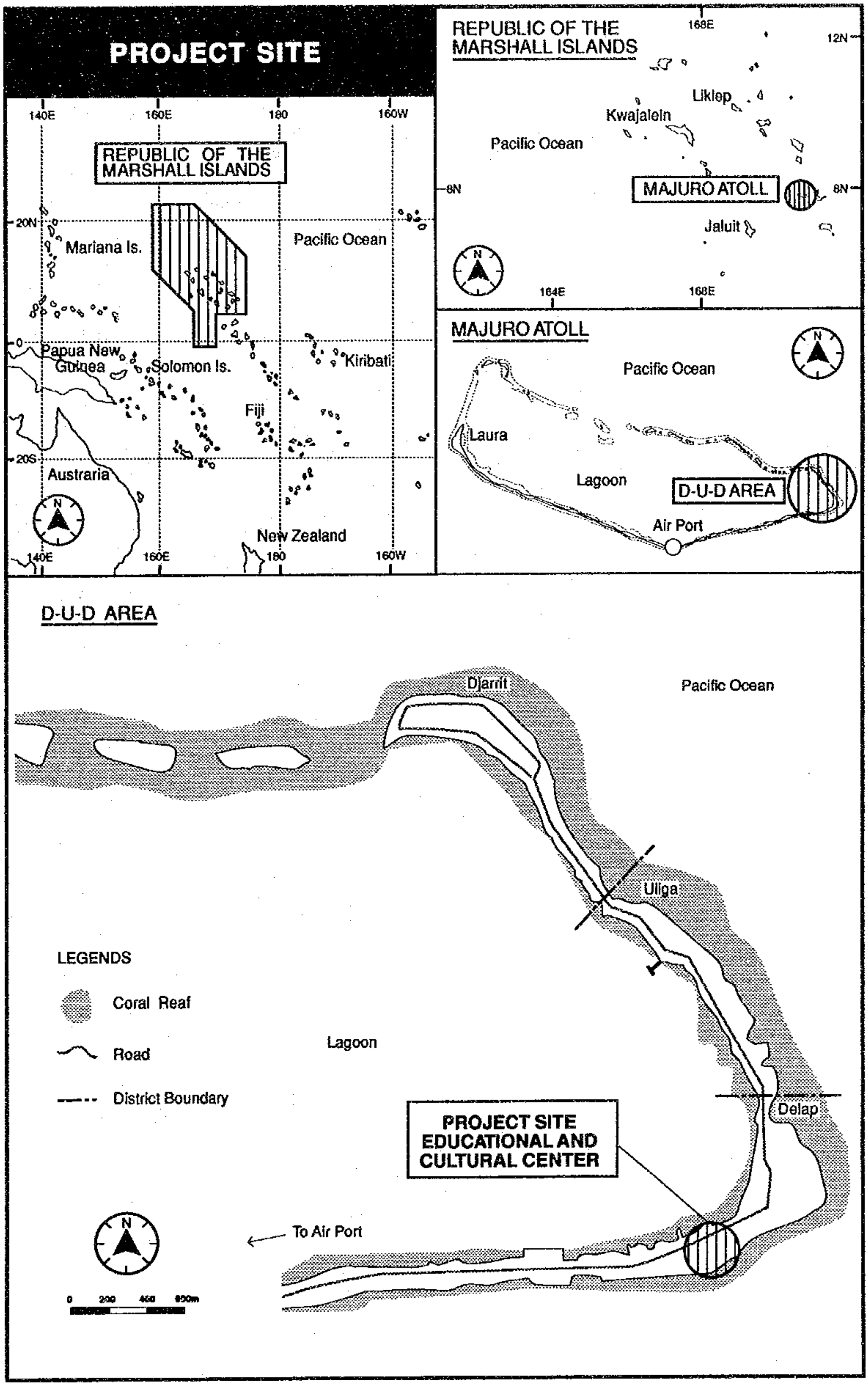
We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, and the Ministry of Education. We would also like to express our gratitude to the officials concerned of the Marshall Islands High School, Ministry of Education in the Republic of the Marshall Islands for their cooperation and assistance throughout our field survey.

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

Very truly yours,

Y. Date

Yukitaka Date
Project manager,
Supplementary Study Team for
Basic Design on the
Project for Marshall Islands High School
Up-Grading/Development in
the Republic of the Marshall Islands
System Science Consultants Inc.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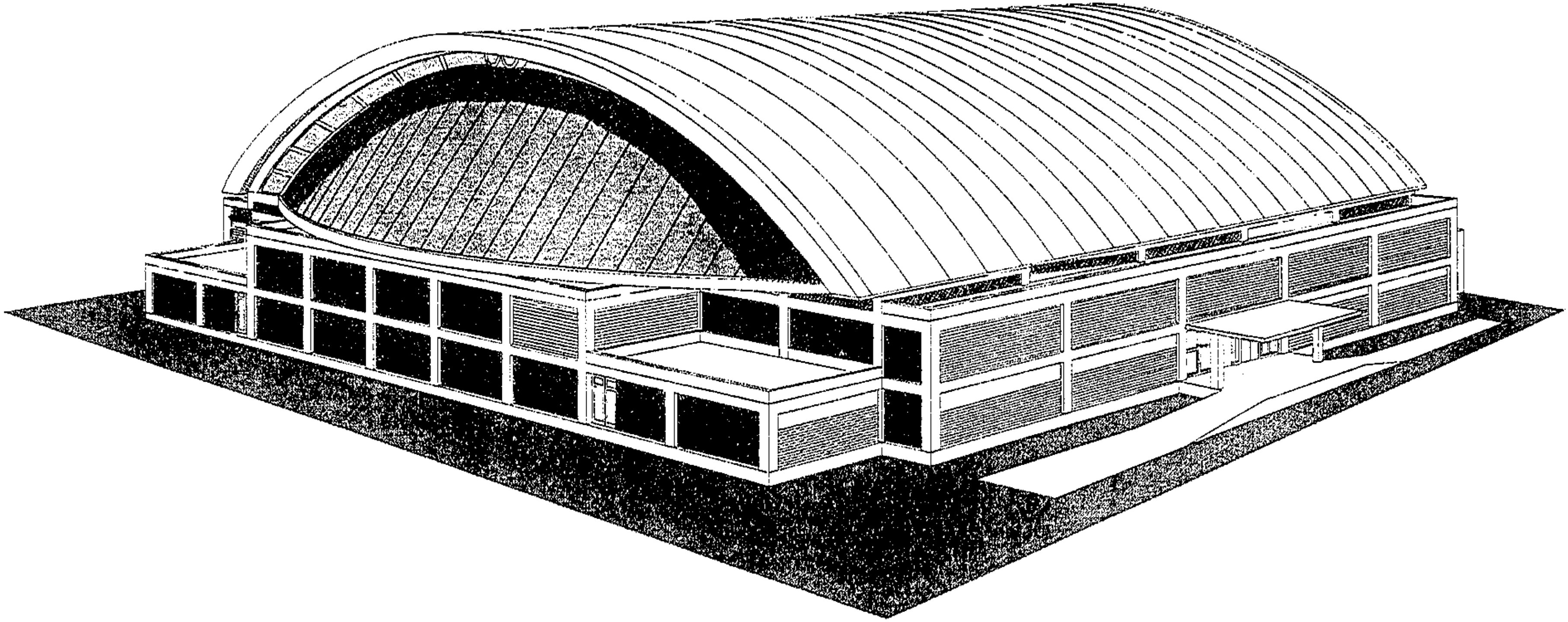
EDUCATIONAL AND CULTURAL CENTER SITE PHOTO



EDUCATIONAL AND CULTURAL CENTER PERSPECTIVE DRAWING

SUMMARY

SUMMARY

The Republic of the Marshall Islands (RMI) is located in the Central Pacific in a narrow area of 181 km^2, consisting of 29 atolls and 5 islands. It is estimated that the population which was 43,380 in 1988 increased rapidly to approximately 70,000 in 2000, and this high increase rate will continue hereafter. Especially in Majuro, the capital of the RMI, the population which is growing rapidly not only due to a natural population growth but also migration from outer islands has reached about half the total population in the country. Owing to this rapid natural growth over half of the population is under 15 years of age, and this rapid increase in the school age population, compounded by problems of shortage and deterioration of the educational facilities, have triggered the need to secure more proper school education facilities.

In the RMI, which became independent in 1986, it is extremely difficult for the youth without experience and high skills to find jobs because industries have not developed adequately since the formation of the self-sustaining economy started quite recently, and the major employment positions are occupied by foreign workers. Consequently, some of the youth are shut out from employment opportunities and find no prospective future. Therefore, improvement of social education for the youth is the top priority issue to be resolved.

According to the educational policy in the Second Five-Year Development Plan, the objective of public high schools is to provide the education emphasizing vocational training, and it is also considered to be significant to facilitate social education for the youth. The RMI has not provided a desirable environment to foster sound youth due to the shortage of social education facilities, sports and recreation facilities, and non-formal educational facilities for unenrolled youth. Under such circumstances, the government of the RMI requested a grant aid from the government of Japan for the Project for Marshall Islands High School Up-Grading/Development (the Project), which comprises the construction of some additional school buildings of Marshall Islands High School (MIHS), upgrading of the educational equipment, and construction of the Educational and Cultural Center (ECC).

In response to the request from the government of the RMI, the government of Japan decided to conduct a basic design study on the Project, and the Japan International Cooperation Agency (JICA) sent a study team from June 1 to July 2, 1993. After the team returned to Japan, the survey materials were examined and analyzed, and further

studies were made regarding the contents and appropriateness of the Project. Based on the results, the basic design was conducted on the facilities and equipment with appropriate scale and contents, and a draft report was prepared. JICA dispatched a mission to the RMI from September 12 to September 24, 1993 to explain and discuss the draft final report, and to confirm the contents of the basic design study with the government of the RMI.

When the draft report was explained, the government of the RMI made a request to change the site of the ECC which is one of the requested facilities. In October 1993 the government of RMI made an official request to change the site of the ECC to the old airport site.

Responding to this request from the government of the RMI, the government of Japan decided to conduct a supplementary study for basic design on the change of the site of ECC, and JICA dispatched a study team from April 4 to April 17, 1994. This supplementary study was to confirm the background of the request to change the site, assess the appropriateness of the site, and confirm the contents, scale and layout of the ECC.

The site of the ECC is located in the old airport site in Delap district in DUD about 500m to the west of the new Capital Complex. It is surrounded by large buildings such as churches, office buildings, large super markets, etc. in an area which has been developed as a business area. The area of the site for the ECC is approximately 0.5 ha, and it is now a vacant lot.

The results of the supplementary study clarified that the plot plan, area, soil and infrastructure conditions of the site for the ECC did not pose any problems in terms of access and construction implementation. It was confirmed that the land acquisition and relocation of the existing house of the site have been arranged by the government of RMI. It was thus concluded that the site is suitable for the construction of the ECC.

It was also confirmed that the contents and objectives of the ECC did not deviate from those approved by the government of RMI in the Basic Design Study Report (November 1993). The objectives of the ECC were clarified as below :

- To reduce the shortage of sports facilities to facilitate sports activities for youth and community.
- To provide opportunities to hold classes and non-formal education for all the community to facilitate social education for youth.

The ECC will be under the jurisdiction of MIHS and the principal of MIHS will be responsible for its management. The activities to be performed in the ECC include (i) special heritage culture classes of MIHS and drama, (ii) community or high school tournament sports, and (iii) social education including sound youth activities and vocational training programs. Three staff members will be newly employed for the ECC to be in charge of the scheduling, operation and maintenance of the facilities.

The facilities of the ECC consist of two basketball courts, an indoor bleachers with a capacity of approximately 600 and a stage. The floor area of ECC to be upgraded and constructed in the Project is shown in the following table.

List of Facilities in ECC

Name of Room	Floor Area (m^2)	Remarks
ECC		
A (1st Floor)		(1st Floor Area : 2,640.00 m^2)
1) Arena	1,470.00	
2) Office Room	10.50	
3) Locker Room	60.00	30.00 m^2x 2, Including shower booth
4) Stage	150.00	
5) Toilet	60.00	30.00 m^2x 2
6) Others	889.50	Including downstairs of Indoor Bleachers, Entrance Hall, etc.
B (2nd Floor)		(2nd Floor Area : 870.00 m^2)
1) Indoor Bleachers	367.00	2.5m higher than 1st floor in steps.
2) Others	503.00	Including Water Reservoir, Void, etc.
Total Area	3,510.00m^2	

In the RMI electricity charges of public facilities is not paid by the relevant authorities but by the Ministry of Finance directly. Therefore, the annual operation and maintenance cost except electricity charges required after the completion of the ECC is expected to be approximately $7,500. The limited revenue of the RMI is supplemented by subsidies from the US. As the annual budget for MIHS has been largely appropriated to cover personnel costs, other operational costs have often dropped to less than ten percent of the whole budget. It is necessary for the Ministry of Education to secure a budget for new operational costs in order to perform operation and maintenance of the Project without any problem. As the Project was requested to alleviate the youth problem, which is the most serious problem encountered, the government of the RMI will make the utmost efforts to secure a budget for the operation and maintenance costs.

The Project will be executed after the Exchange of Notes is concluded between the government of Japan and the government of the RMI. The implementation of the Project will be divided into two phases ; the first phase for construction of some additional school buildings of MIHS to meet increasing enrollment population, and the second phase for upgrading of educational equipment and construction of the ECC to enhance vocational and social education. The work schedule required for the execution is expected to be about 14.5 months for the first phase (4 months for detailed design and tender, and 10.5 months for construction), and about 15.0 months for the second phase (4 months for detailed design and tender, and 11.0 months for construction and procurement). The work allotted to the RMI is estimated to be approximately $190,000 for the first phase, and $140,000 for the second phase. The content of both phases of the Project is described in the following table.

Work Phase of the Project

Phase	Content of Work
1st Phase	Construction of General Classroom & Administration Bldg., Special Classroom Bldg., Sports Shell, and Dormitory. Leveling work of 200m field track. Electricity wiring work of the existing vocational training bldg.
2nd Phase	Construction of ECC. Upgrading of vocational training equipment.

Remark: The contents of Phase 1 and the upgrading of the vocational training equipment in the Phase 2 remain unchanged from the Basic Design Study Report (November 1993).

The implementation of the ECC in the Phase 2 of the Project will enable facilities for sports popular in the country to be improved. The social education for the community and an environment to foster sound youth development will be facilitated. As these factors will make a great contribution to relieving the problems of youth through improved employment opportunities and organized social activities, it is considered to be appropriate to implement the Project under grant aid.

In order to effectively use the ECC's facilities, we would like to suggest that the government of the RMI take the following actions.

(i) The Ministry of Education needs to secure an adequate budget to meet the increasing maintenance expenses of the ECC. It is also necessary to use the newly installed equipment such as air-conditioners and lamps properly and save maintenance costs.

(ii) The implementation schedule should be based on sports activities of youth and social education programs provided by MIHS and the Ministry of Education in order to use the facilities of the ECC properly. Basically, cleaning up after use should be done by the users since most of them are youth. Regulations on using the ECC should be prepared to cultivate responsibility for public facilities. Staff members who are exclusively responsible for the operation and maintenance of the ECC should be employed.

ABBREVIATIONS

CIP :	Capital Improvement Project
CMI :	College of Marshall Islands
DUD :	Delap, Uliga and Djarrit
ECC :	Educational and Cultural Center
JICA :	Japan International Cooperation Agency
JOCV :	Japan Overseas Cooperation Volunteers
MEC :	Marshall Energy Company
MIHS :	Marshall Islands High School
MWSC :	Majuro Water & Sewer Company
NTA :	National Telecommunication Authority
RMI :	Republic of the Marshall Islands

TERMINOLOGY

Alap :	Head of Clan
Iroijlaplap :	Head Chief
Iroijedrik :	Second Chief

CONTENTS

PREFACE
LETTER OF TRANSMITTAL
LOCATION MAP
PHOTO
PERSPECTIVE DRAWING
SUMMARY i
ABBREVIATIONS v

CHAPTER 1 BACKGROUND OF THE ECC 1
1.1 Background of the site change of the ECC 1
1.2 Outline of the Request 2

CHAPTER 2 OUTLINE OF THE ECC 3
2.1 Objectives of the ECC 3
2.2 Study and Examination on the Request 3
  2.2.1 Study and Examination on the Appropriateness and Necessity of the ECC 3
  2.2.2 Components of Requested Facilities 4
  2.2.3 Analysis of Requested Facilities 5
2.3 ECC Project Description 6
  2.3.1 Execution Agency and Operational Structure 6
  2.3.2 Plan of Operation 7
  2.3.3 Location and Condition of ECC Site 9
  2.3.4 Outline of Facilities 13
  2.3.5 Operation and Maintenance Plan 13
2.4 Technical Cooperation 15

CHAPTER 3 BASIC DESIGN 17
3.1 Design Policy 17
3.2 Study and Examination on Design Criteria 17
3.3 Basic Plan 18
  3.3.1 Site and Layout Plan 18
  3.3.2 Architectural Designs 19
    (1) Floor Plan 19
    (2) Section Plan 22
    (3) Structural Design 23

(4) Building Facility Plan 24
(5) Construction Material Plan 28
3.3.3 Equipment Plan 29
3.3.4 Basic Design Drawing 29
3.4 Implementation Plan 37
3.4.1 Construction Condition 37
3.4.2 Implementation Method 37
3.4.3 Construction and Supervisory Plan 38
3.4.4 Procurement Plan 39
3.4.5 Implementation Schedule 39
3.4.6 Scope of Work 42

CHAPTER 4 PROJECT EVALUATION AND CONCLUSION 45
4.1 Project Evaluation 45
4.2 Conclusion 46
4.3 Recommendations 46

[Appendix]

1. Member List of the Survey Team .... A − 1
2. Field Survey Schedule .... A − 2
3. Member List of Concerned Party .... A − 3
4. Minutes of Discussions .... A − 4
5. List of Data .... A − 16
6. Calculation Of Water Reservoir Capacity .... A − 17

[List of Appendix Figures]

Figure 1 Lot Plan .... A − 19
Figure 2 Bore Holes Location .... A − 21
Figure 3 Bore Logs Section Summary .... A − 23
Figure 4 Bore Logs .... A − 25
Figure 5 Grain-Size Accumulation Curve .... A − 34

CHAPTER 1 BACKGROUND OF THE ECC

CHAPTER 1 BACKGROUND OF THE ECC

The background of the request for the Project for Marshall Island High School Up-Grading/Development (the Project) is written in the Basic Design Study Report (November 1993). The background of the site change of the Educational and Cultural Center (ECC) is described below.

1.1 Background of the site change of the ECC

At the time of the field survey of the basic design for the Project on June 1993, it was confirmed by the government of the RMI that the site of the ECC was adjacent to the new Capital Complex in Delap district/DUD, and the site area was approximately 1 ha. After returning to Japan, the JICA study team proceeded with the basic design of the facilities and equipment and prepared a draft report.

When the draft report was explained in September 1993 to confirm the contents of the basic design, the government of the RMI requested to change the project site for the ECC to the old airport site because they decided to build a convention hall adjacent to the Capital Complex.

In response to this request for the site change, the study team on instruction from the government of Japan made the following requests to the government of the RMI.

(i) The government of the RMI should make an official request to the government of Japan concerning the site change of the ECC.
(ii) The government of the RMI should make a decision at a Cabinet meeting that the ECC will be located in a new site.
(iii) The government of the RMI should secure the land for the new Project site.

After procedures were taken by the government of the RMI to obtain the alternative site, an official request was made to the government of Japan concerning the site change. Upon acceptance of the request, the government of Japan instructed JICA to conduct a supplementary study to confirm and study details of the site change request and the appropriateness of the new site for the already approved ECC design.

1.2 Outline of the Request

The following are the reasons for the site change and selection of a new site which was discussed and confirmed during the supplementary study with the executing agency in the RMI.

(1) Objective of the Request

The objective of the ECC in Majuro is to contribute to the enhancement of social education in the RMI. There is no change in the concept and contents of the ECC determined at the Basic Design Study Report (November 1993) except for the change of site location.

(2) Reason for Site Change

The government of the RMI decided on a different construction plan with regards to the site adjacent to the new Capital Complex which was originally supposed to be the ECC site. Instead, an international convention hall was planned for the site as a supplementary facility to the Capital Complex.

(3) Reason for the Selection of the New Site

The new site is the only piece of land that is large enough to meet the ECC's size requirements and is readily accessible to all the intended users.

(4) Executing Agency

The executing agency of the Project will be the Marshall Islands High School under the jurisdiction of the Ministry of Education. There is no change from the Basic Design Study Report (November 1993).

(5) Works To Be Executed

The government of the RMI approved the contents and scale of the ECC's facilities which were concluded in the Basic Design Study Report (November 1993) and confirm the inclusion of the ECC in the Project.

CHAPTER 2 OUTLINE OF THE ECC

CHAPTER 2 OUTLINE OF THE ECC

2.1 Objective of the ECC

The ECC is part of the Project for Marshall Islands High School up-Grading/Development (the Project). The objective of the construction of the ECC is to upgrade social and non-formal education, and alleviate the problem of shortage of sports facilities, and thereby promote social education of youth and stimulate sports activities.

2.2 Study and Examination on the Request

2.2.1 Study and Examination on the Appropriateness and Necessity of the ECC

As a result of the analysis of the appropriateness and necessity of the Project based on the discussion with the government of the RMI, the examination of the prevailing conditions in the secondary and social education in the RMI, and the survey of the site, it is considered to be appropriate to implement the Project. The result of the analysis is described as follows.

(1) Necessity of the Construction of the ECC

In the RMI where the government has just started forming self-sustaining economy, the unemployment rate of the youth is high because of few opportunities for employment and shortage of youth who have received secondary education to meet the needs of employers. It means that an environment which will allow young people to lead sound social lives has not been provided. Therefore, the important measures to be taken to solve the problems of youth is to reeducate unemployed youth and to facilitate sports and recreational activities that foster cooperative group action. But the insufficient facilities in social education have produced the following problems.

(i) The facilities of the College of Marshall Islands (CMI) are used for non-formal education programs sponsored by the Ministry of Education because there are no special facilities. But usage is restricted by class schedules of CMI and enrollment capacity is also limited.

(ii) Local communities as well as youth are highly interested in the sports. More and more people are interested in sports year after year so that only a limited number of youth are able to use the facilities. In addition, adequate facilities for the increasing sports population are also lacking.

(iii) There is no appropriate place for observing traditional culture and heritage as well as public halls or other locations where community people can participate in social education.

Therefore, it is considered that the construction of an ECC will make a great contribution to solving the problems of youth as a place to perform non-formal education programs, sports and participation of community people in social education programs conducted by the Ministry of Education and Marshall Islands High School (MIHS).

(2) Appropriateness of the Implementation of the Japanese Grant Aid

At present there is only one public high school in Majuro and one in Jaluit. The Ministry of Education's educational policy to strengthen the secondary education requires two more public high schools, one of which is under construction, but there is no prospect of starting the work for the other due to lack of funds. The major source of financial assistance from the US which has been reduced year after year, has made it increasingly difficult for RMI to secure funds for its development plans. The high cost of the reconstruction of the MIHS, improvement of the equipment and the construction of the ECC is thus beyond the limit of the nation's finances.

The fact that the RMI which has no outstanding economic resources except fishery products means that the development of the human resource through secondary education, which is one of the basic elements to establish a self-sustaining economy, is of the utmost priority and has to be urgently addressed.

As the objective and the expected effects of the Project correspond to the system of the Japanese grant aid, coupled with the fact that the operation and implementing capabilities are sufficient, it was considered appropriate to implement the Project under the Japanese grant aid program.

The component of the Project will be discussed in the following sections to conduct the most appropriate basic design on the premise that the Japanese grant aid will be provided.

2.2.2 Components of Requested Facilities

(1) Policy of Study and Examination

The content of the requested facilities and equipment was studied in accordance with the following policies in consideration of the background of the request and the result of the discussions on the field survey.

(i) The content and the scale of the ECC should be based on the policy that it be used for classes of MIHS and educational programs of the Ministry of Education.

(ii) The existing office furniture and general equipment should be used to its utmost capacity and replaced by self-reliant efforts of the RMI. The minimum number of educational equipment should be supplied for vocational training conducted in MIHS.

(iii) The building layout, structure, safety and convenience aspects which were strongly emphasized by the RMI should be reflected in the basic design.

(2) Target Year

If the Project is implemented, it is assumed that construction of the ECC will be completed in 1996. Therefore, the facilities of the Project are targeted for operation in 1996.

(3) Components of the Project

The Project aims to improve the public secondary education in Majuro and social education for high school students and youth in general. The ECC, which is a component of the Project, will be used for classes of MIHS as well as a center for sports and social education in the community. The aims of the ECC are outlined in the table below.

Table 1 Aims of the ECC

Improvement of Social Education	(i) To respond to special programs of high school/Ministry of Education
	(ii) To respond to inadequate indoor sports space
	(iii) To respond to participation of communities in social education

2.2.3 Analysis of Requested Facilities

The outline of the major requested facilities and the result of the analysis are described as follows.

Table 2 Outline and Analysis of Requested Facilities

Requested Facilities	Examined Facilities	Analysis of Purpose and Necessity
Educational and Cultural Center		
Request includes the center surrounded by walls with an arena with 2 basketball courts, indoor bleachers with capacity of about 600, locker rooms with shower for 2 teams.	(i) Basketball court, 2 Nos (Note 1) (ii) Stage (Note 2) (iii) Indoor Bleachers (Note 3) (iv) Storage (v) Locker room (vi) Toilet (vii) Bldg. Wall (Note 4)	Note 1 : 2 basketball courts are required for multiple team games and matches. Note 2 : Stage is required for lectures on social educational activities beside sports. Note 3 : Strong request from the government in the RMI was accepted for the installation of indoor bleachers with a capacity of about 600. Note 4 : Strong request from the government in the RMI was accepted to install walls surrounding the building to protect the exhibited items and equipment in the Center and to prevent the rain from pouring into the building in spite of reduced ventilation effects.
At the time of supplementary study: Capacity of the rain water tank for ten days supply was requested.	(viii) Water Reservoir (Note 5)	Note 5 : Request was accepted for additional installation of water reservoir in consideration of water shortage in the dry season and publicity of the building. (See Appendix 6)

2.3 ECC Project Description

2.3.1 Execution Agency and Operational Structure

The operation and maintenance of the facilities of the ECC will be conducted by MIHS. A new department to oversee operation of the newly constructed ECC will be established in MIHS and the principal of MIHS will be responsible for its operation and management.

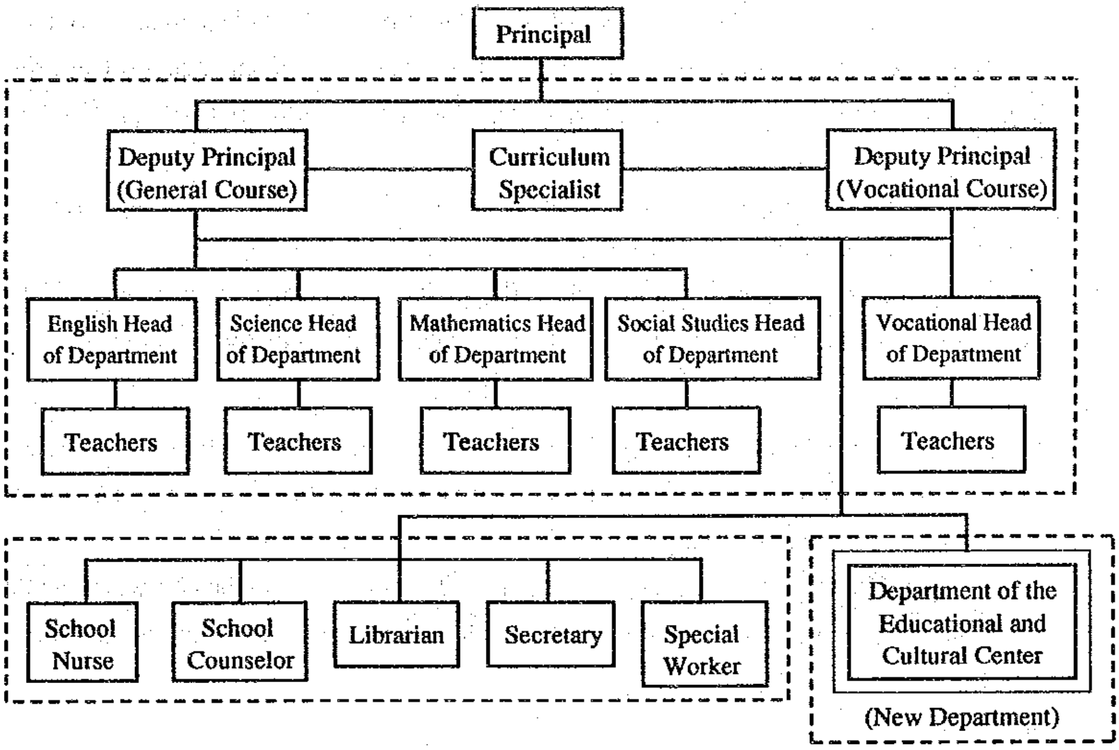


Figure 1 Organizational Chart of MIHS

In 1996 it is planned to employ three staff members for the operation and maintenance of the ECC. The personnel plan of MIHS for ECC is shown in the following table.

Table 3 Personnel Plan of MIHS for ECC

	1996
Center Manager	1
Center Janitor	2
Total	3

2.3.2 Plan of Operation

(1) Operation Programs

The following programs are planned for the ECC.

1) MIHS Class

(i) Physical Education Class: Physical education classes which exceed the capacity of the gymnasium of MIHS will use ECC during normal class hours from Mondays to Fridays.

(ii) Cultural Heritage Special Class: The following will be conducted as special courses on Micronesian culture and wood working by elderly persons and women from the local community. (mat weaving/hat weaving, shell craft, traditional food, folk tales, traditional medicine)

(iii) Drama: Drama performance will be presented twice a year, including time for practice, rehearsal and set construction.

When normal classes are conducted at the ECC, a school bus will be used to transport students from MIHS which is located about 3.5 km away from the ECC.

2) Sports

(i) High School Tournament Matches: Basketball and volleyball tournament matches between the six high schools in Majuro including MIHS to be conducted after school hours from Mondays to Fridays.

(ii) Community Youth Team Tournament Matches: Tournament matches between the 22 volleyball teams and 18 basketball community teams to be conducted on Saturdays and Sundays.

3) Social Education

(i) Teacher Training Program by the Ministry of Education: Lectures and seminars for teacher training to be conducted.

(ii) Vocational Training Class by National Training Council: Lectures excluding practical vocational training are provided.

(iii) Sound Youth Campaign by private groups: Presentation of short dramas and musical shows to be provided to combat drug abuse, Aids, alcoholism among youth.

(iv) Youth Speech Contest and Youth Debate: Activities of Youth Convention to be conducted by Christian church groups.

(2) Budget Plan

Transitions in the annual budget of the Ministry of Education, the agency responsible for the Project, and MIHS, the executing agency are described in the following table. The budget for MIHS is included in the budget of the Ministry of Education, comprising around 10 percent of the actual budget of the Ministry. In 1992/93 and 1993/94 there were no funds carried over from the previous year, but the actual budget was increased which shows the emphasis of education in the government. Personnel costs comprise about 90 percent of the total budget of MIHS, the total amount of which increased in 1992/93. Electricity bills are not included in the following table as they are covered by the Ministry of Finance. Therefore, electricity bills pertaining to the buildings and equipment to be upgraded in the Project will not be paid by MIHS.

Further, it is reviewed to raise the salaries of teachers, and the Ministry of Education is formulating a policy to cope with increasing personnel costs.

Table 4 Transition of Annual Budget of the Ministry of Education and MIHS

	1989/90	1990/91	1991/92	1992/93	1993/94
(1) Ministry of Education					
(i) Actual Budget for Current Year	8,630	6,698	6,675	9,008	9,700
(ii) Carried Over from Previous Year	3,321	3,053	373	0	0
Total	11,951	9,748	7,048	9,008	9,700
(2) MIHS					
(i) Personnel Expense	764	577	596	680	678
(ii) Other Expenses	92	30	165	36	38
Total	856	607	761	716	717

Unit) $1,000
Source) Internal Data of the Ministry of Education

2.3.3 Location and Condition of ECC Site

(1) Natural Conditions

1) Description of Natural Conditions

Majuro has an average temperature of 27.3°C with little yearly variation in temperature. The rain is typically of a squall type with an annual precipitation of 3,360mm. In terms of the monthly rainfall pattern, they have little rain in January to March, gradually increasing from April till October, when the maximum precipitation is reached. Lately during the dry seasons, the amount of monthly rainfall has sometimes been substantially below the average years. Throughout the year stable trade winds blow from east-northeast, with mean wind speed being 3 to 6 m/sec.

The RMI is located outside the typhoon course, and does not suffer from typhoons very often. From recent damage records in Majuro, there have been flood damage due to a flood tide in 1979, and building damage caused by typhoon gales in 1992. Climatic data from the Majuro Meteorological Station is shown below.

Table 5 Climatic Data

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Average temperature(°C)	27.1	27.3	27.3	27.2	27.4	27.2	27.2	27.4	27.4	27.4	27.3	27.1	27.3
Precipitation (mm)	210	256	214	276	278	305	329	289	325	351	325	302	3360
Relative humidity (%)	79	80	81	81	83	82	81	81	81	80	82	81	
Mean wind speed (m/s)	6.1	5.1	5.4	5.4	5.3	4.4	3.8	3.1	2.9	2.8	3.4	4.7	

Notes: (i) Data of average temperature and precipitation are the average from 1959 to 1991.

(ii) Data of relative humidity and mean wind speed are the average from 1989 to 1991.

2) Topography and Geography

(i) Description of Topography and Geology

During the field survey, a topographical survey, a boring survey at three points and a geological survey at six test pits were conducted in the site for the ECC.

The results of the topographical survey shows that the site area is approximately 0.5 ha, and is an almost flat vacant lot. A house and a garden are located in a portion of the site (See Appendix Fig. 1).

The results of the geological survey indicate that the site, which was the site of the old airport, comprise a surface layer of compacted filled ground of silty sandy gravel from - 0.3 m to - 0.6 m from the surface. The second layer contains grey silty sand without any organic substance extending from the first layer down to - 1.4 m ~ - 2.1 m level. The third layer and below consists of alternative strata of coral rock consolidated with gravel bed of coral lime underneath. Soft stratum is found in the second layer and at the level of - 10.0 m, but it is considered that there would be no problem with the planning as the stratum is not very thick (see Appendix Fig 2 & 3).

(ii) Properties of Soil

(Distribution of N-value)

The bore logs of the three bore holes (See Appendix Fig.4) show a similar geological structure. In the section from the surface layer down to the level of - 0.7 m, N-values of 15 to 50 or above are dominant, while in the section between - 0.3 m and - 2.1 m, loose layers are distributed, including a layer with N-value of 3. Since this stratum is not very thick, there would be no serious problem with the basic design of the building. In view of the fact that the building planned in the Project do not have a heavy upper load, and that the surface layer is of firm soil, it is possible to prevent settling of the buildings in the loose strata if the load is not borne by one point but rather dispersed over the whole foundation structure. The outline of soil properties is shown below.

Table 6 Soil Properties of ECC Site

Depth (m)	N-value	Soil Properties
0 to - 0.7	15 to 50	Surface is airstrip of the old airport. White silty sandy gravel.
- 0.3 to - 2.1	3 to 38	Dark grey with rare white silty sand with rare gravel.
- 1.1 to -20	11 to 50	Uncemented white sand medium to coarse, with interbedded fine to medium coralline gravel, silt and shell fragments, and interbedded cemented coralline reef materials.
- 10 to - 20 (some areas)	1 to 3	Sample was not available. No voids but loose sand stratum seems to be present.

(Grain Size Accumulation)

A grain-size accumulation curve was prepared from the soil sample taken from the second layer at the three boring points conducted (See Fig. 3). DH-1 and DH-2 show relatively high N-value, and the gentle curve indicates that grain sizes are evenly distributed and soil property is almost uniform. The second layer of DH-3 indicates the soil has a property that can be improved by mixing with gravel or by soil replacement.

(Unconfined Compression Test)

A soil sample taken from the cemented stratum of - 15 m, and an unconfined compression test was conducted. An uncompressive strength of 110 kg/cm^2 was measured, which was similar to that of blinding concrete.

(Ground Water Level)

The test result shows that ground water is found at a level of 1.1 m to 2.5 m below the ground surface, being affected by the tide level. As submerged soil will experience a loss in the soil frictional forces with subsequent reduction in the bearing capacity, the building foundation should be at a level one meter below the ground surface so that it will not be affected by the ground water level.

(3) Location of Site and Condition of Infrastructure

(i) Location

The site for the ECC is located in Delap district in DUD in the old airport site which is about 500 m to the west of the new Capital Complex. It is surrounded by large buildings such as churches, office buildings, large super markets, etc. in an area where an urban business district has been developing.

(ii) Access Road

The north side of the site faces the main asphalt paved road with the width of about 6.5 m which runs from the east to the west in Majuro. The west side faces an unpaved road which runs into the residential district in the south of the site.

(iii) Utilities Installation

A high voltage power line of 13.8 KV is installed in the south side of the site from which the power line will be installed into the ECC.

The piping system is installed underground in the south side of the site along the above-mentioned power line. It is planned that the sea water line for the rest room will be in pipes with a diameter of 250 mm (10") and drain pipes with a diameter of 450 mm (18"). The main potable water supply lines are installed underground in pipes with a diameter of 400 mm (12") with sufficient pressure of 50 psi from which branch pipelines will be installed.

The installation of telephone line will be made from the telephone poles located near the main power line of the site.

It is necessary for the government of RMI to transfer the existing poles, overhead lines, underground telephone lines, water and drainage pipes on the site to the south side of the site before construction work commences as these utilities are in the way of the ECC.

(iv) Land Acquisition of the Site

The plan to use the site for the ECC was already approved by the Cabinet in October 1993. The site is divided into three lots and the land lease agreements were concluded between the landlords (Iroijlaplap, Iroijedrik and Alap) and the Ministry of Internal Affairs in October 1993. These lease agreements are effective for twenty-five years, and it was understood that the first payment to the landlords has been made.

(v) House Relocation from the Site

One house and a portion of a garden of other house are located in the site. Agreements for the house and garden relocation were made in November 1993 and February 1994 respectively, and the payment for house relocation has been made.

2.3.4 Outline of Facilities

The outline of the facilities of the ECC is described as follows.

Sports activities, lectures and exhibitions will be held in the two-story, approximately 3,500 m^2 ECC. The arena which is to be used not only for physical education classes and tournament matches of high schools but also for the community should be large enough to hold two basketball courts. It will also have space for exhibitions. A stage will be installed for use in lectures on social education.

In order to use these facilities properly, electricity, telephone, air-conditioning, water supply and sewage, and fire alarm services will be installed as required.

2.3.5 Operation and Maintenance Plan

(1) Operation and Maintenance System

The following measures should be taken for operation and maintenance of the facilities in the ECC by MIHS.

Public notices should be posted by MIHS to allow other youth groups and community people besides MIHS to use the ECC. Cleaning will be done by those who use the ECC and this will be the general rule regarding the ECC's use. Operation and maintenance of the building and equipment of the ECC will include daily cleaning, inspection and repair as in the new school building. The Department of the ECC to be newly established will be in charge of operation and maintenance. Fees will not be collected for use of the ECC.

(2) Operation and Maintenance Costs

The operation and maintenance costs of the facilities are summarized as follows.

1) Electricity Charges

Table 7 Annual Electricity Costs

Educational and Cultural Center

A) Basic Charge $10/month x 12 months = $120

B) Demand Charge

(i) Hourly Demand	Rated Power(kwh)	x	Usage Ratio	=Demand (kwh)
Lamps/Outlets	115.4	x	0.6	=69.2
Water supply pump	3.0	x	0.7	=2.1
Sub-Total				=71.3

(ii) Demand Charge = [(71.3 kwh x 6 hr x 20 days) - 100] x $0.12 x 12 months = $12,177

C) Annual Cost = Basic Charge + Demand Charge = 120 + 12,177 = $12,290

Remark: Electricity charges consist of a basic and demand charges. Electricity of public facilities is charged by a basic charge if the consumption volume is less than 100 kw/month, and a demand charge of $0.12/kwh is added to volumes exceeding 100 kw.

2) Water Supply and Sewage Charges

The water supply and sewage charges of public facilities consist of a flat rate; $8/month for water supply and $7/month for sewage (including sea water and sewage) i.e. $15/month in total.

$15/month x 12 months = $180

The total annual water supply and sewage charges the ECC are $180

3) Telephone Charges (excluding international calls)

As it is anticipated that the use of the telephone should be restricted with the frequency specified as follows, the annual telephone cost is estimated to be $900.

$ 0.5/min. x 10 min./day x 15 days x 12 months = $900

4) Repainting Cost of the Building

It is expected that the walls of the building are repainted once every five years so that the annual repainting costs including the paint cost, is estimated as follows.

$18,000 ÷ 5 years = $3,600

5) Equipment Replacement Cost

- Air-conditioning equipment to be replaced after 10 years which translates to a cost of $200/year.
- Lamps to be replaced after 3 years which translates to a cost of $2,300/year.

- Water supply pump parts to be replaced after 5 years which translates to a cost of $300/year.

Thus, the annual equipment replacement cost is expected to be $2,800.

6) Total Annual Operation and Maintenance Cost

The total annual operation and maintenance cost is expected to be approximately $19,700. However, as the electricity charges are paid directly by the Ministry of Finance, the cost shared by MIHS will be about $7,400.

Table 8 Estimated Annual Operation and Maintenance Cost

Item	Educational and Cultural Center
Electricity	$12,290
Water & Sewage	$ 180
Telephone	$ 900
Bldg. Repaint	$ 3,600
Replacement	$ 2,800
Total	$19,770

The operation and maintenance cost for about ten years after the implementation of the ECC is expected to be required in the periods shown in the following table.

Table 9 Period in Which Operation and Maintenance Cost is Required

Item	1year	2year	3year	4year	5year	6year	7year	8year	9year	10year
1) Electricity	Annual electricity charge is $ 12,290									
2) Water Supply & Sewage	180	180	180	180	180	180	180	180	180	180
3) Telephone	900	900	900	900	900	900	900	900	900	900
4) Repainting	0	0	0	0	18000	0	0	0	0	18000
5) Replacement	0	0	6900	0	1500	6900	0	0	6900	3500
Total	1080	1080	7980	1080	20580	7980	1080	1080	7980	22580

Note 1) As electricity charge is paid by the Ministry of Finance, it is not included in the total.
Note 2) Price is as of 1993.

2.4 Technical Cooperation

At present Japan Overseas Cooperation Volunteers (JOCV) are sending teachers to MIHS. Such cooperation in the educational sector by JOCV will continue to be required. In the educational activities after the implementation of the Project, the government of RMI has no intention of requesting further technical assistance from Japan except from JOCV. However, it is considered to be necessary to formulate a comprehensive policy for secondary and social education and to establish a system to implement this policy and it is essential to receive technical assistance from developed countries in this sector.

The Project aims at enhancement of secondary education by increasing the number of students enrolled in the high school and providing more efficient vocational training, and improvement of sports and social education for the youth including unenrolled students.

In order to achieve these aims, the following factors will be significant.

(i) Fostering competent Marshallese teachers and strengthening of in-service training.

(ii) Active participation in social education by communities to lift the educational spirit of the communities.

These factors are also pointed out in the Second Five Year Development Plan. However, in the implementation it is essential to formulate comprehensive policies for practical social education centering on secondary education, not only dealing with these as individual measures, but also to complement the personnel for implementing the policies concerned. At present technical assistance is provided by foreign countries including the US, and it is considered that the promotion of above-mentioned comprehensive policies with this cooperation will make a great contribution to effective implementation of the Project.

CHAPTER 3 BASIC DESIGN

CHAPTER 3 BASIC DESIGN

3.1 Design Policy

The basic design of the facilities in the EEC is based on the following policies.

(1) The scale of the facilities should correspond to the increasing number of enrollments in secondary education. The educational policies emphasizing vocational education in public high schools and strengthening social education should also be reflected in the content of the facilities.

(2) The structure of the buildings should be planned taking into consideration the ground condition of coral rock. The layout and appearance should be coordinated with the existing buildings.

(3) Natural conditions such as salt breezes from the ocean, wind direction, strong sunshine, concentrated rainfall, etc. should be considered.

(4) The standard of the facilities should meet the local operation capability; namely they should be easy to be operated and maintained and able to be renewed in the country.

(5) The construction materials should be selected based on a comprehensive analysis of the use purpose, durability, cost, etc., and the construction work should be conducted in the range of construction technology and existing construction machines available in the field.

(6) The ECC which is a component of the Project, will be implemented during Phase 2.

3.2 Study and Examination on Design Criteria

(1) Seismic Intensity

As RMI is outside the known earthquake zone, the seismic intensity is assumed to be zero for the design consideration.

(2) Wind Load

In the RMI the wind pressure indicated by the US Uniform Building Code (UBC) is adopted. The basic wind velocity for the RMI is 44.7 m/sec. The design wind pressure is calculated using this basic wind velocity in the following formula.

P (Design Wind Pressure) = Ce x Cq x Qs x I

However, Ce : Combined height, exposure and gust factor coefficient (1.30)
Cq : Pressure coefficient for the portion of the structure under consideration.
Qs : Basic Wind Velocity (44.7 m/sec)
I : Importance Coefficient (1.15)

The design wind pressure obtained by this calculation is almost the same as the wind pressure required in the Construction Law of Japan.

3.3 Basic Plan

The content of the plan for the ECC was confirmed at the Basic Design Study and remains unchanged except for the change of site.

3.3.1 Site and Layout Plan

The site for the ECC is located at the old airport, and is about 60 m from north to south and about 103 m from east to west. The layout plan of the ECC has been formulated based on the following factors:

(1) Utilities Installation

Electrical power will be supplied from the high voltage overhead line on the south side of the site. Sewerage, sea water supply for toilet use, and telephone line will be connected to their respective main underground supply line at the south side of the site. Water supply will be connected to the main underground pipeline along the road at the north side.

(2) Layout Plan

The ECC and service yard will be constructed at the west side with the parking space at the east side of the site. The premise road will be constructed at the east side to be connected to the main road at the north side of the site. The entrance to the

ECC will be from the premise road. The building of the ECC will be constructed about 4 m away from the south border to allow space to locate the power, sewage, sea water, and telephone utilities after they are relocated from the north of the site, and also to allow some space required for the construction work.

The outline of the layout plan in the site is illustrated below.

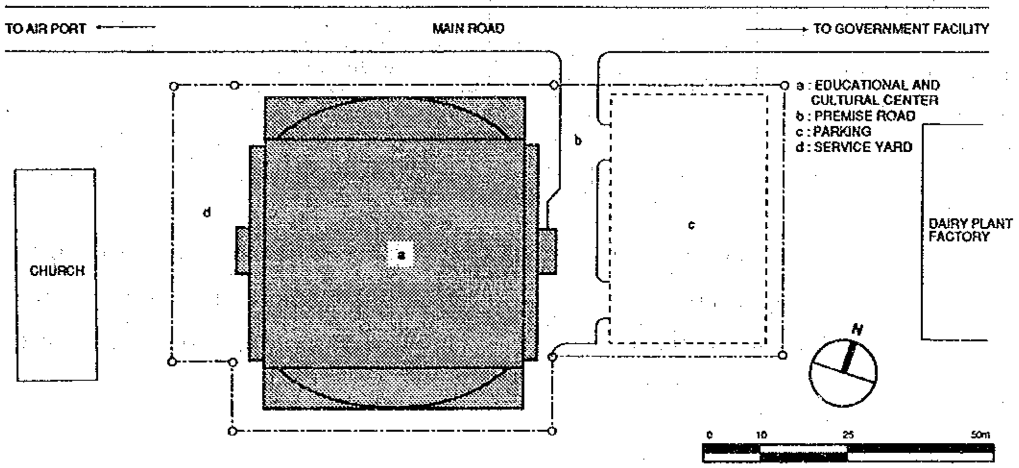


Figure 2 Outline of Layout Plan of the ECC

3.3.2 Architectural Design

(1) Floor Plan

The floor plan is based on a design policy in accordance with the required indoor environmental conditions, etc. The main space in the ECC consists of an arena with two basketball courts, indoor bleachers with a capacity of about 600, stage, office room, toilet and locker rooms. The floor plans of the ECC are described as follows;

(1st Floor)

* Arena : Two basketball courts with a size of 15m x 28m. 5m wide space between the two courts and 3m on the remaining three sides will be secured. Thus, the effective area of the arena will be 41m x 34m.
* Indoor Bleachers : Indoor bleachers for spectators will be installed at the east and west of the arena. Seat space per spectator will be 0.75m x 0.50m, and the width of the aisle is 1.5m at the end and 0.8m between the stands which is the same as the design standards of Japan.

  Entrance hall will be provided at the east side of the arena, and an emergency exit will be installed at the center of the west side, dividing the stand into the right and left sides. Thus, the number of seats will be as follows.

Table 10 Number of Seat in Indoor Bleachers

Location	No. of Stand	No. of Seat in One Stand	No. of Seat
East Side	6	8 Rows 6 Steps (48)	288
West Side	8	7 Rows 6 Steps (42)	336
Total			624

As the indoor bleachers will be a step-style, the space under the bleachers will be used as temporary locker rooms when many teams participate in the sports tournament. The layout of arena and indoor bleachers is illustrated below.

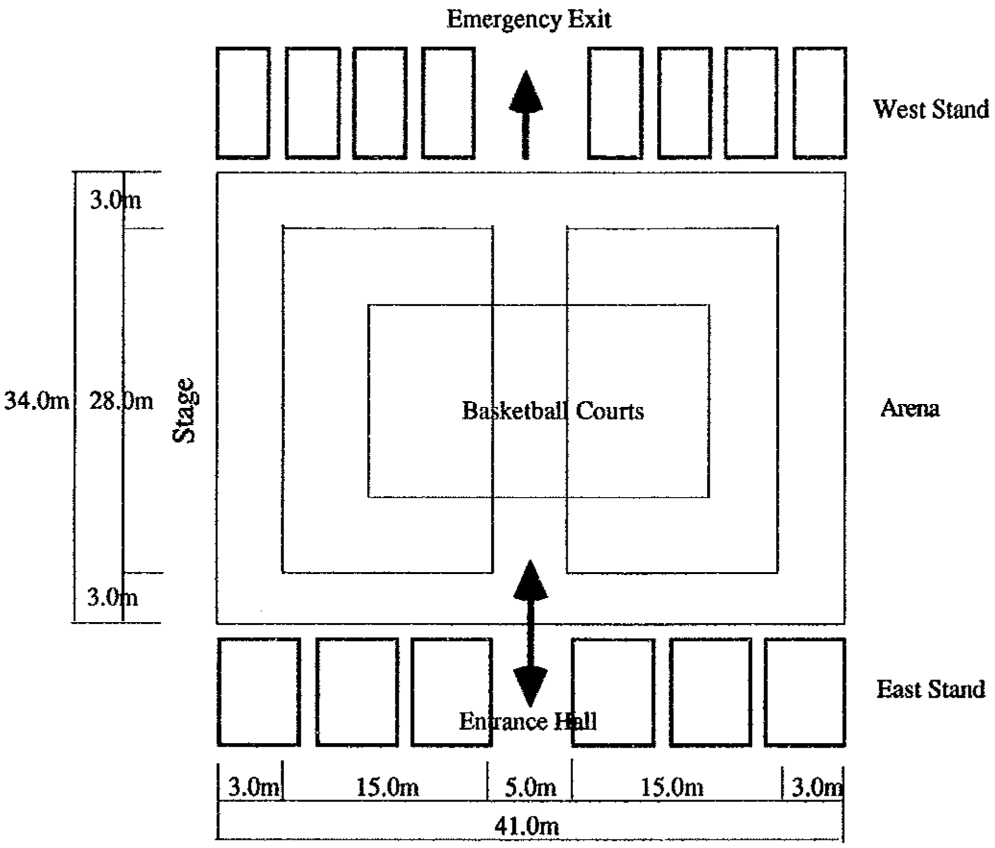


Figure 3 Layout of Arena and Stand of Indoor Bleachers

* Office Room : An office room will be located beside the entrance hall. This room will be for the three staff members of the ECC.
* Stage : A stage of 15m in width and 7m in depth is planned. Events held at the stage such as lectures, debates, dramas, etc. are to be viewed from the arena. Indoor bleachers which cannot be installed in front of the stage are to be used for watching sports performed in the arena. The corridors beside the stage could be used for bringing in stage construction materials.
* Storage : Storage for stage tools will be provided on both sides of the stage. This storage space shall also contain the FRP water reservoirs which will be supplied from the mains and from the rain water collected from the roof of the ECC. The water from these reservoirs will be used for the shower and wash basins.

  Storage shall also be provided under the indoor bleachers on both sides of the arena.
* Locker Room and Toilet : Locker rooms with shower booths will be installed in two locations for two teams, and toilets will be installed in two locations for male and female. Toilet and locker rooms will be located to the south of the arena on both sides of the corridor although not located in the interior of the building as stipulated by the government.

(2nd Floor)
* Water Reservoir : An FRP water reservoir shall be installed above the locker room on the first floor.
* Storage : Storage facilities will be installed next to the water reservoir.

The arena is designed as a high roofed structure without any column in the middle. The large roof will be supported by a girder with a horizontal projection distance of about 45 m to create a column free space from east to west in the arena and indoor bleachers of approximately 45 m. For an economical design, columns to support the girder will be located at every 8.4 m distance running north to south.

The floor area of the rooms in the ECC is shown in the following table.

Table 11 List of Rooms in ECC

Name of Room	Area (m²)	Remarks
A (1st Floor)		1st Floor Area : 2,640.00 m²
1) Entrance Hall	63.00	
2) Arena	1,470.00	
3) Office Room	10.50	
4) Locker Room	60.00	30.0 m² x 2 Including shower booths
5) Stage	150.00	
6) Storage	96.00	48.0 m² x 2. Beside the stage
7) Corridor, Staircase	196.00	
8) Toilet	60.00	30.00 m² x 2
9) Storage	524.50	Below the Indoor Breachers
10) Machine Room	10.00	
B (2nd Floor)		2nd Floor Area : 870.00 m²
1) Water Reservoir	30.00	
2) Storage	40.00	
3) Indoor Bleachers	367.00	
4) Corridor, Staircase	220.00	
5) Void	213.00	Above Entrance Hall
Total Floor Area	3,510.00	
Building Area	2,640.00	

(2) Section Plan

Ceiling height of the EEC is shown in the following list.

Table 12 Ceiling Height

Location	Ceiling Height	Remarks
(1) Arena		
(i) Highest part	13.5m	Height of the last row at the rear of bleachers is 6.0m. The minimum height of ceiling above the basketball courts is 8.5 m.
(ii) First Row in Bleachers	8.5 m	

An exterior wall will be installed around the ECC building at the strong request of the government of the RMI. As air-conditioning requires a higher construction and maintenance costs, natural ventilation will be provided to some extent near the bleachers. A part of the exterior wall will be made from concrete hollow block to facilitate ventilation, and the open risers (steps) of the bleachers will be open to let the air blow in from underneath the seats. The hot air inside will be channeled out through the opening in the gable side of the arena. (See the following figure.)

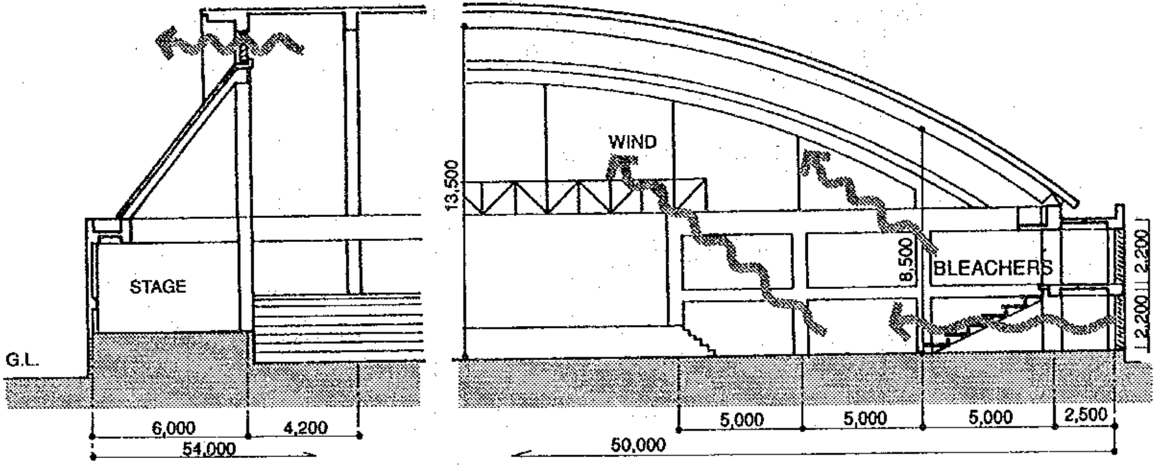


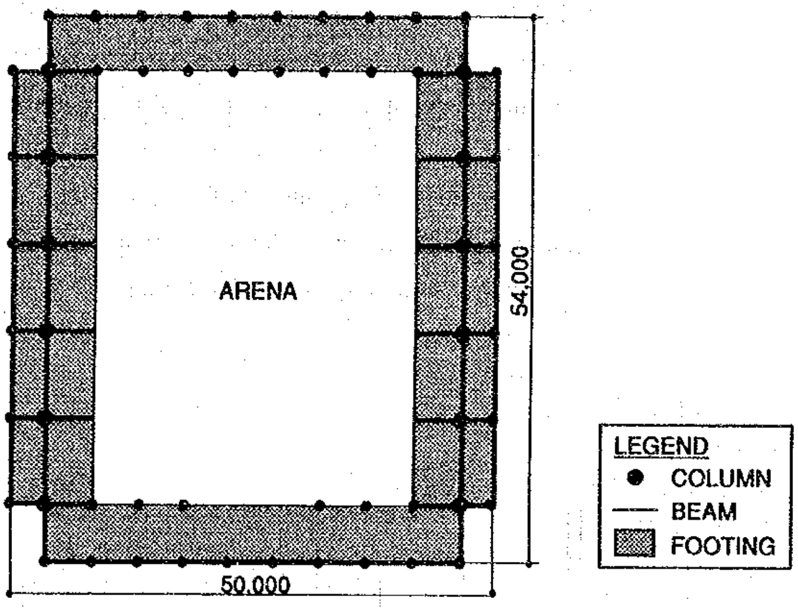
Figure 4 Standard Section of the ECC

(3) Structural Design

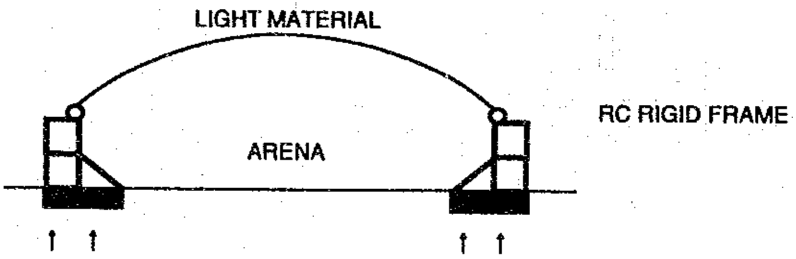
Loose soil was detected in the south side of the construction site indicating N-value of 3 ~ 4 at the level of - 0.3 m to - 2.3 m from the surface. As a result, the bearing capacity of soil is estimated to be 5 ton/m^2. The basic foundation design of the building is planned as follows.

As the roof is supported by a small number of columns, load per column is high. A rigid continuous footing to be provided to support the load from the column and the indoor bleachers in order to distribute the load over a bigger area rather than at a point load. (See the following figure.)

The long roof span of the ECC will use wooden girder to support light weight roofing materials.



(FOUNDATION PLAN)



(SECTION)

Figure 5 Foundation Pattern of the ECC

(4) Building Facility Plan

1) Electrical Equipment Plan

(i) Electrical Equipment

Power supply to the ECC is provided by an overhead line method with a low voltage of 208/120 V via the main distribution board installed next to the stage in the ECC.

Emergency power supply equipment will not be installed in the ECC as the power supply in the Majuro is relatively reliable, and as the building does not require emergency power supply. The single line diagram is illustrated below.

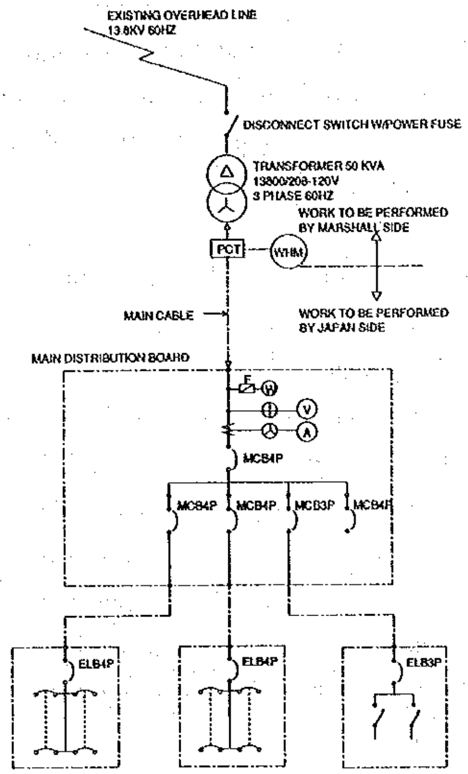


Figure 6 Single Line Diagram

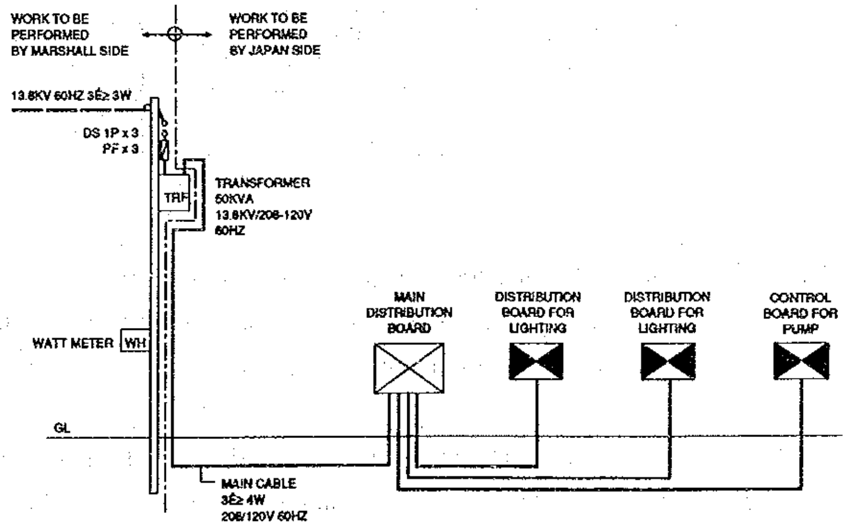


Figure 7 Main Feeder Diagram

(ii) Main Feeder Equipment

Power supply is provided from the main distribution board to each lighting distribution board, power distribution and control panel through the main feeder. The outdoor main cable is to be installed underground in compliance with general construction methods in Majuro.

(iii) Distribution and Control Boards

The distribution and control boards shall be water-proof to protect the electrical components inside from damage by the salt breeze.

(iv) Lighting and Outlet Equipment

For general lighting fixtures fluorescent lamps are mainly used. Indoor lighting fixtures include emergency lamps with built-in batteries. In the arena of the ECC very bright discharge lamps will be installed on the high ceiling.

The outlets for power supply, equipment and air-conditioning/ventilation apparatus should be exclusive circuits. The outlets installed outdoors should have earth grounding for safety, and the breakers for these branch circuits should be earth leakage breakers. The wiring for the lighting fixtures and outlets should be basically exposed wiring.

The number of lighting fixtures was determined by the room illumination requirements based on the JIS Illumination Standard (JIS Z 9110). The illumination of the major rooms is shown below.

Table 13 Illumination Plan

Name or Room	Illumination (Lx)
Office	300
Arena	250

(v) Telephone Equipment

The main equipment of the push-button phones will be installed in the office room; the terminals in the other rooms will be required with the function of the interphone to enable communication between extensions.

(vi) Emergency Equipment

In the ECC emergency alarm equipment such as transmitters and alarms will be installed in the required locations in addition to the emergency lights. Receivers of the emergency alarm equipment will be installed in the office room.

2) Air-Conditioning/Ventilation Equipment

(i) Air-Conditioning Equipment

In Majuro the temperature is constantly high at 27 °C throughout the year. In the EEC wall mounted air-conditioner will be installed in the office.

(ii) Ventilation Equipment

Ventilation fans will be installed in rooms which require forced ventilation like the machine room, toilets, etc. In the arena of the ECC natural ventilation will be used.

3) Water Supply and Sanitary Equipment

(i) Rain Water Supply Equipment

A system will be constructed in which rain water from the roof of the building is collected via the storm drain line to the water reservoirs and pumped up to the required locations. Considering the local meteorological data and the water shortage situation in the dry season, water reservoirs will be installed with a total capacity of 60 ton (See Appendix 6). The water reservoirs are connected with the city water main pipes to receive the water supply. A small pressure pump which does not require a large installation area will be used to supply water under adequate pressure to the facilities. The piping diagram of the water supply is illustrated below.

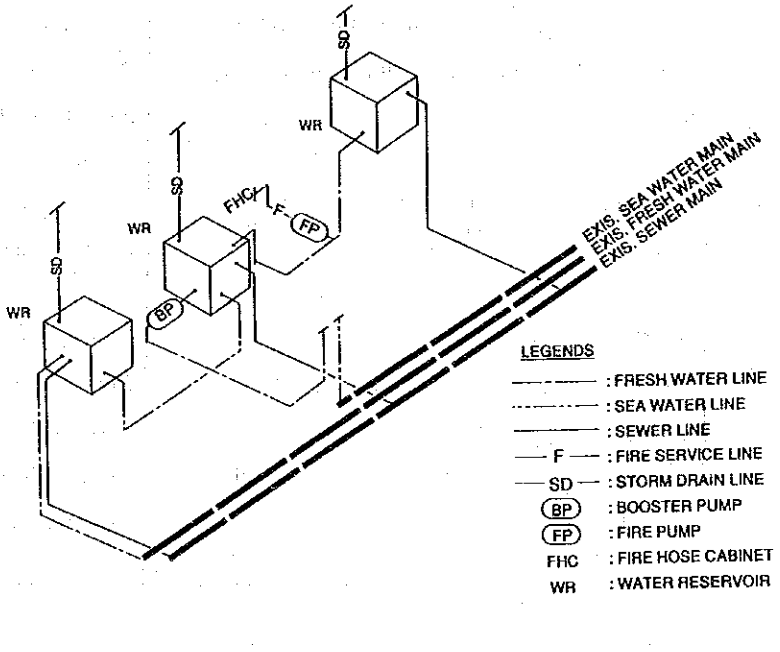


Figure 8 Piping Diagram of ECC

(ii) Sea Water Supply and Sewer System

Sea water will be used for flushing toilets by connecting them to public sea water lines. As toilets are located on the first floor, the pressure is strong enough to supply water. A joint sewer system to treat sewage and drainage will be installed, connecting with public main sewerage pipes.

(iii) Fire Fighting Equipment

Water for the fire hydrant will be supplied from the water reservoirs via a fire pump. Besides this, fire extinguishers will be installed in the locations required.

(5) Construction Material Plan

Among the construction materials, only concrete aggregate and concrete block are produced in the RMI. Most of the construction materials are imported from the US, Australia and Japan. In the EEC the products available in the domestic market will be procured first,. Those materials with limited stock or quality lower than specified will be imported from Japan. The specifications for the finishing and fitting materials of the buildings are described in the following table.

Table 14 Specifications for Finishing & Fitting Materials

Part of Bldg.	Specifications for Finishing & Fitting Materials	Remarks
1. Exterior		
(i) Roof	-Reinforced Concrete with Water-proof Agent	Conventional Method
	-Wooden Girder with Corrugated Metal Roofing (Sports Shell, ECC)	Protected coating on roofing to prevent salt damage
(ii) Outer Walls	Concrete Block with Paint Finish	Conventional Method
(iii)Windows/Doors	-Aluminum	Conventional Method
2. Interior		
(i) Floor	-PVC Tiling	Conventional Method
	-Mortar with Steel Trowel Finish	Conventional Method
	-Synthetic Resin Painted Floor	Absorbing Shocks.
(ii) Wall	-Concrete Block with Mortar with Paint Finish	Conventional Method
(iii) Ceiling	-Mortar with Paint Finish	Conventional Method

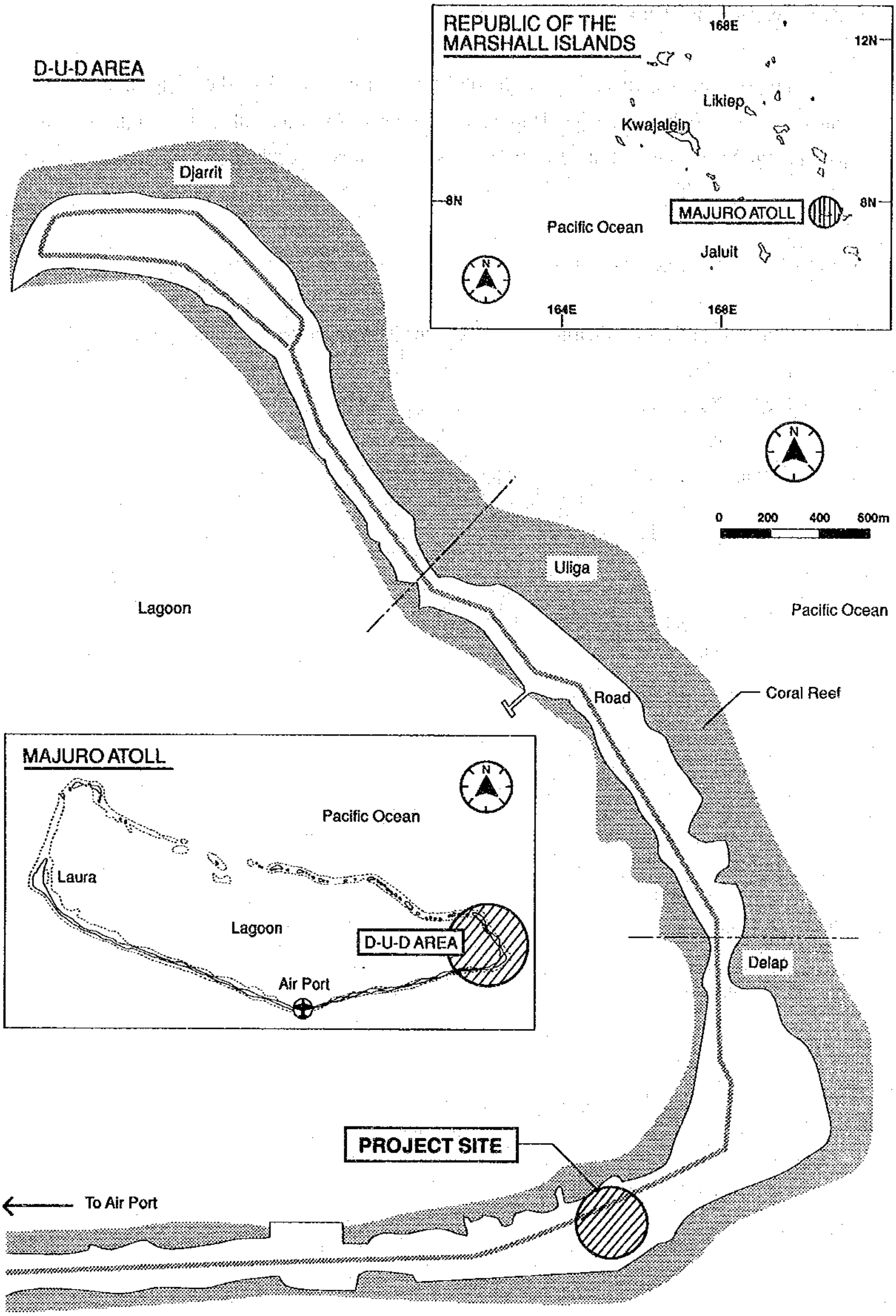
3.3.3 Equipment Plan

The equipment to be provided for MIHS is described in the Equipment Plan section of the Basic Design Study Report of the Project for Marshall Islands High School Up-Grading/Development (November 1993) and remains unchanged.

3.3.4 Basic Design Drawing

The basic design drawings of the ECC are shown in the following pages.

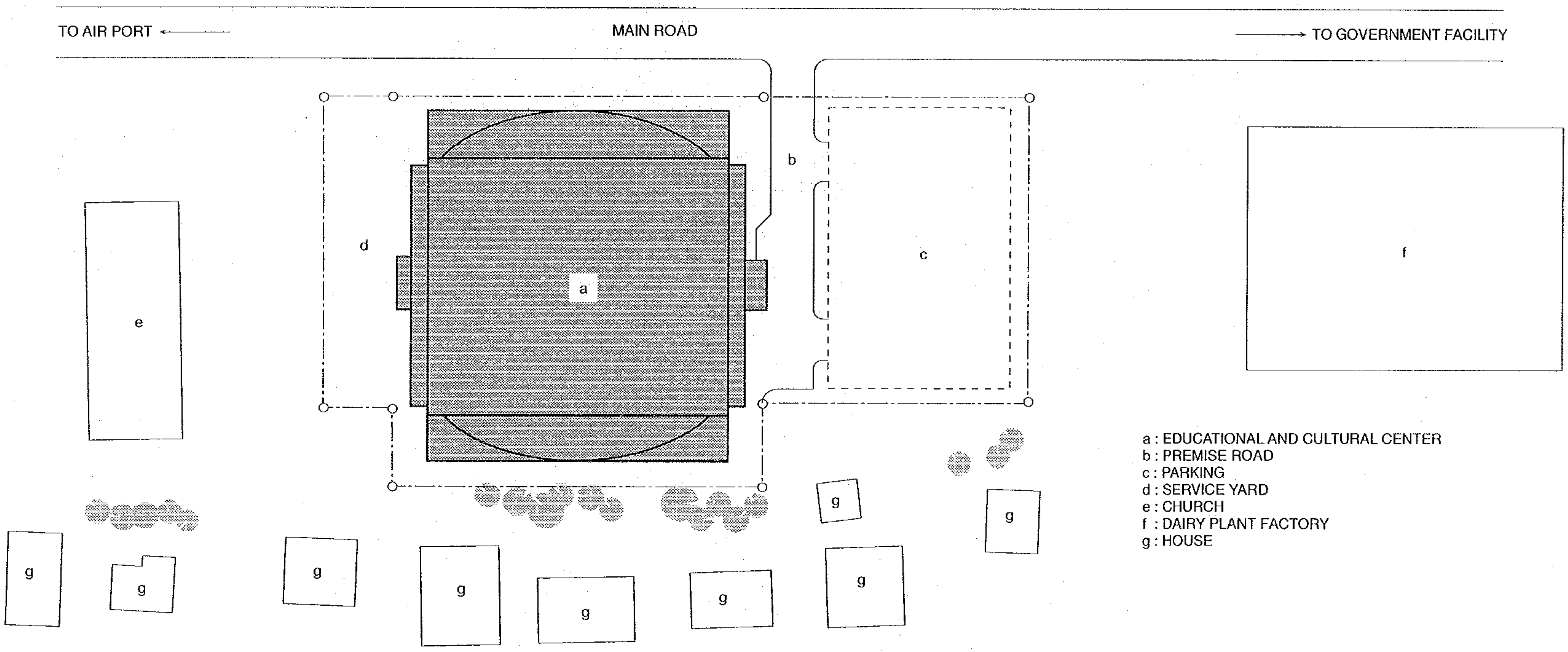
1 Project Site
2 Layout Plan
3 Floor Plan
4 Elevation/Section



PROJECT SITE

REPUBLIC OF THE MARSHALL ISLANDS
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT PROJECT

1



a : EDUCATIONAL AND CULTURAL CENTER
b : PREMISE ROAD
c : PARKING
d : SERVICE YARD
e : CHURCH
f : DAIRY PLANT FACTORY
g : HOUSE

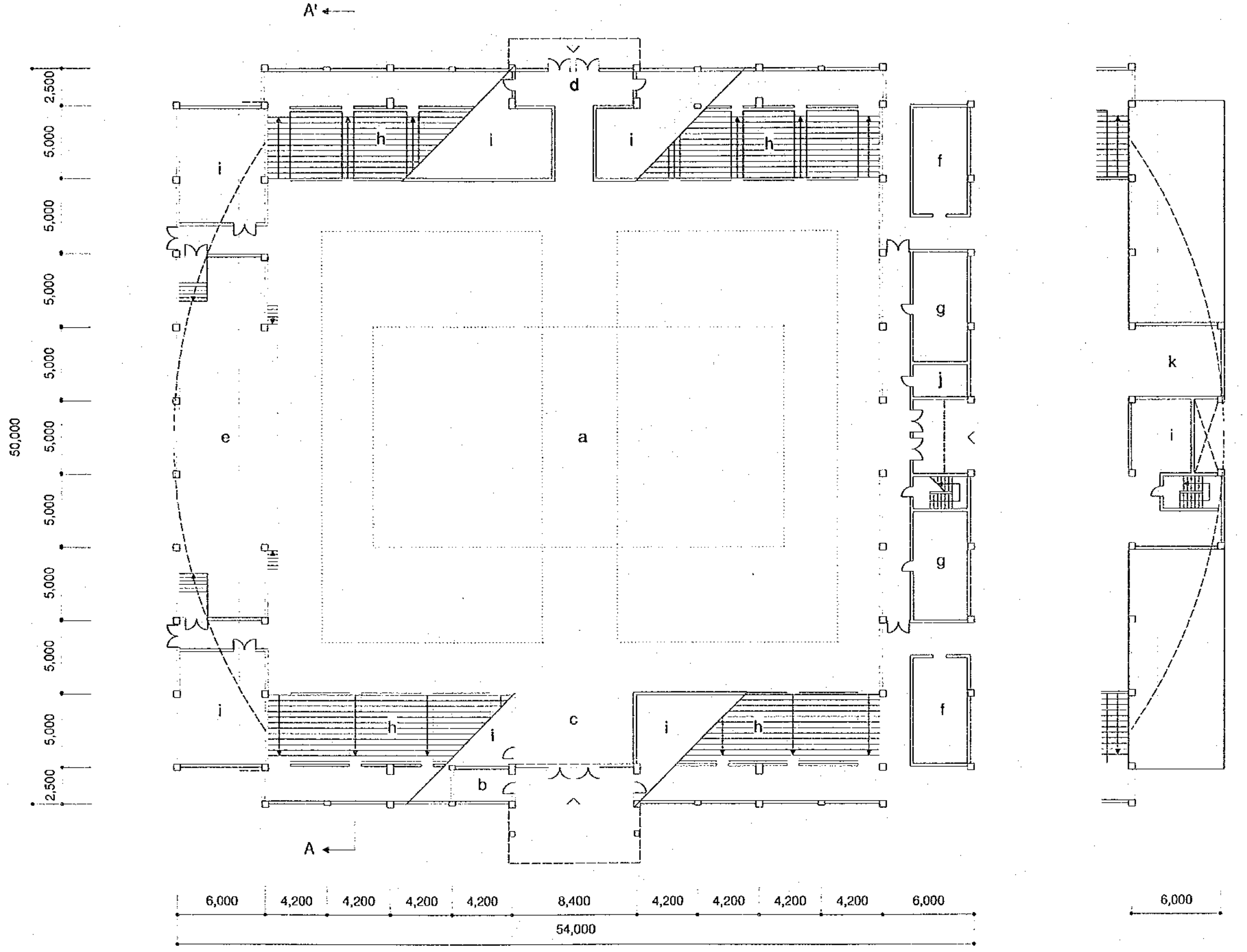
LAYOUT PLAN

EDUCATIONAL AND CULTURAL CENTER

0 10 25 50m

REPUBLIC OF THE MARSHALL ISLANDS
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT PROJECT

2



FLOOR PLAN

a : ARENA
b : OFFICE ROOM
c : ENTRANCE HALL
d : EMERGENCY EXIT
e : STAGE
f : TOILET
g : LOCKER ROOM
h : INDOOR BLEACHERS
i : STORAGE
j : MACHINE ROOM
k : WATER RESERVOIR

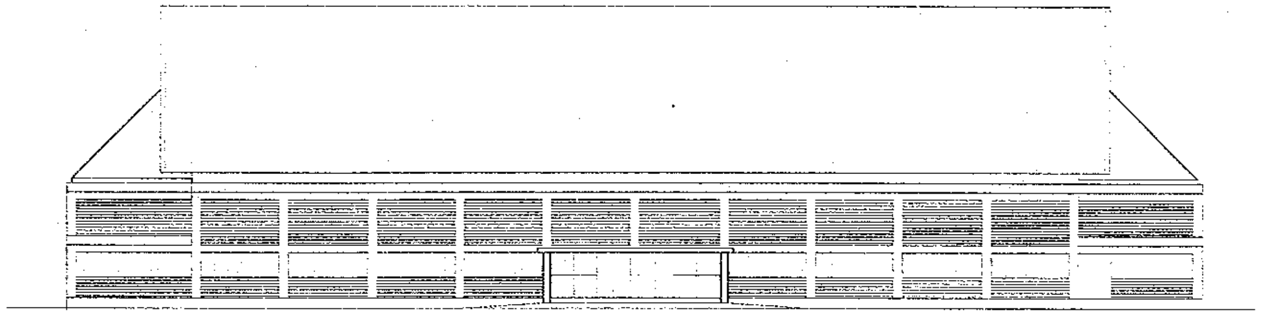
FLOOR PLAN

EDUCATIONAL AND CULTURAL CENTER

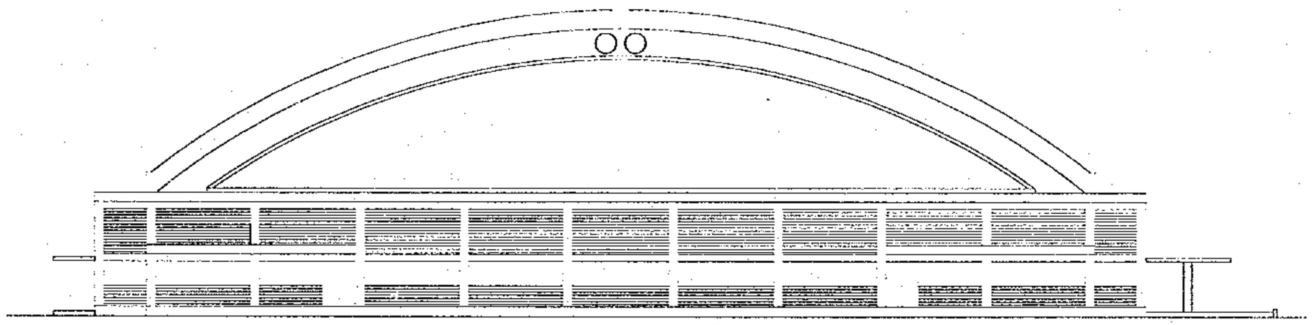
0 2 5 10 20m

REPUBLIC OF THE MARSHALL ISLANDS
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT PROJECT

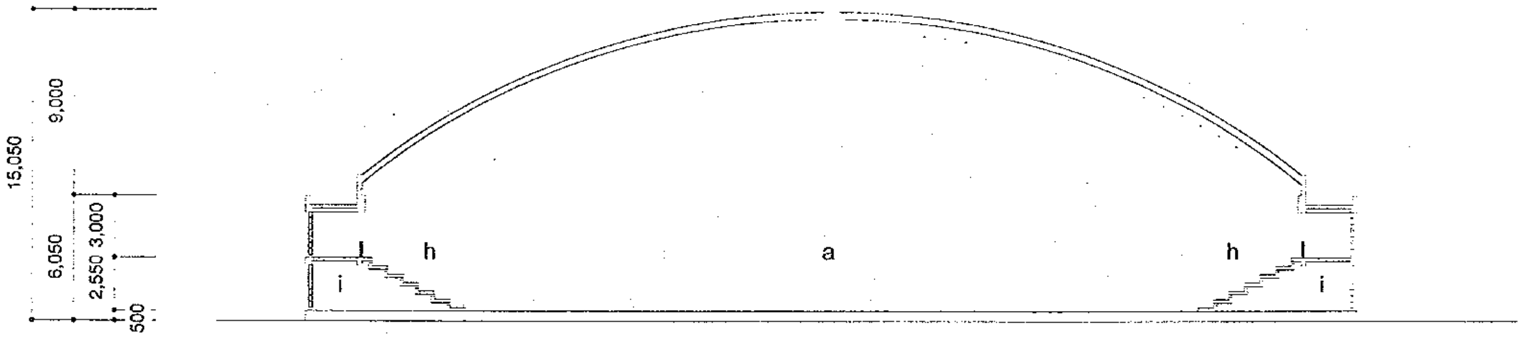
3



EAST ELEVATION



SOUTH ELEVATION



a : ARENA
h : INDOOR BLEACHERS
i : STORAGE

A-A' SECTION

ELEVATION/SECTION

EDUCATIONAL AND CULTURAL CENTER

4

0 2 5 10 20m

REPUBLIC OF THE MARSHALL ISLANDS
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT PROJECT

3.4 Implementation Plan

The executing agency of the Project is the MIHS. After the Exchange of Notes is concluded between the government of Japan and the government of the RMI, the consultant in Japan will promptly enter into contract of the detailed design and supervision with the government of the RMI. Then, a Japanese construction company will enter into contract with the government of the RMI to carry out the work and procure the equipment under the supervision of the consultant. After the work is completed, MIHS will be responsible for the operation and maintenance of the ECC facilities and equipment.

3.4.1 Construction Condition

In the RMI most of the buildings are one-story or two-story buildings, but recently five-story medium-rise buildings and those equipped with elevators have been built. These large-scale or equipment centered buildings are constructed by foreign-affiliated firms. Owing to the housing shortage and increasing income level, apartments for high income earners have been built.

Since most of the construction materials are imported and foreign workers are employed to meet the requirements for high specifications and skills level , the building cost has been increasing. It is necessary to establish a lower cost grade for the facilities in the EEC.

In constructing public buildings it is required to inform CIP, under the Ministry of Public Works and the Environment Protection Authority, of the outline of the planned building and to obtain approval before starting the work. Thus, thorough explanation will be provided to the relevant authorities on implementation of the ECC.

3.4.2 Implementation Method

Considering that the Project will be implemented under the Japanese grant aid program, it is to be implemented based on the following policies.

(1) Good communication should be maintained so that the opinions may be exchanged openly and freely between the MIHS, the consultant and the construction company in order to facilitate the execution of the work.

(2) As skilled workers are in short supply in the field, the construction work method is to include as much as possible methods used in the Majuro, and flexible supervision should be conducted to meet the local conditions.

(3) The following points should be taken into consideration in carrying out the construction work.

- As the Project site is located by the sea, construction materials which are not easily damaged by salt breezes should be selected, and measures should be taken to protect construction materials and equipment against salt breezes during the construction.
- As the aggregate available in the field is coral sand and rock, salts in the aggregate should be washed out thoroughly to avoid corrosion of reinforcement bars. As the coral aggregate does not have high strength in general, it should be properly mixed with cement. Slump and compression tests should be performed to ensure design strength.
- As the temperature is constantly high, appropriate measures should be taken, such as providing expansion joints between materials which differ in the heat expansion rate in order to avoid warping through heat expansion.
- As works on the large roof requires skilled workers due to the complexity of the structure, skilled foreign workers may be required.

3.4.3 Construction and Supervisory Plan

The basic policies and important points in supervision of construction of the Project are as follows.

(1) The consultant should coordinate closely with MIHS and MOF in order to conduct the work and delivery/installation smoothly. Especially in the demolition and removal of the existing buildings and installation of the utilities which is to be carried out by the government of the RMI, the timing of the work is so important that it is necessary to hold meetings beforehand concerning the work schedule and specifications to coordinate with the works done by Japanese side.

(2) Before starting the work, the execution plan and shop drawings submitted by the construction company will be carefully reviewed and the appropriateness of the temporary work plan, work schedule, quality of planned materials and the construction methods will be examined.

(3) In the completion and handing over of the work, completed work and delivered equipment will be examined to see that they meet design specifications, and appropriate instructions will be provided in case revision is required.

(4) Architects and equipment engineers will be assigned to the site for the required period to supervise the construction.

3.4.4 Procurement Plan

The materials and equipment required for the execution of the Project will be procured and transported in the following way.

The major construction materials to be procured from Japan include reinforcement bar, corrugated metal roofing material, electric appliances except fluorescent lamps, water supply and sewer instruments except sanitary ceramic materials, air-conditioning apparatus, vinyl-chloride gutter. Other equipment will be procured from supplies stocked in the RMI.

Table 15 Materials & Equipments Procurement List

Materials & Equipments	Japan	RMI	Transportation Method
1. Construction Materials			
(i) Reinforcement bar, Corrugated metal roofing material	O		Shipped from Japan
(ii) Others		O	
2. Equipment Materials			
(i) Fluorescent Lamps, Sanitary Wares		O	
(ii) Others	O		Shipped from Japan

3.4.5 Implementation Schedule

If the Project is executed under grant aid from the government of Japan, tender documents will be prepared after the Exchange of Notes is concluded between the two countries. Then, the tender and contract pertaining to the construction work and equipment procurement will be conducted, and the construction work, procurement/installation of the equipment will be executed. Implementation work is divided into two phases ; Firstly, construction of facilities in MIHS; Secondly, upgrading of equipment and construction of the ECC. The implementation schedule which was confirmed at the basic design study will follow the sequence below.

(1) Detailed Design Work

The detailed design is conducted and tender documents are prepared based on the basic design study report. The work period required is expected to be 2.7 months for the first phase, and 2.7 months for the second phase.

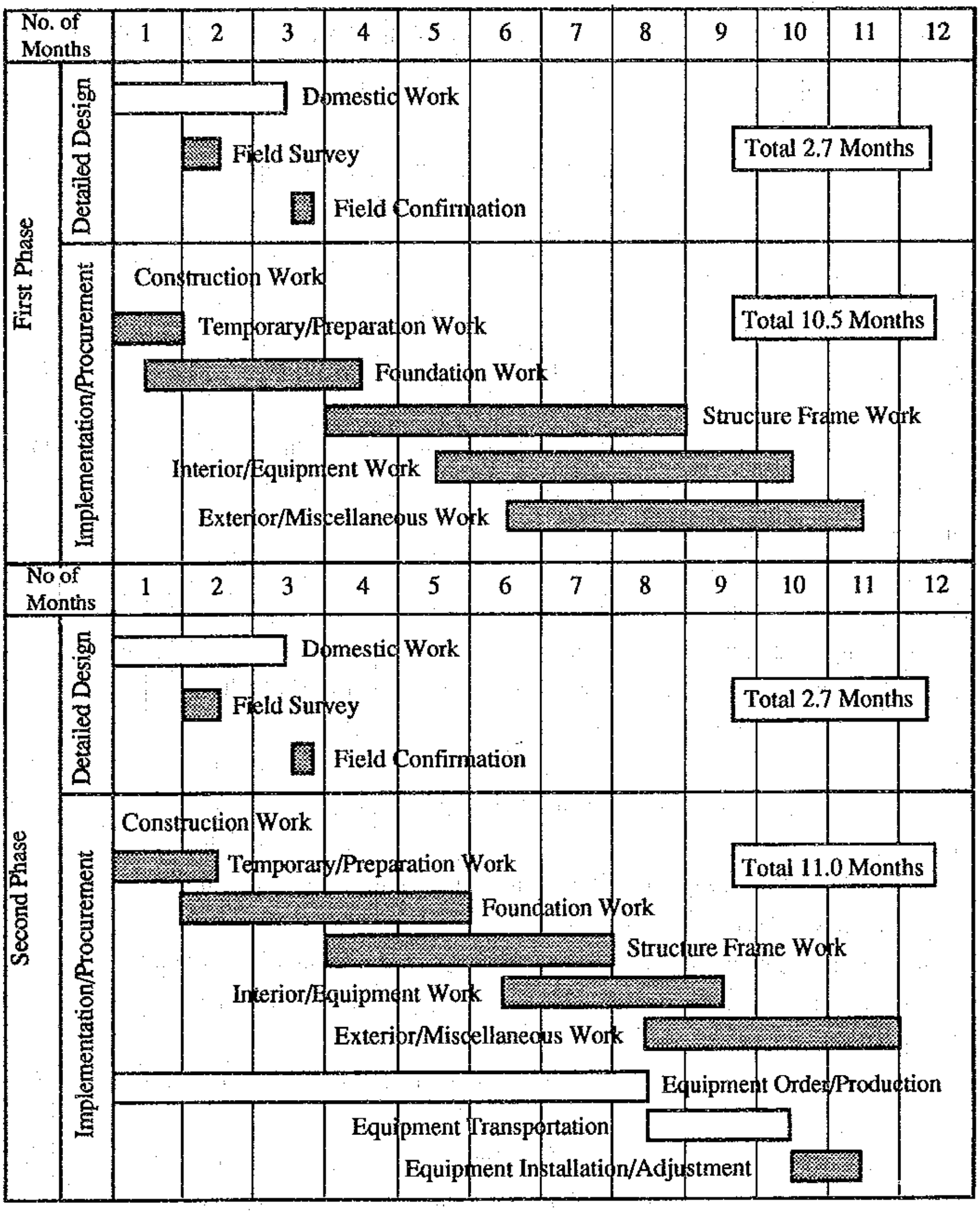
(2) Tender Work

After the completion of the detailed design, participants in the tender for the construction work and equipment procurement of the Project will be invited by public announcement, and their qualifications will be examined to select participants in the tender. Based on the result of the pre-qualification, the executing agency will invite the participants to the tender and conduct the tender in Japan in the presence of the concerned parties. The period required from the time of tender announcement to the contract is expected to be 1.3 months for the first phase, and 1.3 months for the second phase.

(3) Construction Work and Equipment Procurement/Installation Work

After the contract is signed, the work will start after the approval of the government of Japan. If the work assigned to the government of the RMI is conducted smoothly, the period required is expected to be 10.5 months for the first phase and 11.0 months for the second phase. The implementation schedule is illustrated as below.

Table 16 Implementation Schedule



3.4.6 Scope of Work

(1) The scope of work for the construction of the ECC assigned to Japan and the RMI is described in the following table.

Table 17 Scope of Work of the Project

Scope of Work	Japan	RMI
1. To secure land.		O
2. To construct the parking lot.		O
3. To provide facilities for the Project site. (Electricity, Water, Sea Water, Drainage, Telephone)		O
4. Demolition and removal of the existing buildings		O
5. To clear, level and reclaim the site when needed.		O
6. To construct the buildings. (ECC)	O	
7. To ensure customs clearance		
(1) Transportation to RMI and Internal Transportation	O	
(2) Tax Exemption & Customs Clearance		O
8. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the B/A		O
9. To accord Japanese nationals in connection with the Project such facilities as may be necessary for their entry into the RMI and stay therein for the performance of their work. .		O
10. To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant..		O
11. To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.		O
12. To perform all the approval application procedures required for the construction work.		O
13. To exempt Japanese nationals from internal taxes including value added taxes which may be imposed in the RMI with respect to the supply of the products and services under the verified contracts.		O
14. To coordinate and solve any issues related to the Project which may be raised from third parties and inhabitants in the Project area during implementation of the Project.		O

(2) The cost allotted to the RMI is expected to be $330,000 and the breakdown is shown as follows.

Phase 1		
1)	Demolition/Removal of the existing buildings	$ 122,000
2)	Utilities Installation	$ 19,000
3)	General Furniture	$ 40,000
4)	Gardening & Others	$ 9,000
Phase 2		
1)	Land Acquisition (Land lease)	$ 4,000
2)	Demolition/Removal of the existing building	$ 34,000
3)	Parking Lot	$ 6,000
4)	Utilities Installation	$ 84,000
5)	Gardening & Others	$ 12,000

It is necessary to conduct the demolition/removal work of the existing buildings before the work, and the utilities installation work before the power and water supply work conducted by the Japan side.

CHAPTER 4 PROJECT EVALUATION AND CONCLUSION

CHAPTER 4 PROJECT EVALUATION AND CONCLUSION

4.1 Project Evaluation

The government of the RMI requested a grant aid from the government of Japan pertaining to the Project for Marshall Islands High School Up-Grading/Development including the construction of the ECC. The current problems in secondary and social education in the RMI, the measures to be taken and the effects /improvements in the Project are summarized as follows.

Table 18 Project Evaluation

Current Problems	Measures Taken in the Project	Effects & Improvements
As a self-sustaining economy has just been launched in the RMI, skilled personnel are preferred in employment. Thus, youth without experience and high skills have few opportunities, and most of the unemployed youth find no hope for the future. On the other hand, interest in sports is very high, but the environment to foster sound youth has not been formed due to shortage of sports and recreation facilities. Furthermore, as the community people have few opportunities to participate in education, interest in school and social education is low. Thus, it is essential to promote social education mainly for the youth.	- To construct ECC. - An arena will be installed in the ECC which is large enough to conduct tournament matches in basketball, and other popular sports in the country. - In the ECC a stage will be installed for lectures to provide non-formal education to unenrolled youth as a place for social education, and teacher in-service training programs conducted by the Ministry of Education.	- Shortage of sports facilities will be improved by securing areas for indoor sports, and thereby enhance sports activities. - Special classes will be provided in MIHS including traditional craft class by the community group. Thus, the exchange between community people through school education will be facilitated, and interest in education will be enhanced in the communities. - Non-formal education will be provided with sufficient classrooms, and thereby education for unenrolled youth will be facilitated. - Programs to foster sound youth will be conducted regularly, which will contribute to a good environment for the youth.

4.2 Conclusion

The construction of the ECC is one of the ways to achieve the aims of the Project.

About half of the population is under 15 years of age, and the high unemployment and unenrollment rate of the youth has been a big burden to families and communities both economically and mentally. Furthermore, due to the limited opportunities for non-formal education in which youth learn to acquire self-sustaining capabilities, it is important to form an environment to foster ambitious and broad-minded youth. Considering the situation which face the youth, it is essential to cultivate self-sustaining abilities in youth by the secondary education and to provide opportunities for sports. Under such circumstances, the ECC will provide a place for the exchange between youth and the community through sports and social education. This will make a great contribution to the sound formation of the youth who are potential leaders of the next generation irrespective of whether they receive a secondary education or not.

In view of afore-mentioned circumstances as well as the role of the Project and the necessity to implement the Project, it has been concluded that it will be appropriate to implement the Project under the Japanese grant aid program.

4.3 Recommendations

We would like to suggest that the government of the RMI take the following measures if the Project is to realize a more effective use of the facilities and equipment.

(i) The Ministry of Education need to secure an adequate budget to meet the increasing expenses of the maintenance for the ECC. It is also necessary to use the newly installed equipment such as air-conditioners and lamps properly and save maintenance costs.

(ii) The activities schedule should be based on sports activities of youth and social education programs provided by MIHS and the Ministry of Education in order to use the facilities of the ECC properly. Basically, cleaning after use should be carried out by users since most of them are youth. Regulations on using the ECC should be prepared to cultivate responsibility for public facilities. Staff members who are exclusively responsible for the operation and maintenance of the ECC should be employed.

[APPENDIX]

Appendix 1. Member List of the Survey Team

(1)	Eiichiro CHO	Leader	First Project Management Division, Grant Aid Project Management Department, JICA
(2)	Yukitaka DATE	Architectural Design	System Science Consultants Inc.
(3)	Takehide SEKI	Quantities Surveyor	System Science Consultants Inc.

Appendix 2. Field Survey Schedule

	1994 DATE	PLACE	ACTIVITY	OFFICIAL	DATE	SEKI
1	APR. 4 (MON.)	(NARITA)→(GUAM)	10:00: Lv. Narita (CO 962)	○	○	○
2	5 (TUE.)	(GUAM)	AM : Courtesy Call to CGJ	○	○	○
3	6 (WED.)	(GUAM)→(MAJURO)	8:15: Lv. Guam (CO 952)	○	○	○
4	7 (THU.)	MAJURO	AM : Courtesy Call to MOE and MFA	○	○	
			: Meeting w/ Boring Surveyer			○
			PM : Meeting w/ MOE	○	○	
			: Site investigation w/MOE and MRD	○	○	○
			: Infrastructure Data Collection		○	○
5	8 (FRI.)	do.	AM : Joint Meeting w/ MOE, MIOA and MRD	○	○	
			PM : Meeting for Draft Minutes w/ MOE	○	○	
			: Natural Condition Survey, Construction Condition Survey			○
6	9 (SAT.)	do.	: Data Analysis	○	○	
			: Natural Condition Survey			○
7	10 (SUN.)	do.	: Data Analysis	○	○	○
8	11 (MON.)	do.	AM : Signing of Minutes of Discussions	○	○	
			PM : Natural Condition Survey, Construction Condition Survey			○
9	12 (TUE.)	(MAJURO)→(GUAM)	11:00: Lv. Majuro (CO 957)	○		
		MAJURO	: Natural Condition Survey, Construction Condition Survey		○	○
10	13 (WED.)	GUAM	: Courtesy Call to CGJ	○		
		(GUAM)→(NARITA)	16:00: Lv. Guam			
		MAJURO	: Natural Condition Survey, Construction Condition Survey		○	○
11	14 (THU.)	do.	: Natural Condition Survey, Construction Condition Survey		○	○
12	15 (FRI.)	do.	: Natural Condition Survey, Construction Condition Survey		○ ○	○ ○
13	16 (SAT.)	(MAJURO)→(GUAM)	11:00: Lv. Majuro (CO 957)		○	○
14	17 (SUN.)	(GUAM)→(NARITA)	11:00: Lv. Guam (CO 967)		○	○

CGJ : Consulate General of Japan
MOE : Ministry of Education
MRD : Ministry of Resources & Development
MFA : Ministry of Foreign Affairs
MIOA: Ministry of Interior & Outer Islands Affairs

Appendix 3. Member List of Concerned Party

(1) Consulate-General of Japan
-Mr. Takashi Matsumura Consul
-Mr. Shingo Naganawa Administrative staff

(2) Japan Overseas Cooperation Volunteer
-Mr. Toshiro Sato Coodinator

(3) Ministry of Foreign Affairs
-Mr. Jiba Kabua : Secretary
-Mr. Mack Kaminaga : Ambassador to Japan

(4) Ministry of Education
-Hon. Phllip H. Muller : Minister of Education
-Hon. Evelyn Konou : New Minister of Education
-Ms. Hilda Heine Jetnil : Secretary
-Mr. Valekuta Mateni : Head Adviser-Secondary & Vocational Education

(5) Marshall Islands High School
-Mr. Jimmy Kemen : Principal
-Mr. Devid Minert : Assistant Principal

(6) Ministry of Internal Affairs
-Mr. Billy Sawej : Administrative staff

(7) Ministry of Resorces and Development
-Mr. Albert Andrike : Surveyer

(8) Capital Investment Project Administration, Ministry of Public Works
-Mr. Johnny Lasao : Civil Engineer

(9) Majuro Water & Sewer Company
-Mr. Paul A. Kaminski : General Manager
-Mr. Bernard Cotter : Engineer

(10) Marshall Energy Company Inc.
-Mr. Orland DeBrume : Assistant General Manager

(11) National Telecommunications Authority
-Mr. Thomas H. DeBrume : Vice President & Deputy General Manager

Appendix 4. Minutes of Discussions

MINUTES OF DISCUSSIONS

SUPPLEMENTARY STUDY
FOR
BASIC DESIGN STUDY
ON
THE PROJECT FOR MARSHALL ISLANDS HIGH SCHOOL UP-GRADING/DEVELOPMENT

The Government of the Republic of the Marshall Islands requested officially to change the site for Educational and Cultural Center for the project.

In response to the request from the Government of the Republic of the Marshall Islands, the Government of Japan decided to conduct a Supplementary Study for Basic Design Study on the Project for Marshall Islands High School Up-grading/Development (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA).

The objectives of the supplementary study are to confirm the details of the request of site change, to assess appropriateness of the site condition and to confirm layout, components and scale of Educational and Cultural Center.

JICA sent to Marshall Islands a study team, which is headed by Mr. Eiichiro Cho, First Project Management Division, Grant Aid Management Department, JICA, scheduled to stay in the country from April 6 to April 16, 1994.

The Team held discussions with the officials concerned of the Government of Marshall Islands and conducted field surveys at the new site.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets.

Majuro, April 11, 1994

長 英一郎

Eiichiro Cho
Leader,
Basic Design Study Team,
JICA

Hon. Phillip H. Muller
Minister of Education,
Republic of the Marshall Islands

ATTACHMENT

1. Confirmation of detail of site change

The Government of the Republic of the Marshall Islands explained the reason for the change of site for the Educational and Cultural Center (ECC). The detail and background of the request to change the site are confirmed by the team.

2. Basic policy of supplementary study

The Government of the Republic of the Marshall Islands has agreed in principle the study items summarized in the inception report and the basic policy of the supplementary study not to change the previously approved basic design plan of ECC.

3. New site for Educational and Cultural Center(ECC)

The new site for ECC is located at Delap, DUD, Majuro. Location map of the new site and site area plan are shown in ANNEX-I.

4. Design of Educational and Cultural Center(ECC)

Layout, components and scale of ECC are shown in ANNEX-II.

5. Japan's Grant Aid system

(1) The Government of Marshall Islands has understood the system of Japanese Grant Aid explained by the team.

(2) The Government of Marshall Islands will take necessary measures, described in ANNEX-III for smooth implementation of the Project in case the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Acquisition of new site

The Ministry of Education fully assures the site acquisition and house relocation which is necessary for smooth implementation of the Project.

(1) The land leases of the new site for ECC have been arranged by the Government of Marshall Islands.

(2) The house relocations in and beside the new site for ECC shall be executed by the Government of Marshall Islands on or before September 30, 1994.

The above actions shall be undertaken prior to the commencement of the Project.

E.C

7. Submission of final report

JICA will analyze the result of field survey and further study in Japan, complete the final report and send it to the Government of Marshall Islands around August 1994.

8. Implementation schedule of the Project

The implementation of the Project will be divided into two phases. The contents of both phases of the Project are described below.

Tentative schedule of phase 1 and phase 2 of the Project is shown in ANNEX-IV.

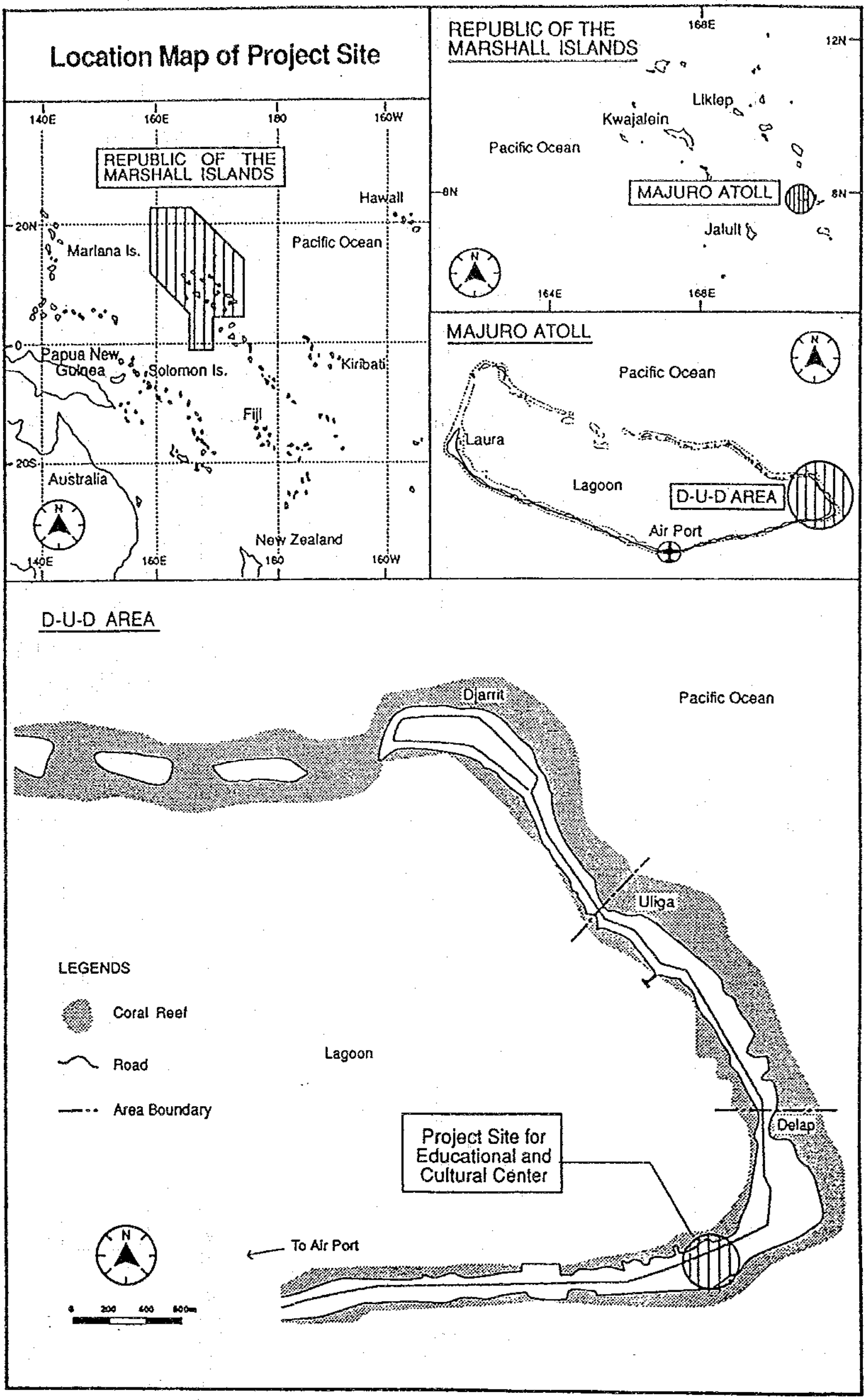
Phase 1 : Construction of General Class Room and Administration bldg., Special Class Room bldg., Sports Shell and Dormitory.
Leveling work of field track.
Electricity wiring work of the existing vocational bldg.

Phase 2 : Construction of Educational and Cultural Center.
Upgrading of vocational training equipment.

EC

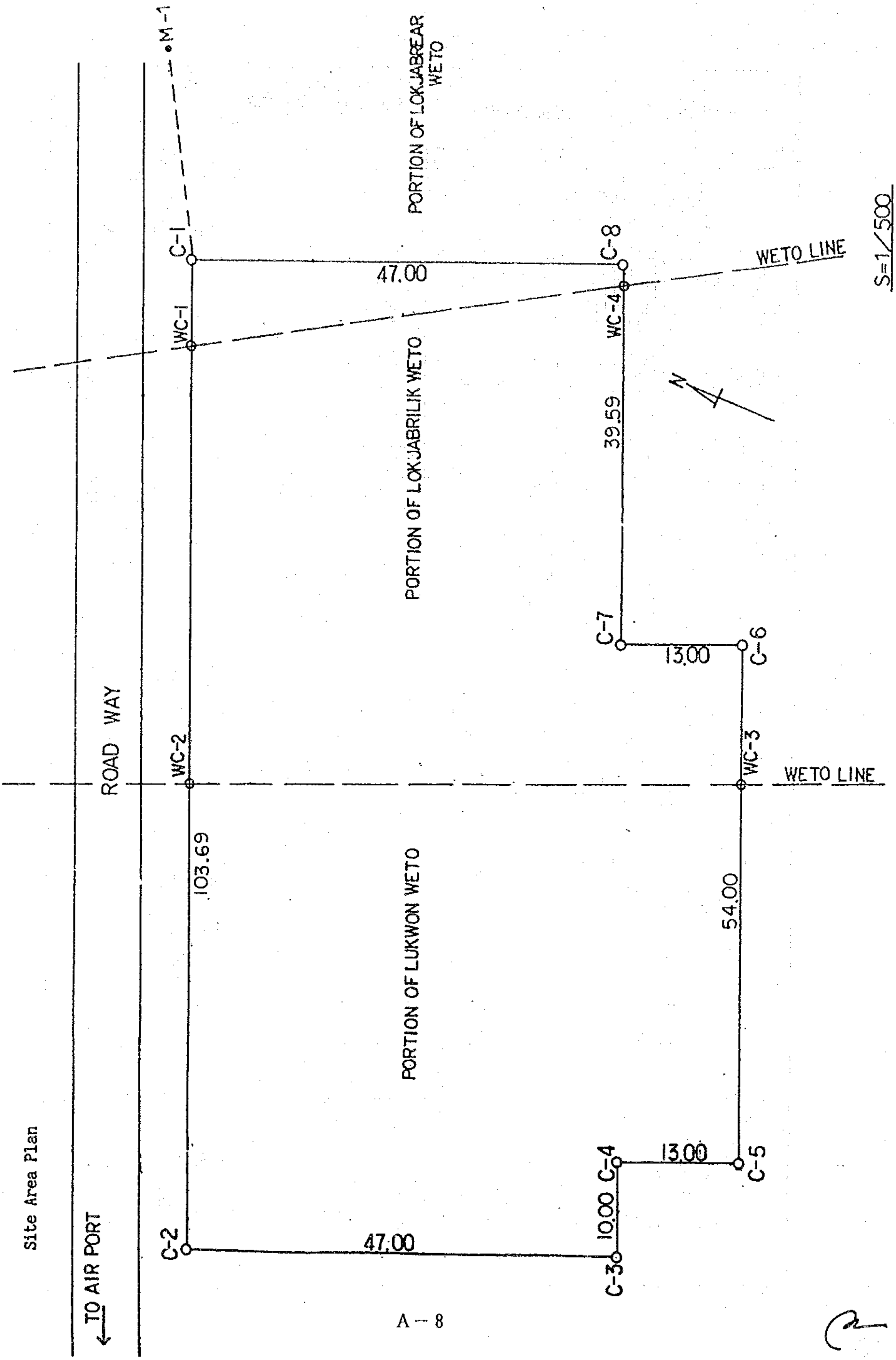
ANNEX-I

Location Map of Project Site



Ee

Site Area Plan



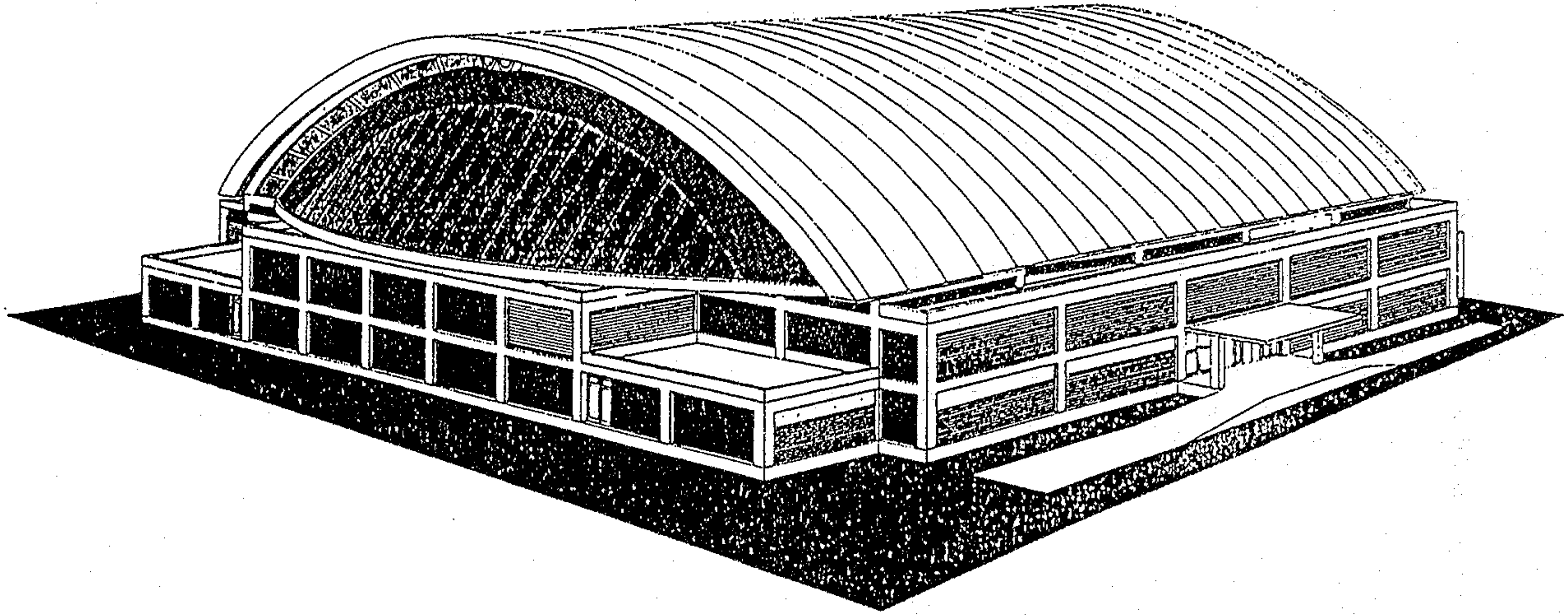
Ec

ANNEX-II

Layout, components and scale of Educational and Cultural Center

- Perspective
- Layout plan
- Plan
- Elevation and Section

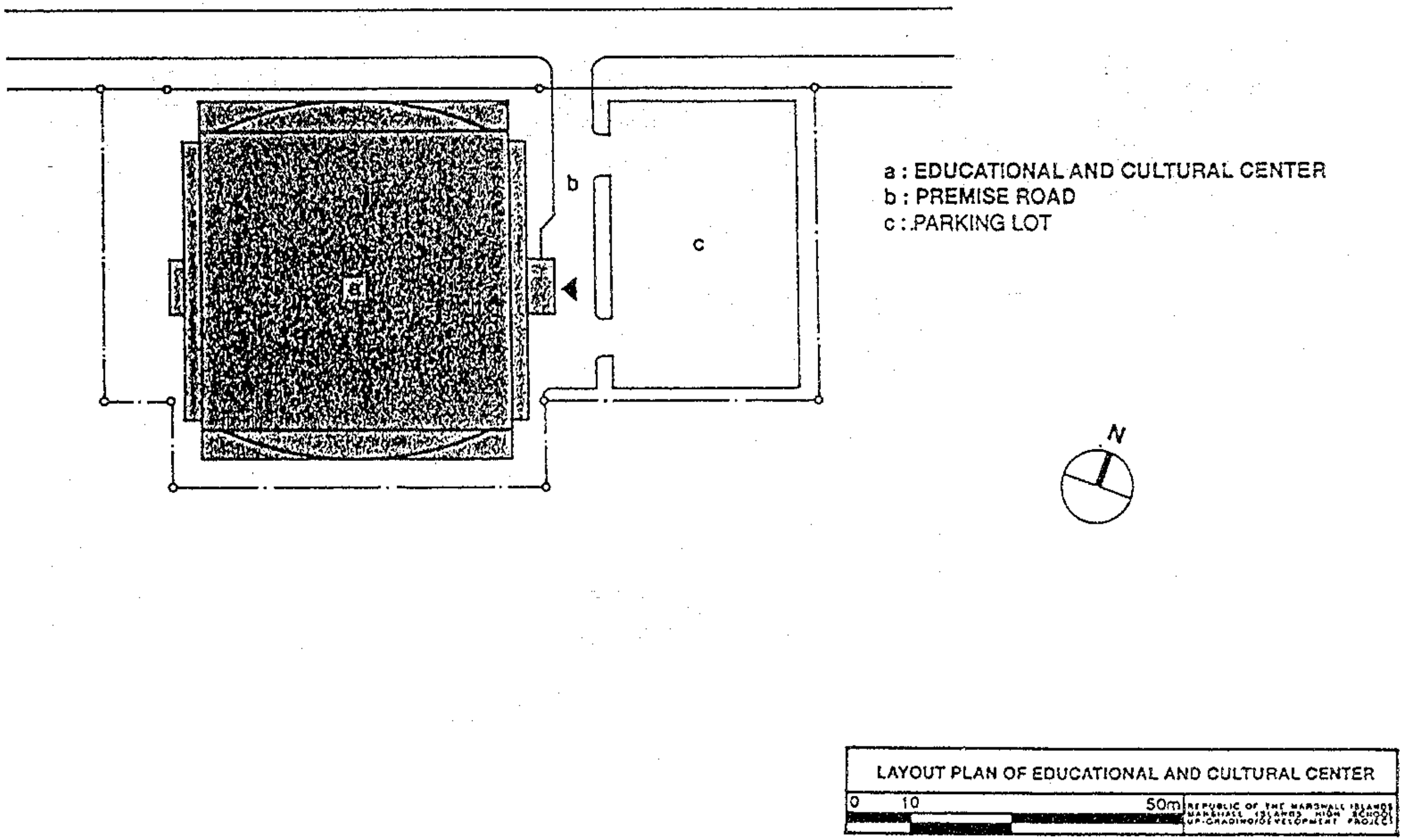
Perspective



EDUCATIONAL AND CULTURAL CENTER PERSPECTIVE DRAWING

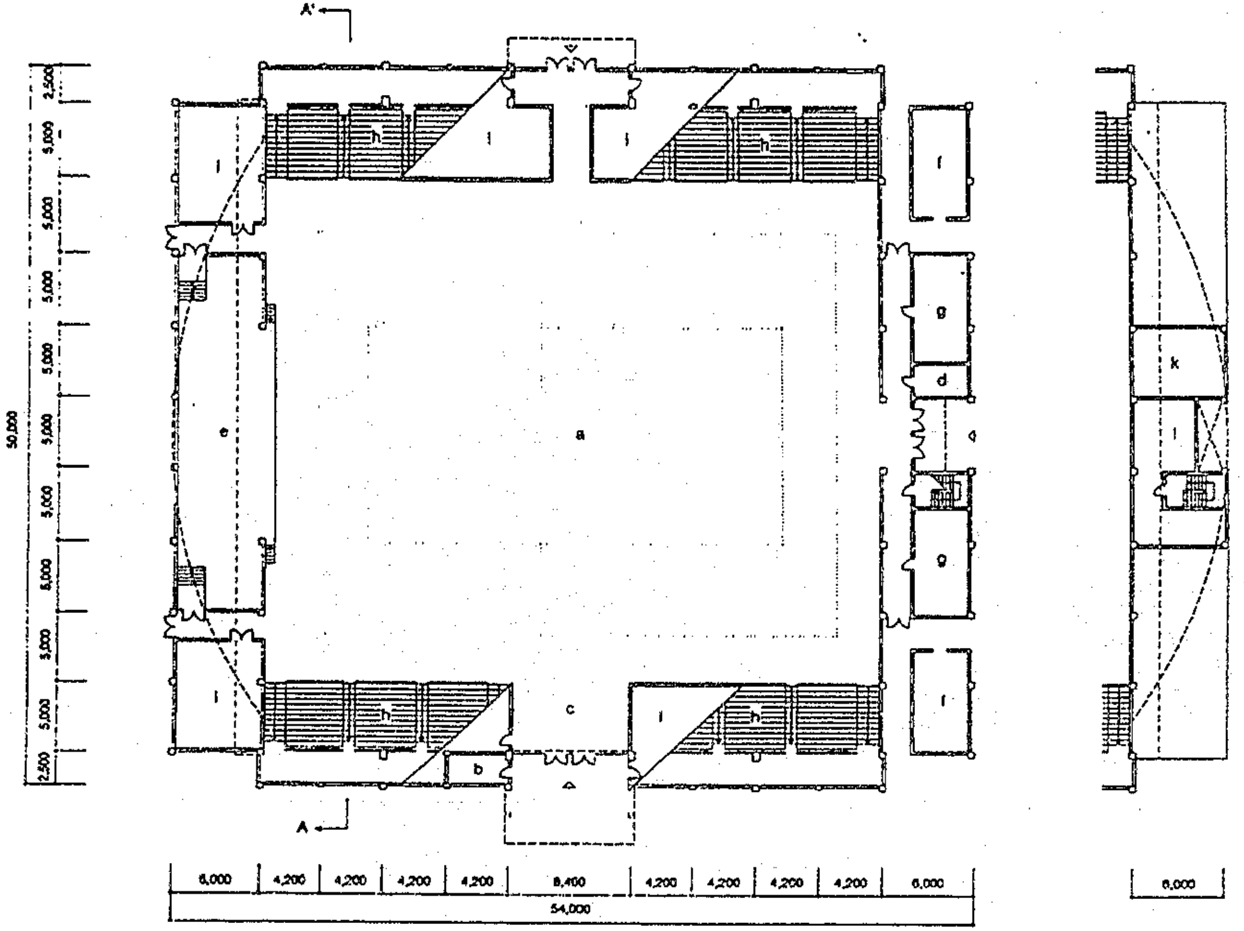
EC

Layout Plan



EC

Plan



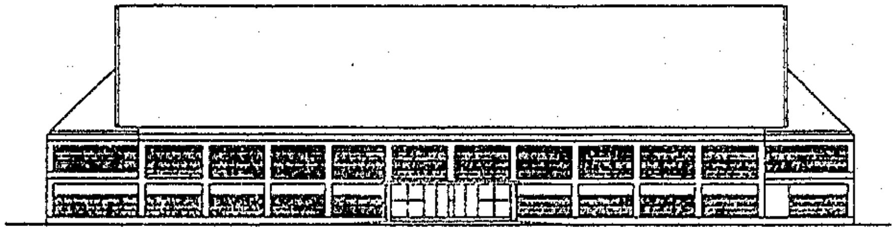
FLOOR PLAN

a : ARENA
b : OFFICE ROOM
c : ENTRANCE HALL
d : MACHINE ROOM
e : STAGE
f : TOILET
g : LOCKER ROOM
h : INDOOR BLEACHERS
i : STORAGE
k : WATER RESERVOIR

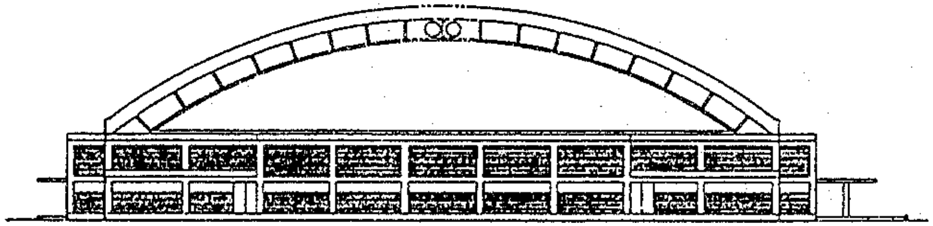
EDUCATIONAL AND CULTURAL CENTER		
0 2 5 10 20m	PLAN	REPUBLIC OF THE MARSHALL ISLANDS MARSHALL ISLANDS HIGH SCHOOL UP-GRADING/DEVELOPMENT PROJECT

Elevation and Section

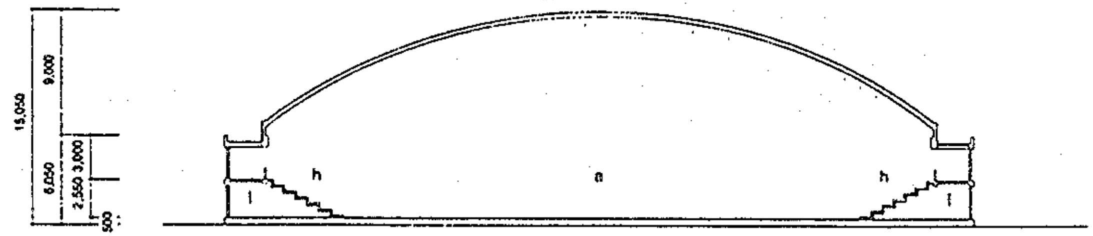
EC



ELEVATION



ELEVATION



A-A' SECTION

a : ARENA
h : INDOOR BLEACHERS
l : STORAGE

EDUCATIONAL AND CULTURAL CENTER

0 2 5 10 20m

ELEVATION SECTION

REPUBLIC OF THE MARSHALL ISLANDS
MARSHALL ISLANDS HIGH SCHOOL
UP-GRADING/DEVELOPMENT PROJECT

ANNEX-III

Necessary measures to be taken by the Government of Marshall Islands in case Japan's Grant Aid is executed.

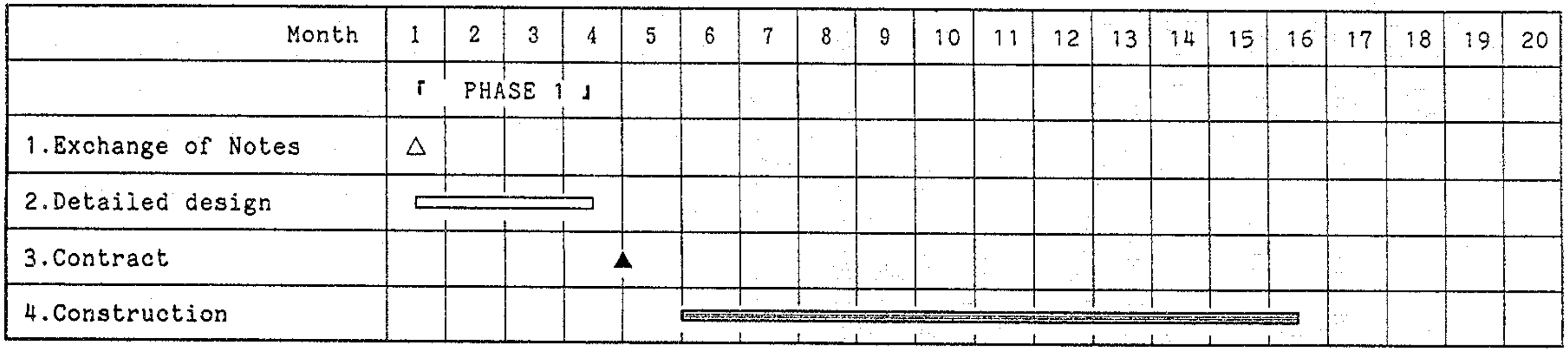
1. To secure the site for the Project site.
2. To clear, level and reclaim the site prior to commencement of the construction.
3. To demolish or remove existing facilities, if required for the execution of works.
4. To provide necessary permission, licence and other authorizations for smooth implementation.
5. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
6. To provide facilities for distribution of electricity, water supply, telephone, drainage, sewage and other incidental facilities to the Project site.
   1) Electricity distributing line to the site.
   2) City water distribution main to the site.
   3) Drainage city main to the site.
   4) Telephone trunk line to the main distribution panel of Building.
   5) General furniture such as carpets, curtains, table chairs and others.
7. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
8. To ensure prompt unloading, tax exemption, and custom clearance of the materials and equipment for the Project at port of disembarkation.
9. To accord Japanese National whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into Marshall Islands and stay therein for the performance of their work.
10. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Marshall Islands in respect to the supply of the products and services under the verified contracts.
11. To maintain and use properly and effectively the facilities constructed and equipment purchased under the verified contracts.
12. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.
13. To coordinate and solve any issues related to the Project which may be raised from third parties and inhabitants in the Project area during implementation of the Project.

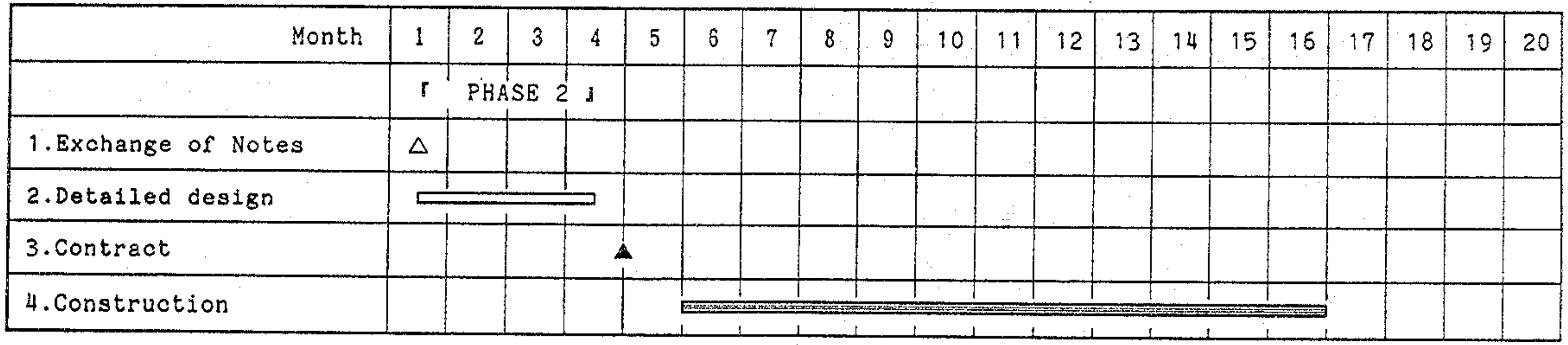
ec

ee

ANNEX-IV

TENTATIVE SCHEDULE





Appendix 5. List of Data

	Name of Data	Source	Date
(1)	Marshall Islands Statistics Abstract 1992	Office of Planning and Statistics	'94 2
(2)	Ground Lease Agreement	Ministry of Internal Affairs	'93 10
(3)	Agreement of house demolish	Ambi Lojbwil	'94 2-3
(4)	Tide Table, Majuro, 1994	Meteorological Service	'94
(5)	Majuro Central Building Foundation Investigation Drilling & Core Logging	Worley Consultants Ltd.	'91
(6)	Survey Plat of Educational Cultural Center (Revised)	Division of Land & Surveys, Department of Resources and Development	'92
(7)	Majuro Sewer Project Phase 1 Plan and Profile	Ministry of Public Works	'87 10
(8)	Exchange Map	National Telecommunication Authority	'91 12

Appendix 6. Calculation Of Water Reservoir Capacity

The amount of water to be used is calculated based on the weekly activity schedule of the arena of the Educational and Cultural Center. When the two courts are used twice during a weekday for a nine-player volleyball high school tournament, the amount used is 3.92 ton/day (see calculation **A** (1) below). Weekends tournament matches are assumed to have 3 rotations using up 5.88 ton/day (see calculation **A** (2) below). The operation rate (frequency of use) is assumed to be 70%. The amount of stored water is supposed to be equivalent to the amount used for ten days according to the suggestion by the Majuro Water and Sewer Company.

A. Average Amount Used in a Day

(1) Amount Used for Toilet and Shower on Weekdays

Number of Persons
[9 (player) + 5 (substitute)] x 2 courts x 2 teams x 2 rotations = 112/day
Amount of Water Used in a Day
112/day x 50 lit./person x 0.7 = 3,920 lit. = 3.92 ton/day

(2) Amount Used for Toilet and Shower on Weekends

Number of Persons
[9 (player) + 5 (substitute)] x 2 courts x 2 teams x 3 rotations = 168/day
168/day x 50 lit./person x 0.7 = 5,880 lit. = 5.88 ton/day

(3) Amount Used for Toilet by Spectators on Weekends
10 lit./person x 800 x 0.7 = 5,600 lit. = 5.6 ton/day

To calculate the average weekly amount used based on the amount used for a week =
(1) x 5 days + (2) + (3)
3.92 ton/day x 5 days + 5.88 ton/day + 5.60 ton/day = 31.08 ton/7 days
= 4.44 ton /day

B. Water for Extinguishing Fires
The amount provided by the fire regulations in Japan = 7.8 ton

C. Capacity of Water Reservoir
Storage Capacity (Amount required for 10 days) = **A** x 10 days + **B**
= 4.44 ton/day x 10 days + 7.8 ton
= 52.2 ton
Required capacity should be 60 ton to allow extra amount of about 10 %.

[APPENDIX FIGURES]

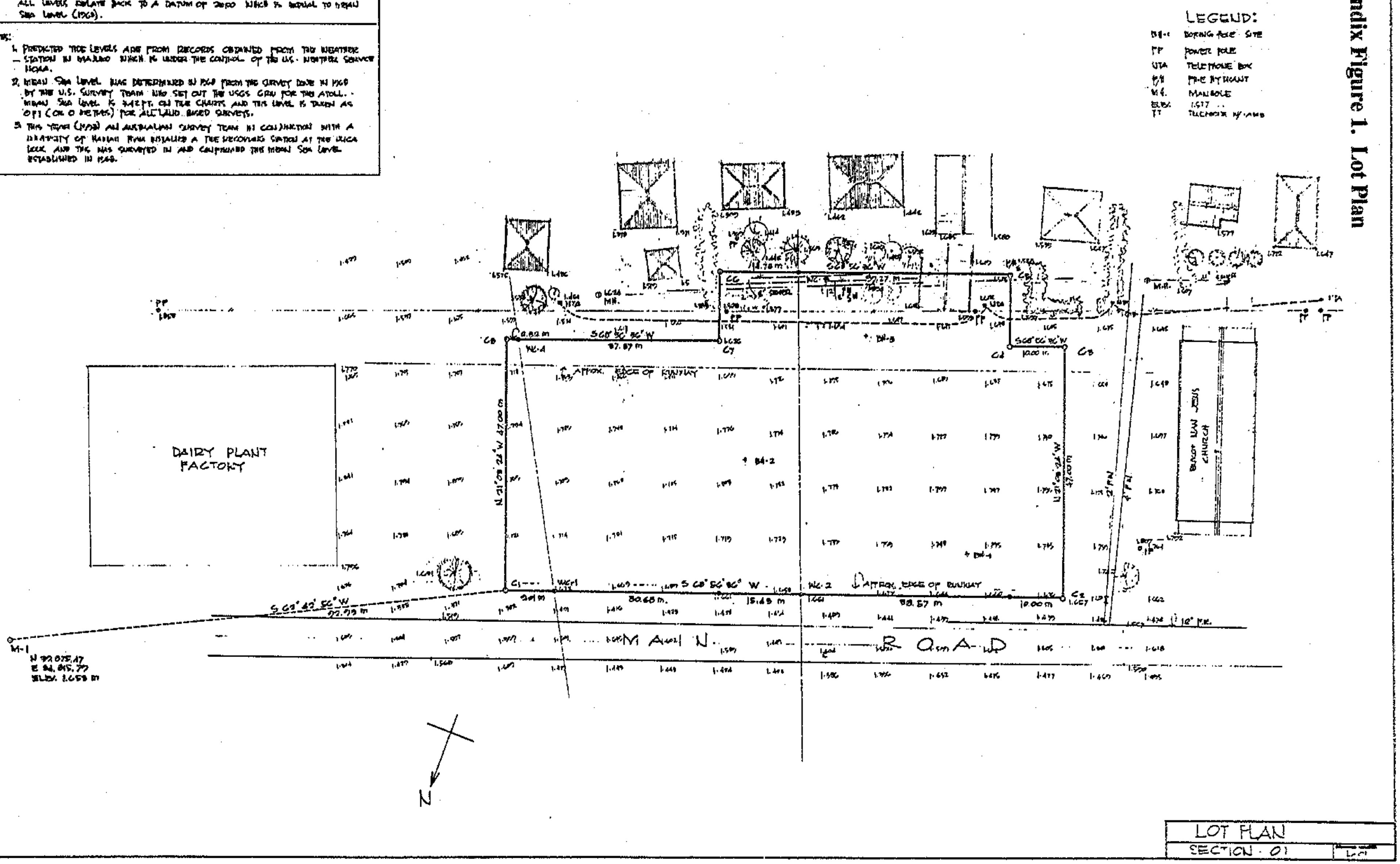
Appendix Figure 1. Lot Plan

	CHART DATUM	IN RELATION TO LEVELS ON THIS DRWG.
PREDICTED HIGHEST TIDE LEVEL (OCT. 16, 1998)	6.7 FT. = 2.04 m.	3.28 FT = 1.0 m.
MEAN SEA LEVEL (1960)	3.42 FT = 1.04 m.	0.0 FT = 0.0 m.
PREDICTED LOWEST TIDE LEVEL (FEB 9, 1999)	-0.1 FT = -0.03 m.	-3.52 FT = -1.07 m.

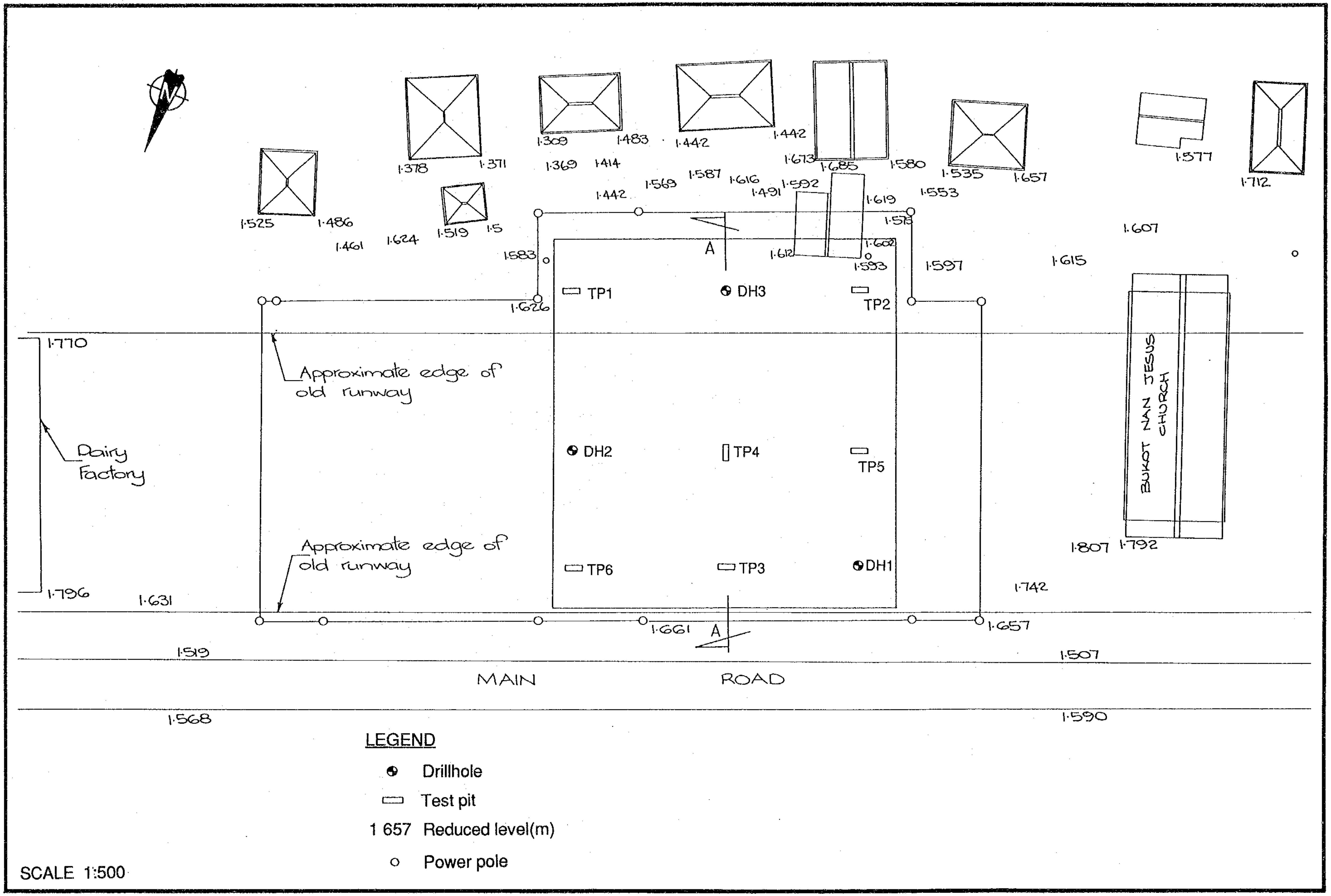
ALL LEVELS RELATE BACK TO A DATUM OF ZERO WHICH IS EQUAL TO MEAN SEA LEVEL (1960).

NOTES:

1. PREDICTED TIDE LEVELS ARE FROM RECORDS OBTAINED FROM THE WEATHER STATION IN MAJURO WHICH IS UNDER THE CONTROL OF THE U.S. WEATHER SERVICE NOAA.
2. MEAN SEA LEVEL WAS DETERMINED IN 1960 FROM THE SURVEY DONE IN 1960 BY THE U.S. SURVEY TEAM WHO SET OUT THE USGS GRID FOR THE ATOLL. MEAN SEA LEVEL IS 3.42 FT. ON THE CHARTS AND THIS LEVEL IS TAKEN AS 0 FT (OR 0 METRES) FOR ALL LAND BASED SURVEYS.
3. THIS YEAR (1998) AN AUSTRALIAN SURVEY TEAM IN CONJUNCTION WITH A UNIVERSITY OF HAWAII TEAM INSTALLED A TIDE RECORDING STATION AT THE ULIGA DOCK AND THIS WAS SURVEYED IN AND CONFIRMED THE MEAN SEA LEVEL ESTABLISHED IN 1960.



Appendix Figure 2. Bore Holes Location



Appendix Figure 3. Bore Logs Section Summary