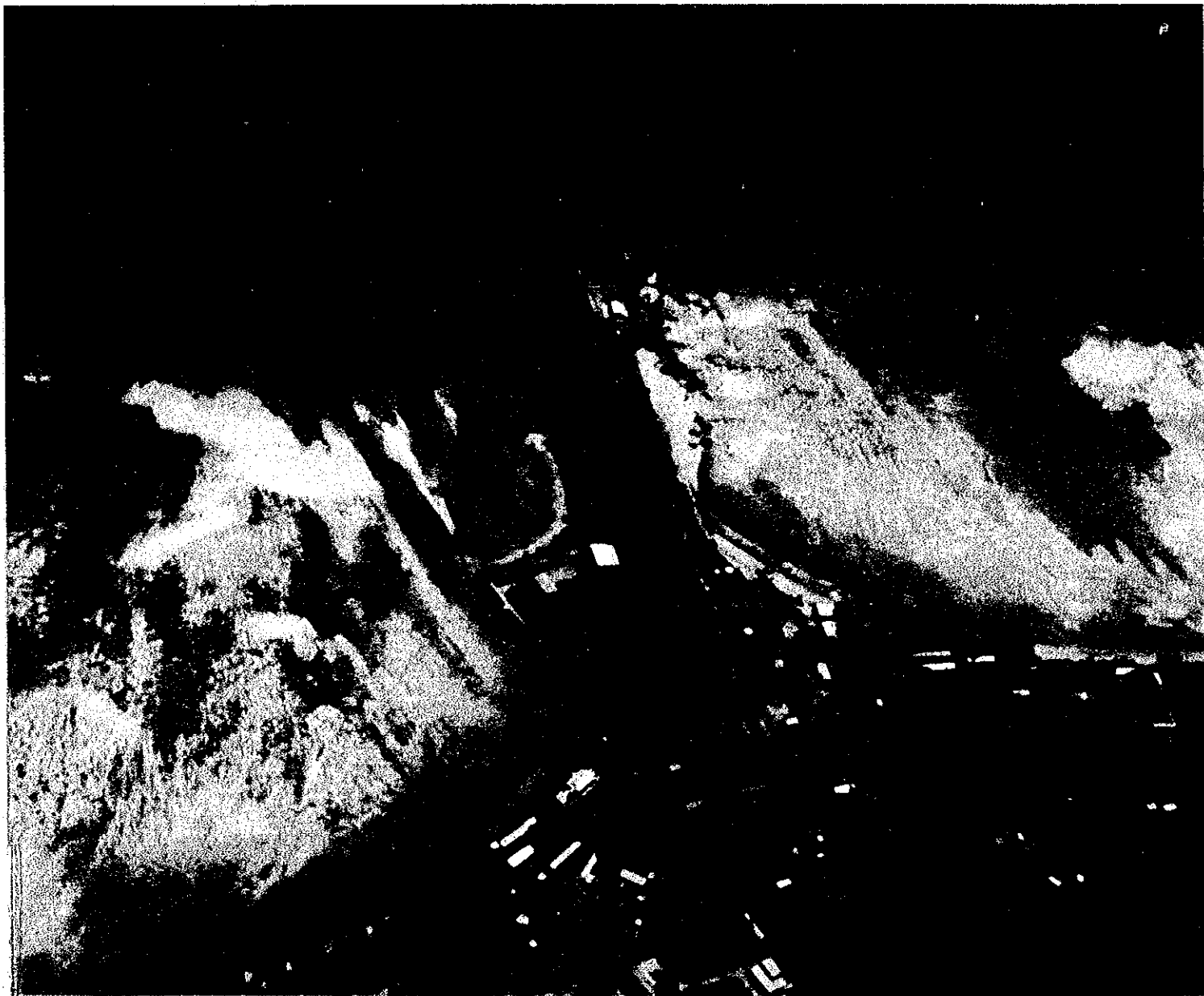


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT, COMMUNICATIONS AND TOURISM
THE REPUBLIC OF KIRIBATI

FINAL REPORT
THE STUDY ON PORTS DEVELOPMENT
IN KIRIBATI



MARCH 1995

NIPPON TETRAPOD CO., LTD. (NTC)

SSF

CR(3)

95-035

28/6/

JICA LIBRARY



1121330131

国際協力事業団

28161

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT, COMMUNICATIONS AND TOURISM
THE REPUBLIC OF KIRIBATI**

**FINAL REPORT
THE STUDY ON PORTS DEVELOPMENT
IN KIRIBATI**

MARCH 1995

CURRENCY EXCHANGE RATE

1 Australian Dollar = 0.757 US Dollar = 75.33 Japanese Yen

(As of July, 1994)

PREFACE

In response to a request from the Government of Republic of Kiribati, the Government of Japan decided to conduct a feasibility study on Ports Development in Kiribati and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent a study team to Kiribati three times between March 1994 and January 1995. The study team was headed by Mr. Hisanori Kato of the Nippon Tetrapod Co., Ltd. (NTC).

The team held discussions with the officials concerned of the Government of Kiribati and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

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 Republic of Kiribati for their close cooperation extended to the team.

March, 1995



Kimio Fujita
President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

March, 1995

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Mr. Fujita

It is my great pleasure to submit herewith the Report for the Study on Ports Development in Kiribati.

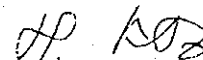
The study team which consists of the Nippon Tetrapod Co., Ltd. (NTC), headed by myself, conducted a survey in Kiribati from March 1994 to January 1995 as per the contract with the Japan International Cooperation Agency.

The findings of this survey were fully discussed with the officials of the Ministry of Transport, Communications and Tourism and other authorities concerned to formulate the Conceptual Port Development Plan for the period up to the year 2005 and to formulate and examine the feasibility of the Improvement Plan for the period up to the year 2000, and were then compiled into this report.

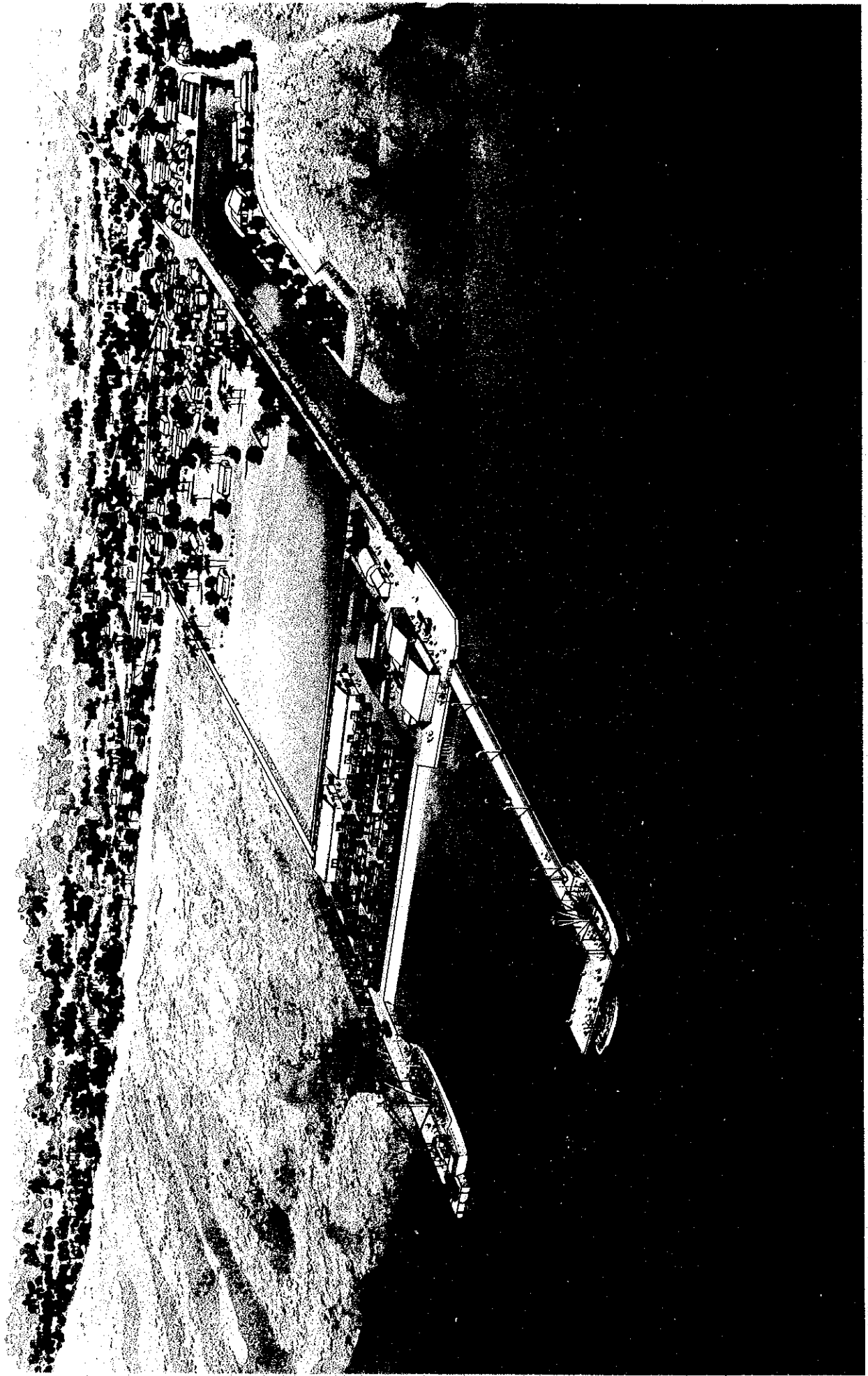
On behalf of the study team, I would like to express my deepest appreciation to the Government of Kiribati and other authorities concerned for their brilliant cooperation and assistance and for the heartfelt hospitality which they extended to the study team during our stay in Kiribati.

I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Embassy of Japan in Fiji for giving us valuable suggestions and assistance during the preparation of this report.

Respectfully,



Hisanori Kato
Leader of the Study Team for
the Study on Ports Development
in Kiribati



Conceptual Port Development Plan of Betio Port



Conceptual Port Development Plan of London Wharf

ABBREVIATIONS

A\$:	Australian Dollar
BHL	:	Bali Hai Line
BSL	:	Betio Shipyard Limited
BTC	:	Betio Town Council
CCS	:	Chief Container Service
CDL	:	Chart Datum Line
CFC	:	Factor for Consumption
CFL	:	Conversion Factor for Labour
CIF	:	Cost, Insurance and Freight
DL	:	Datum Line
DP 6	:	Kiribati Sixth National Development Plan 1987 – 1991
DP 7	:	Kiribati Seventh National Development Plan 1992 – 1995
DWT	:	Dead Weight Tonnage
EEZ	:	Exclusive Economic Zone
EIA	:	Environmental Impact Assessment
EIRR	:	Economic Internal Rate of Return
FIRR	:	Financial Internal Rate of Return
FOB	:	Free on Board
GDP	:	Gross Domestic Product
GOK	:	Government of Kiribati
GRT	:	Gross Registered Tonnage
IEE	:	Initial Environmental Examination
JICA	:	Japan International Cooperation Agency
KCCS	:	Kiribati Cooperative Copra Society
KCWS	:	Kiribati Cooperative Wholesale Society
KOIL	:	Kiribati Oil Limited
KPA	:	Kiribati Ports Authority
KSSL	:	Kiribati Shipping Services Limited
LOA	:	Length Over All
LPG	:	Line and Phoenix Group
MCIE	:	Ministry of Commerce, Industry and Employment
MENRD	:	Ministry of Environment and Natural Resources Development
MFAIT	:	Ministry of Foreign Affairs and International Trade
MFEP	:	Ministry Finance and Economic Planning
MHARD	:	Ministry of Home Affairs and Rural Development

MHWS : Mean High Water Level Spring
MLPD : Ministry of Line and Phoenix Development
MLWS : Mean Low Water Level Spring
MTC : Marine Training Center
MTCT : Ministry of Transport, Communications and Tourism
MWE : Ministry of Works and Energy
MSL : Mean Sea Level
NRT : Net Registered Tonnage
NPO : National Planning Office, MFEP
PFL : Pacific Forum Line
PWD : Public Works Division, MWE
PVU : Plant and Vehicle Unit
RERF : Revenue Equalization Reserve Fund
SCF : Standard Conversion Factor
SCK : Shipping Corporation of Kiribati
SS : Suspended Sediments
SWL : Safe Work Load
TEU : Twenty-foot Equivalent Unit
TML : Te Mautari Limited
UK : United Kingdom

CONTENTS

LOCATION MAPS

PHOTOS

EXECUTIVE SUMMARY

	Page
1. OUTLINE OF THE REPUBLIC OF KIRIBATI.....	1-1
1.1 General	1-1
1.2 Geography and Climate	1-1
1.2.1 Geographical Conditions.....	1-1
1.2.2 Climatological Conditions	1-2
1.3 Socioeconomic Situations.....	1-2
1.3.1 Population	1-3
1.3.2 Gross Domestic Product.....	1-4
1.3.3 Trade	1-9
1.4 Transport Sector.....	1-9
1.4.1 Sea Transport	1-9
1.4.2 Air Transport	1-11
1.4.3 Land Transport	1-12
2. PRESENT SITUATION OF BETIO AND OTHER PORTS	2-1
2.1 General	2-1
2.2 Natural Conditions	2-1
2.2.1 Betio Port	2-1
2.2.2 London Wharf	2-23
2.3 Port Facilities	2-30
2.3.1 Existing Port Facilities of Betio Port	2-30
2.3.2 Deterioration of Facilities of Betio Port	2-45
2.4 Port Activities	2-48
2.4.1 Sea Transport Sector	2-48
2.4.2 Ships' Call	2-55
2.4.3 Cargo Handled	2-63
2.4.4 Cargo Handling Operation	2-67

	Page
2.4.5 Problems and Constraints	2-75
2.5 Ports in Outer Islands	2-79
2.5.1 London Wharf	2-79
2.5.2 Other Ports	2-84
3. CONCEPTUAL PORTS DEVELOPMENT PLAN	3-1
3.1 Basic Concept of Port Development	3-1
3.1.1 Role and Function of Port	3-1
3.1.2 Improvement and Rehabilitation of Facilities.....	3-2
3.1.3 Improvement of Port Operation	3-5
3.2 Demand Forecast	3-8
3.2.1 Future Economic Framework	3-8
3.2.2 Port Cargo Forecast	3-12
3.3 Required Port Facilities and Equipment	3-23
3.3.1 Design Ship	3-23
3.3.2 Dimension of Wharf	3-26
3.3.3 Container Yard, Shed and Equipment	3-26
3.3.4 Other Facilities	3-30
3.3.5 Utilization of the Existing Facilities	3-33
3.4 Conceptual Development Plan	3-34
3.4.1 Possible Sites for Development	3-34
3.4.2 Proposed Port Layout	3-36
3.4.3 Examination on Littoral Drift	3-45
3.5 Structural Design	3-49
3.5.1 Design Premises	3-49
3.5.2 Design Conditions	3-49
3.5.3 Proposed Port Facilities	3-51
3.6 Construction Plan and Preliminary Cost Estimation	3-59
3.6.1 Construction Quantities	3-59
3.6.2 Construction Procedure	3-60
3.6.3 Construction Schedule	3-62
3.6.4 Cost Estimation	3-64
3.7 Port Development in Christmas Islands	3-67
3.7.1 Development Plan	3-67
3.8 Maintenance Dredging Operation	3-77
3.8.1 Maintenance Dredging in Betio Port	3-77
3.8.2 Dredging Method in Outer Islands	3-78

	Page
4. IMPROVEMENT PLAN OF BETIO PORT	4-1
4.1 Basic Planning Policies of Improvement Plan	4-1
4.2 Port Layout and Facilities	4-2
4.2.1 Port Layout	4-2
4.2.2 Required Port Facilities and Equipment	4-2
4.2.3 Examination on Littoral Drift	4-9
4.3 Structural Design	4-10
4.3.1 Proposed Port Facilities	4-10
4.3.2 Rehabilitation of the Existing Wharf	4-12
4.4 Construction Plan and Cost Estimation	4-22
4.4.1 Construction Quantities	4-22
4.4.2 Construction Procedure	4-23
4.4.3 Construction Schedule	4-23
4.4.4 Cost Estimation	4-24
5. MANAGEMENT AND OPERATION	5-1
5.1 Present Organization	5-1
5.2 Kiribati Ports Authority Act 1990	5-5
5.3 New Port Organization	5-8
5.3.1 Kiribati Ports Authority	5-8
5.3.2 Port Regulations	5-14
5.3.3 Port Tariff	5-15
5.3.4 Proposed Additional Incentive Scheme	5-17
5.3.5 Transitional Arrangements for Establishment of KPA	5-18
5.4 Management of KPA	5-21
6. ENVIRONMENTAL EXAMINATION ..	6-1
6.1 Initial Environmental Examination	6-1
6.1.1 Principal Policy	6-1
6.1.2 Initial Environmental Examination	6-2
6.2 Environmental Impact Assessment	6-19
6.2.1 Principal Policy	6-19
6.2.2 Environmental Impact Assessment	6-21
7. ECONOMIC AND FINANCIAL ANALYSIS	7-1
7.1 Economic Analysis	7-1
7.1.1 Methodology	7-1
7.1.2 Prerequisites of Economic Analysis	7-1
7.1.3 Economic Prices	7-7

	Page
7.1.4 Costs of the Project	7-11
7.1.5 Benefits of the Project	7-16
7.1.6 Calculation of EIRR and Evaluation	7-25
7.2 Financial Analysis	7-36
7.2.1 Method of Financial Analysis	7-36
7.2.2 Discount Cash Flow Analysis	7-36
7.2.3 Analysis of Financial Statement	7-40
8. IMPLEMENTATION PLAN	8-1
8.1 Implementation Schedule and Required Fund	8-1
8.2 Raising Funds	8-2
9. CONCLUSION AND RECOMMENDATION	9-1
9.1 Conclusion	9-1
9.2 Recommendation	9-4

[APPENDICES]

Appendix A-1	Scope of Work	A-1
3-4-1	Current Distribution	A-10
3-4-2	Current Distribution	A-11
3-4-3	Calculation Results of Long-Period Oscillation	A-12
3-4-4	Calculated Current Distribution	A-13
5-2-1	Kiribati Ports Authority Act, 1990	A-14
5-2-2	Harbour Ordinance, 1957	A-45
5-3-1	Port Tariff, Shipping Corporation of Kiribati	A-65
A-2	Study Team and Study Schedule	A-71

LIST OF TABLES

			Page
Table	1-3-1(1)	Census Population by Island, 1931-1990	1-5
	1-3-1(2)	Land Area and Population Density, 1990	1-7
	1-3-2	Gross Domestic Product by Economic Activity, 1979-1993	1-8
	1-3-3	Balance of Trade Summary, 1987-1991	1-10
	1-3-4	Major Domestic Exports by Volume, 1987-1991	1-10
Table	2-2-1	Meteorological Elements, 1981- 1992	2-4
	2-2-2	Annual Frequencies of Occurrence of Winds by Direction and Intensity, 1991-1993	2-6
	2-2-3	Results of Tide Harmonic Analysis	2-10
	2-2-4	Comparison of Tide Harmonic Constants	2-10
	2-2-5	Frequency of Occurrence of Waves by Height and Direction	2-14
	2-2-6	Frequency of Occurrence of Waves by Height and Period	2-15
	2-2-7	Characteristics of Seabed Materials	2-21
	2-2-8	Concentration of Suspended Sediments	2-21
	2-2-9	Wave Statistics	2-26
	2-2-10	Characteristics of Seabed Materials	2-28
	2-3-1	Port Facilities in Betio Port	2-32
	2-3-2	Existing Sheds in Betio Port	2-41
	2-3-3	Navigational Aids in Betio Port/Anchorage	2-43
	2-3-4(1)	KSSL Floating Equipment	2-44
	2-3-4(2)	Cargo Handling Equipment of KSSL	2-44
	2-3-5	Usage of Cargo Handling Equipment (April 1994 only)	2-45
	2-3-6	Measurement Results of Steel Sheet Pile Thickness	2-46
	2-3-7	State of Seawall Damage in Betio Port	2-46
	2-4-1(1)	Chief Container Service Schedule (Papuan Chief)	2-49
	2-4-1(2)	Chief Container Service Schedule (Baltimar Boreas)	2-50
	2-4-1(3)	Kiribati Shipping Services Ltd. Schedule (Arktis Trader)	2-51
	2-4-1(4)	Bali Hai Long Term Schedule	2-52
	2-4-1(5)	Kiribati Shipping Services Ltd. Schedule (N. Matangare)	2-53
	2-4-2	Sailing Distance of Domestic Trade	2-56
	2-4-3	Number of Foreign Ships' Call	2-57
	2-4-4(1)	Number of Principal Cargo Vessels, 1993	2-57
	2-4-4(2)	Ships' Call and Port Time, 1993	2-58
	2-4-5(1)	Dimensions and Arrival Draft of Principal Ships, 1993	2-59

	Page
Table 2-4-5(2)	Dimensions and Arrival Draft of Principal Ships, 1993 2-60
2-4-6	Accumulated Arrival Draft of Ships, 1993 2-61
2-4-7	Registered Vessels in Kiribati 2-62
2-4-8	Export/Import Cargo Statistics, 1983-1993, Betio Port 2-63
2-4-9(1)	Domestic Cargo Statistics, 1983-1993 2-68
2-4-9(2)	Passenger Statistics, 1983-1993 2-68
2-5-1	Number of Ships' Call in Christmas 2-82
2-5-2	Volume of Cargo Handled 2-83
2-5-3	Passenger Statistics in London Wharf 2-85
Table 3-2-1	Population Forecast, Kiribati 3-9
3-2-2	Sectoral Distribution of GDP at Factor Cost 3-10
3-2-3	Projection of Gross Domestic Product at Factor Cost 3-11
3-2-4	Projections of Export/Import Values by Major Commodity ... 3-13
3-2-5	Total Copra Production and Exports 3-16
3-2-6	Copra Exports by Destination 3-16
3-2-7	Export of Marine Resources 3-17
3-2-8	Fish Catch by Foreign Fishing Vessels in Kiribati EEZ 3-17
3-2-9(1)	Export/Import Cargo Forecast, 1995-2005 3-18
3-2-9(2)	Export Cargo Forecast, 1995-2005 3-18
3-2-9(3)	Import Cargo Forecast, 1995-2005 3-21
3-3-1	Imported Containers/Call by Carrier, 1990-1993 3-26
3-3-2	Imported Containers by Carrier 3-27
3-3-3	Imported Containers by Carrier 3-27
3-3-4	Number of Import TEUs Forecast in 2000 and 2005 3-28
3-3-5	Required Cargo Handling Equipment 3-30
3-3-6	Numbers of Outgoing Passengers 3-31
3-4-1	Comparison of Alternative Conceptual Port Development Plans 3-41
3-6-1	Port Facilities and Construction Quantities 3-59
3-6-2	Main Construction Materials 3-60
3-6-3	Construction Schedule 3-63
3-6-4	Summary of Construction Cost 3-66
3-7-1	Comparison of Alternative Conceptual Port Development Plans 3-68
3-7-2	Summary of Construction Cost (Alternative 1) 3-76
3-7-3	Summary of Construction Cost (Alternative 2) 3-76
3-7-4	Summary of Construction Cost (Alternative 3) 3-76

	Page
Table 4-2-1	Imported Containers by Carrier, 2000 4-3
4-2-2	Required Cargo Handling Equipment 4-6
4-4-1	Port Facilities and Construction Quantities 4-22
4-4-2	Main Construction Materials 4-23
4-4-3	Construction Schedule 4-24
4-4-4	Summary of Construction Cost 4-24
4-4-5	Annual Investment 4-25
Table 5-3-1	Number of Staff of KPA and Office Area 5-11
5-4-1	Existing Fixed Assets to be Transferred to KPA 5-23
5-4-2	New Fixed Assets of Kiribati Ports Authority 5-24
5-4-3	Staff and Basic Salary of Kiribati Ports Authority 5-25
5-4-4	Income and Expenditure Statement of KSSL, 1989-1993 5-26
5-4-5	Port Tariff 5-27
Table 6-1-1	Result of Transparency Measurement 6-7
6-1-2	Result of Survey of the Port Sea Area 6-9
6-1-3	Heavy Metal Found in Bottom Spoil 6-11
6-1-4	Catch Percentage 6-14
6-1-5	Environmental Impact Checklist for Port Development 6-17
6-2-1	Environmental Issues in Port Construction 6-20
6-2-2	Monitoring Line and Target Value of SS 6-23
Table 7-1-1	Fixed Assets of Kiribati Ports Authority 7-2
7-1-2	Port Facilities in "Without" Case 7-2
7-1-3	Overseas Cargo Forecast per Ship Type (Except Bulk Cargo), 1995-2022 7-4
7-1-4	Domestic Cargo Forecast, 1995-2022 7-4
7-1-5	Overseas Ships' Call, 1995-2022 7-5
7-1-6	Domestic Ships' Call, 1995-2022 7-6
7-1-7	Port Facilities in "With" Case 7-6
7-1-8	Import and Export Statistics, 1989-1992 7-8
7-1-9	Standard Conversion Factor (SCF) 7-8
7-1-10	Casual Labour Cost 7-10
7-1-11	Shadow Wage Rate 7-10
7-1-12	Shadow Prices of Construction Cost 7-12
7-1-12(A)	Shadow Prices of Repair and Maintenance Costs for New Fixed Assets 7-12

	Page
Table 7-1-13	Shadow Prices of Additional Indirect Labour Costs and Administration Costs 7-13
7-1-14	Fuel Costs for New Equipment 7-15
7-1-15	Shadow Price of Fuel Costs for New Equipment 7-15
7-1-16	Cargo Handling Rate 7-18
7-1-17	Ships' Waiting Time 7-19
7-1-18	Saving of Ship Staying Costs 7-19
7-1-19	Time Charterage of Dry Cargo Ships 7-19
7-1-20	Saving of Direct Labour Costs of Cargo Handling 7-21
7-1-21	Shadow Prices of Direct Labour Costs Saving 7-21
7-1-22	Saving of Other Direct Costs 7-22
7-1-22(A)	Other Direct Costs, 1989-1993 7-22
7-1-23	Shadow Prices of Other Direct Costs Saving 7-23
7-1-24	Costs/Benefits and EIRR, Shadow Price (Feedback Ratio of Ship Staying Saving Cost: 70%) 7-26
7-1-25	Costs/Benefits and EIRR, Market Price (Feedback Ratio of Ship Staying Saving Cost: 70%) 7-27
7-1-26	Costs/Benefits and EIRR, Shadow Price (Case A- Construction Cost -10%) 7-31
7-1-27	Costs/Benefits and EIRR, Shadow Price (Case B- Construction Cost +10%) 7-32
7-1-28	Costs/Benefits and EIRR, Shadow Price (Case C- Benefits -10%) 7-33
7-1-29	Costs/Benefits and EIRR, Shadow Price (Case D- Benefits +10%) 7-34
7-1-30	Costs/Benefits and EIRR, Shadow Price (Case E- Benefits +100%) 7-35
7-1-31	Results of Economic Analysis, EIRR 7-28
7-2-1	Cost for Costs/Benefits (Market Price) 7-37
7-2-2	Benefits for Costs/Benefits (Market Price) 7-37
7-2-3	Income for Costs/Benefits (Market Price) 7-37
7-2-4	Costs/Benefits and FIRR (Market Price) 7-39
7-2-5	FIRR by Sensitivity Analysis 7-38
7-2-6(1)	Repayment Schedule of Foreign Loan 7-42
7-2-7(1)	Repayment Schedule of Local Loan 7-43
7-2-7(1A)	Total Repayment Schedule of Foreign and Local Loan 7-44 (Case A)
7-2-7(2)	Repayment Schedule of Local Loan 7-45

	Page
Table 7-2-7(2A) Total Repayment Schedule of Foreign and Local Loan (Case B)	7-46
7-2-7(3) Repayment Schedule of Local Loan	7-47
7-2-7(3A) Total Repayment Schedule of Foreign and Local Loan (Case C)	7-48
7-2-8 Fixed Assets	7-49
7-2-9 Income of KPA, 1995-1996, by Present Tariff	7-51
7-2-10 Income of KPA, 1997-2022, by Revised Port Tariff	7-52
7-2-11 Income of KPA, 1997-2022, Without Case, (for reference) by Present Tariff	7-53
7-2-12 Expenditure of KPA, 1995-2022	7-54
7-2-13(1) Statement of Incomes and Expenditures (Case A)	7-57
7-2-14(1) Statement of Source and Application of Funds (Case A)	7-58
7-2-15(1) Balance Sheet (Case A)	7-59
7-2-13(2) Statement of Incomes and Expenditures (Case B)	7-60
7-2-14(2) Statement of Source and Application of Funds (Case B)	7-61
7-2-15(2) Balance Sheet (Case B)	7-62
7-2-13(3) Statement of Incomes and Expenditures (Case C)	7-63
7-2-14(3) Statement of Source and Application of Funds (Case C)	7-64
7-2-15(3) Balance Sheet (Case C)	7-65
7-2-16 Financial Ratio	7-66
 Table 8-1-1 Overall Implementation Schedule	 8-3

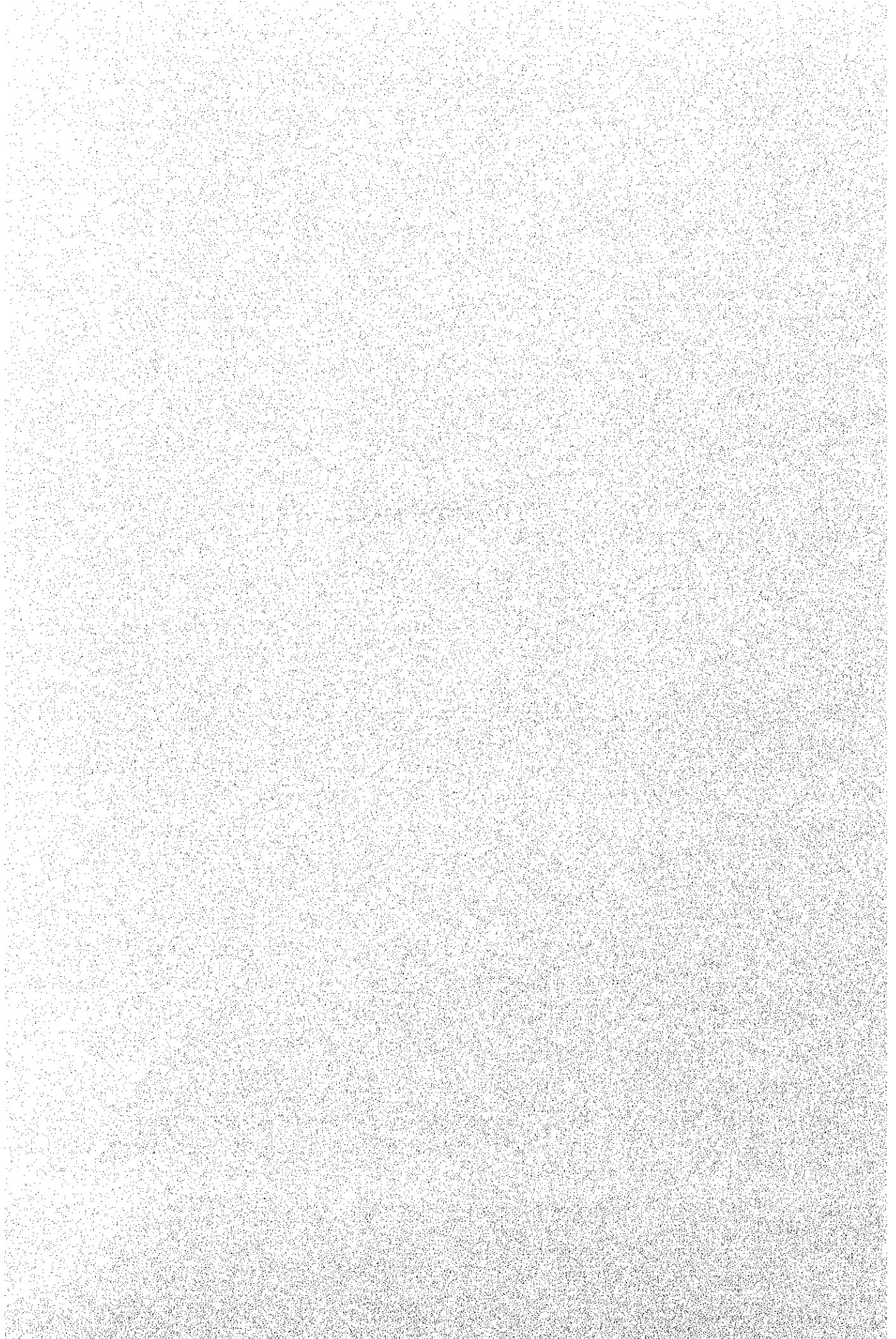
LIST OF FIGURES

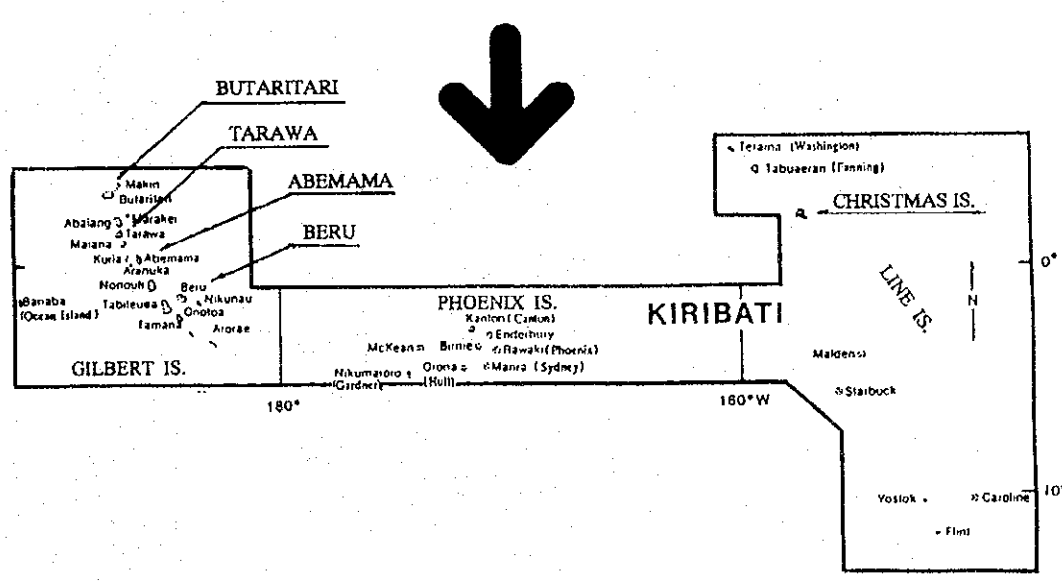
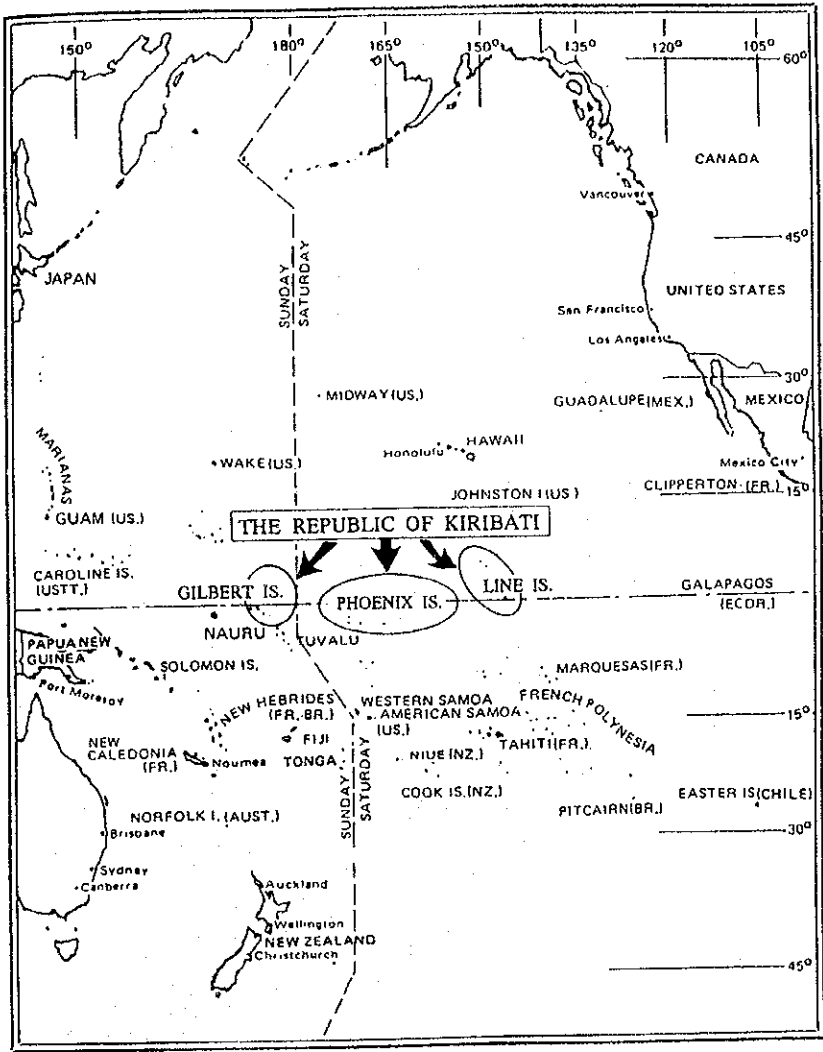
		Page
Figure 1-3-1	Census Population by Island, 1931-1990	1-6
1-3-2	Gross Domestic Product, 1979-1993	1-6
Figure 2-2-1	Topographic Map of Betio Port	2-3
2-2-2	Annual Rainfall in Tarawa, 1970-1992	2-4
2-2-3	Wind Rose	2-7
2-2-4	Tide Curve	2-9
2-2-5	Tide Level Chart	2-11
2-2-6	Installation Points of Current Meters	2-13
2-2-7	Dimensions of Hindcast Ocean Waves	2-16
2-2-8	Locations of Boring Points	2-18
2-2-9	Borehole Logs	2-18
2-2-10	Locations of Sampling Points of Seabed Materials (Betio Port)	2-20
2-2-11	Locations of Survey Points of Suspended Sediments (Betio Port)	2-20
2-2-12	Topographic Map of London Wharf	2-24
2-2-13	Annual Rainfall of Christmas, 1970-1991	2-25
2-2-14	Locations of Sampling Points of Seabed Materials (London Wharf)	2-28
2-3-1	Outline of Existing Facilities in Betio Port	2-31
2-3-2	Typical Cross Section of Seawall (East and West Mole)	2-33
2-3-3	Typical Cross Section of Access Channel (Betio Port)	2-34
2-3-4	Design Structure of Existing Wharf in Betio Port	2-36
2-3-5(1)	Layout of Fisheries Jetty	2-37
2-3-5(2)	Typical Cross Sections of Fisheries Jetty	2-38
2-3-6	Layout of Existing Sheds in Betio Port	2-40
2-3-7	Existing Fairway and Navigational Aids	2-42
2-3-8	State of Seawall Damages	2-47
2-4-1	Shipping Routes of Major Container Carriers	2-54
2-4-2	Accumulated Number of Vessels Calling at Betio Port	2-61
2-4-3(1)	Overseas Cargo, 1983-1993, Betio Port	2-64
2-4-3(2)	Export Cargo, 1983-1993, Betio Port	2-64
2-4-3(3)	Import Cargo, 1983-1993, Betio Port	2-66
2-4-3(4)	Container Cargo, 1983-1993, Betio Port	2-66
2-4-4(1)	Domestic Cargo, 1983-1993, Betio Port	2-69

	Page
Figure 2-4-4(2)	Domestic Passenger, 1983-1993, Betio Port 2-69
2-4-5	Existing Documentary and Cargo Clearance Flow-Chart of KSSL 2-71
2-4-6	Container Stacking Slots Allocation 2-78
2-5-1	Existing Wharf Structure in London Wharf 2-80
Figure 3-2-1(1)	Cargo Forecast, 1995-2005, Betio Port 3-19
3-2-1(2)	Export Cargo Forecast, 1995-2005, Betio Port 3-19
3-2-1(3)	Import Cargo Forecast, 1995-2005, Betio Port 3-22
3-3-1	Forecast of Passenger Traffic 3-31
3-4-1	Land Use Plan, Betio Town 3-35
3-4-2	Alternative Conceptual Port Development Plans 3-37
3-4-3	Alternative Plan 1 3-38
3-4-4	Alternative Plan 2 3-39
3-4-5	Alternative Plan 3 3-40
3-4-6(1)	Proposed General Layout Plan (Conceptual Development Plan) 3-43
3-4-6(2)	Proposed Container Yard Layout Plan 3-44
3-5-1(1)	General Plan of Wharf 3-53
3-5-1(2)	Typical Cross Section of Wharf and Return Wall 3-54
3-5-2(1)	Typical Cross Section of Seawall 3-55
3-5-2(2)	Typical Cross Section of Seawall at Access Road 3-56
3-5-3	New Arrangement of Approach Channel & Navigation Aids.. 3-58
3-6-1	Flow of Construction Procedure of Steel Sheet Pile Wharf 3-62
3-7-1(1)	Conceptual Development Plan of London Wharf Alternative 1 3-69
3-7-1(2)	Typical Cross Section of Main Wharf (Alternative 1) 3-70
3-7-2(1)	Conceptual Development Plan of London Wharf Alternative 2 3-71
3-7-2(2)	Typical Cross Section of Main Wharf (Alternative 2) 3-72
3-7-3(1)	Conceptual Development Plan of London Wharf Alternative 3 3-73
3-7-3(2)	Typical Cross Section of Main Wharf (Alternative 3) 3-74
3-8-1	Outline of Proposed Dredger 3-79
Figure 4-2-1(1)	Proposed General Layout Plan (Improvement Plan) 4-4
4-2-1(2)	Proposed Container Yard Layout Plan 4-5
4-3-1(1)	General Layout Plan of Wharf 4-13
4-3-1(2)	Typical Cross Section of Wharf and Return Wall 4-14

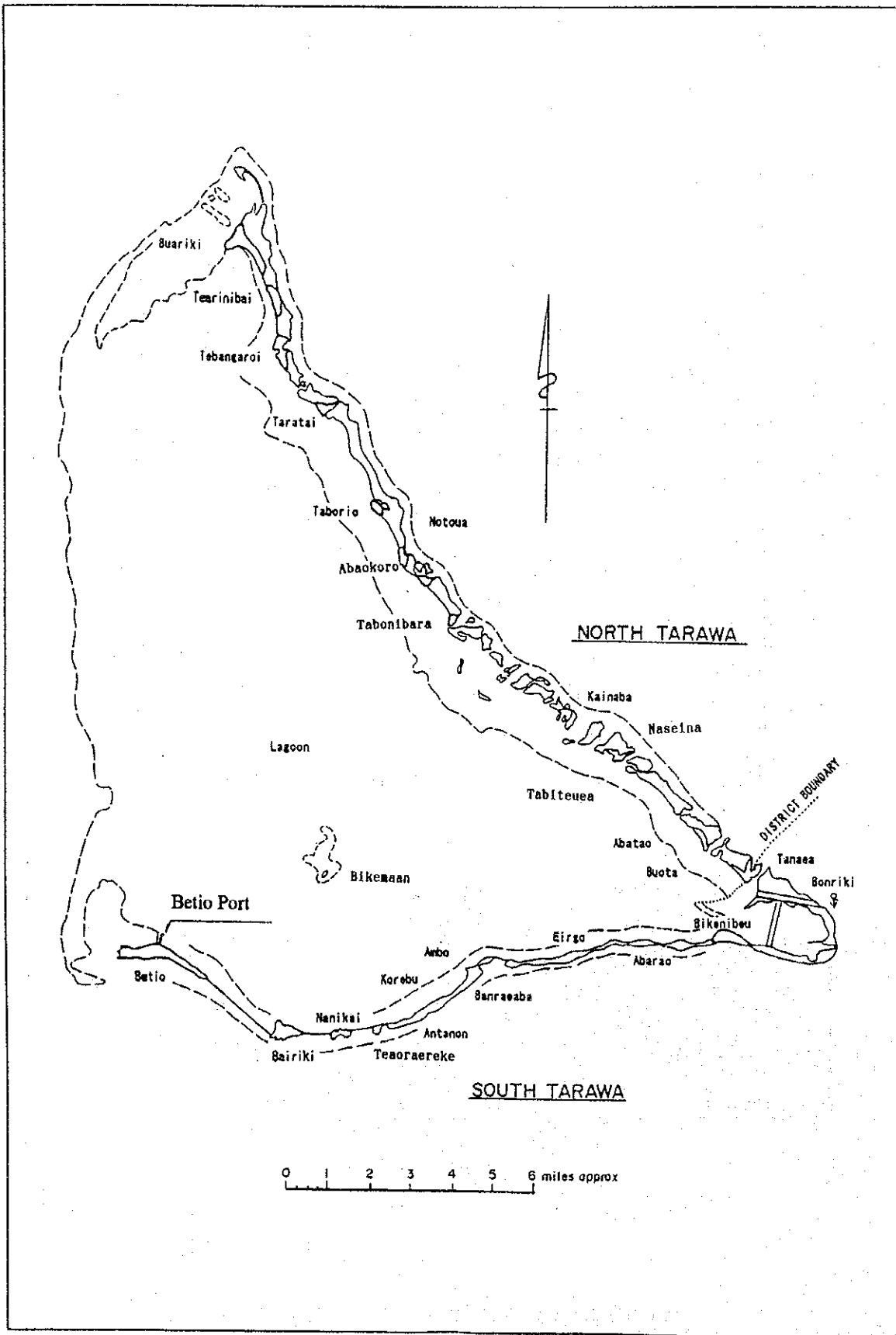
	Page
Figure 4-3-2(1)	Typical Cross Section of Seawall 4-15
4-3-2(2)	Typical Cross Section of Seawall at Access Road 4-16
4-3-3(1)	General Layout Plan of Shed and Office 4-17
4-3-3(2)	Elevations and Cross Section of Shed and Office 4-18
4-3-4(1)	General Layout Plan of Passenger Terminal 4-19
4-3-4(2)	Elevations of Passenger Terminal 4-20
4-3-5	Repair Work of Existing Wharf in Betio Port 4-21
Figure 5-1-1	Organization Chart of the Ministry of Transport, Communications and Tourism (MTCT) 5-2
5-1-2	Organization Chart of Kiribati Shipping Services Limited (KSSL) 5-3
5-3-1	Organization Chart of Port Authority (KPA) 5-10
Figure 6-1-1	Survey Area for Environmental Assessment 6-4
6-1-2	Locations of Measuring Points of Transparency 6-6
6-1-3	Sampling Points of Mud 6-12
6-2-1	Monitoring Area 6-24

LOCATION MAPS

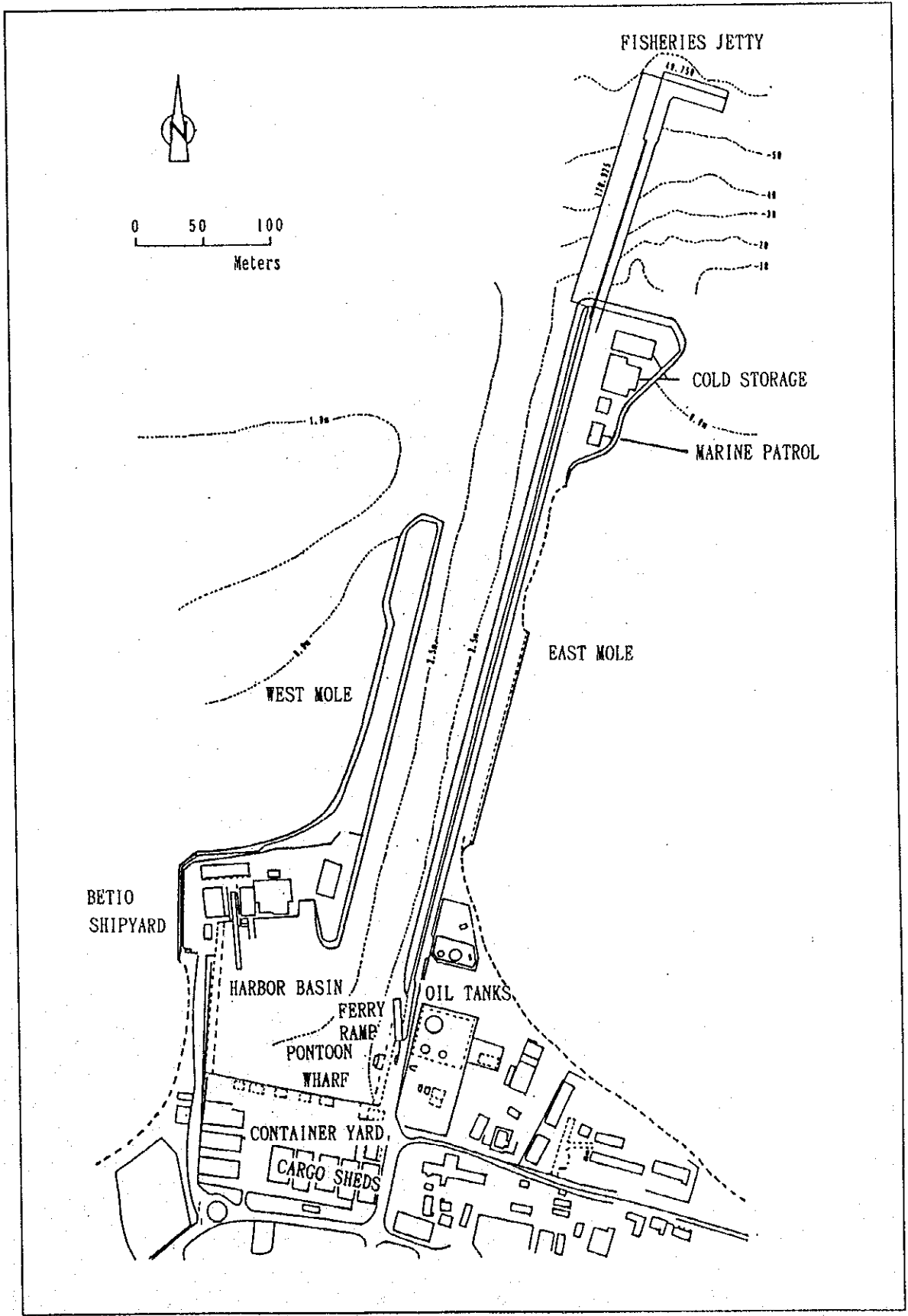




LOCATION OF THE REPUBLIC OF KIRIBATI



TARAWA ATOLL



FISHERIES JETTY



0 50 100
Meters

COLD STORAGE

MARINE PATROL

EAST MOLE

WEST MOLE

BETIO SHIPYARD

HARBOR BASIN

FERRY RAMP

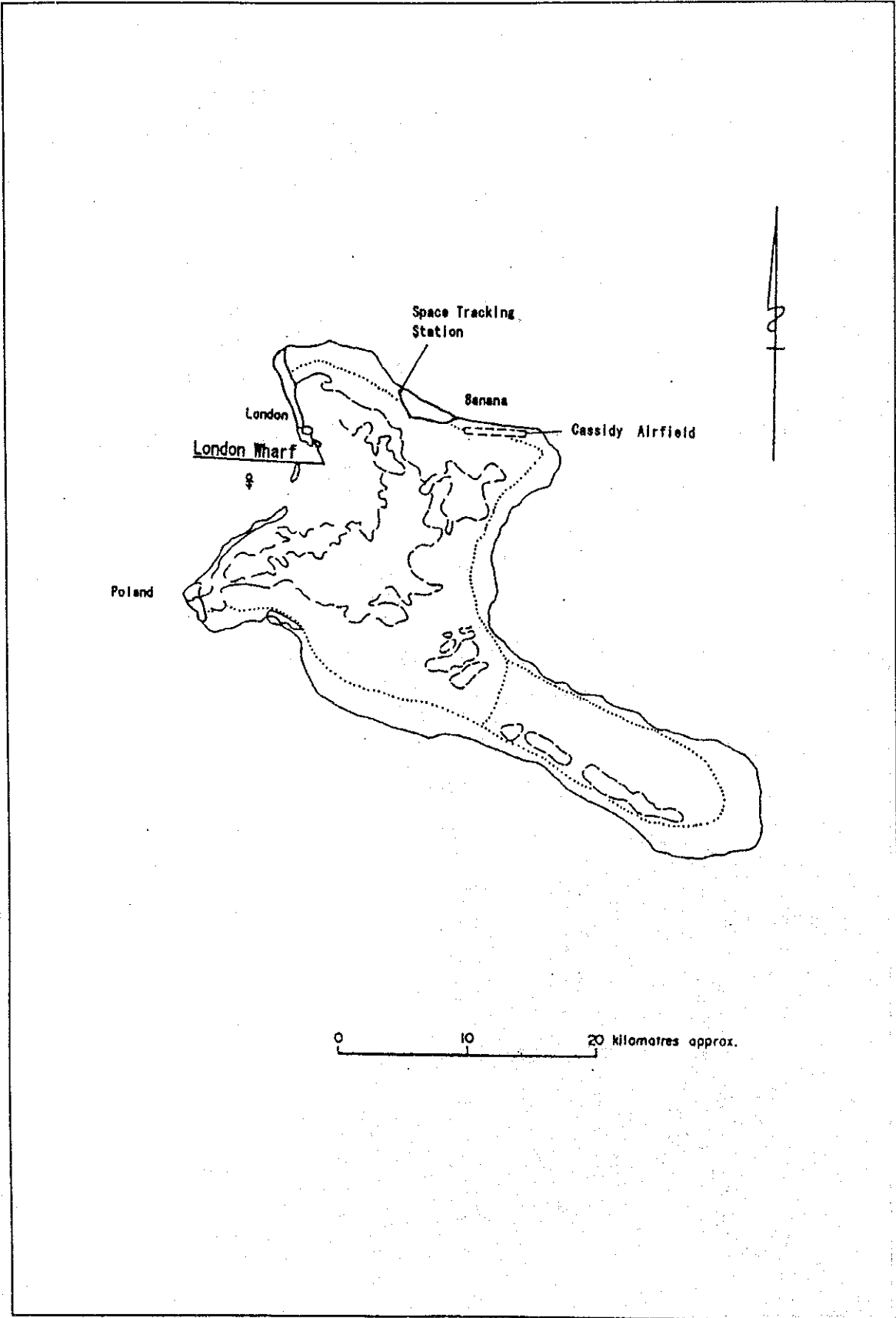
PONTOON WHARF

OIL TANKS

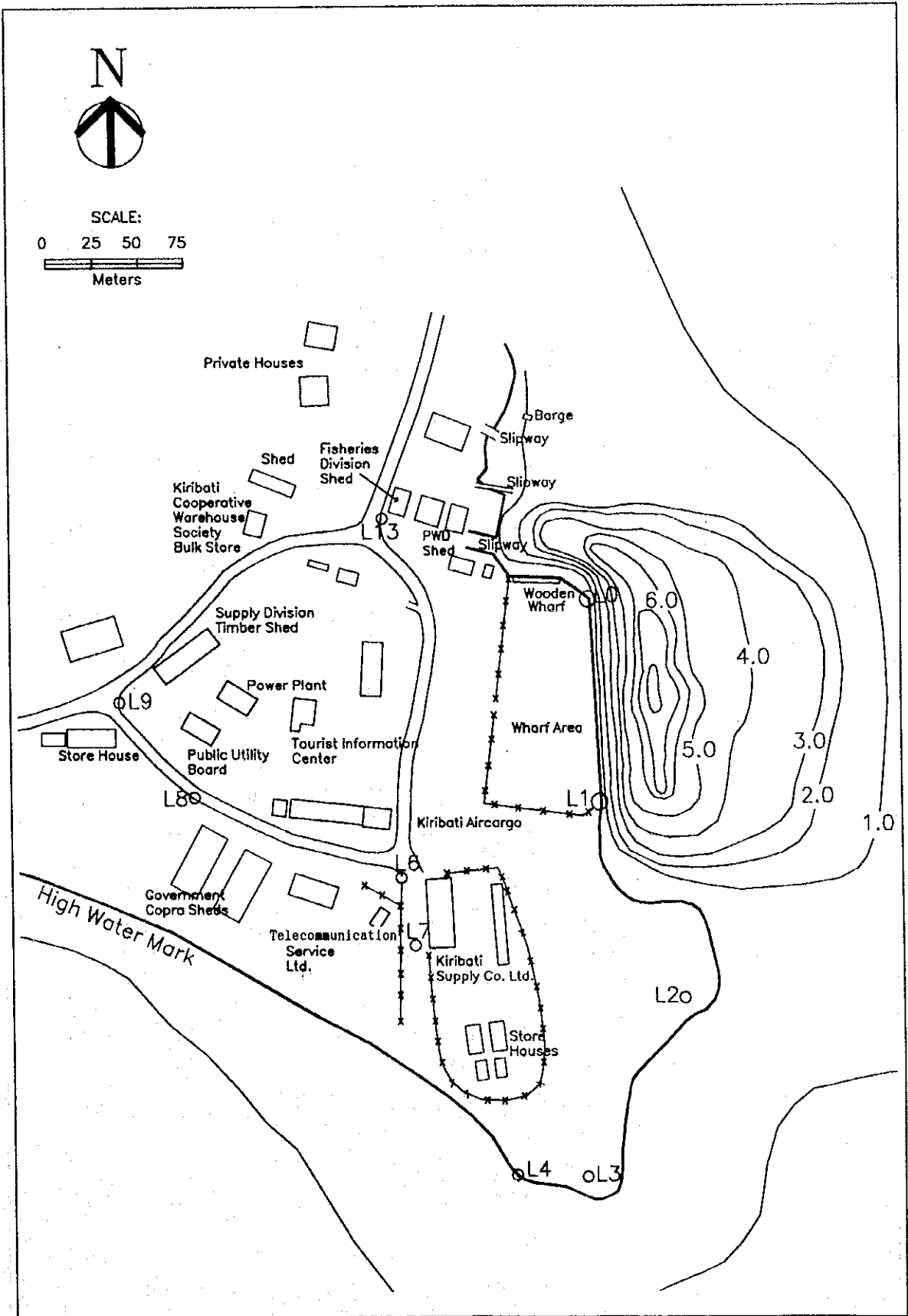
CONTAINER YARD

CARGO SHEDS

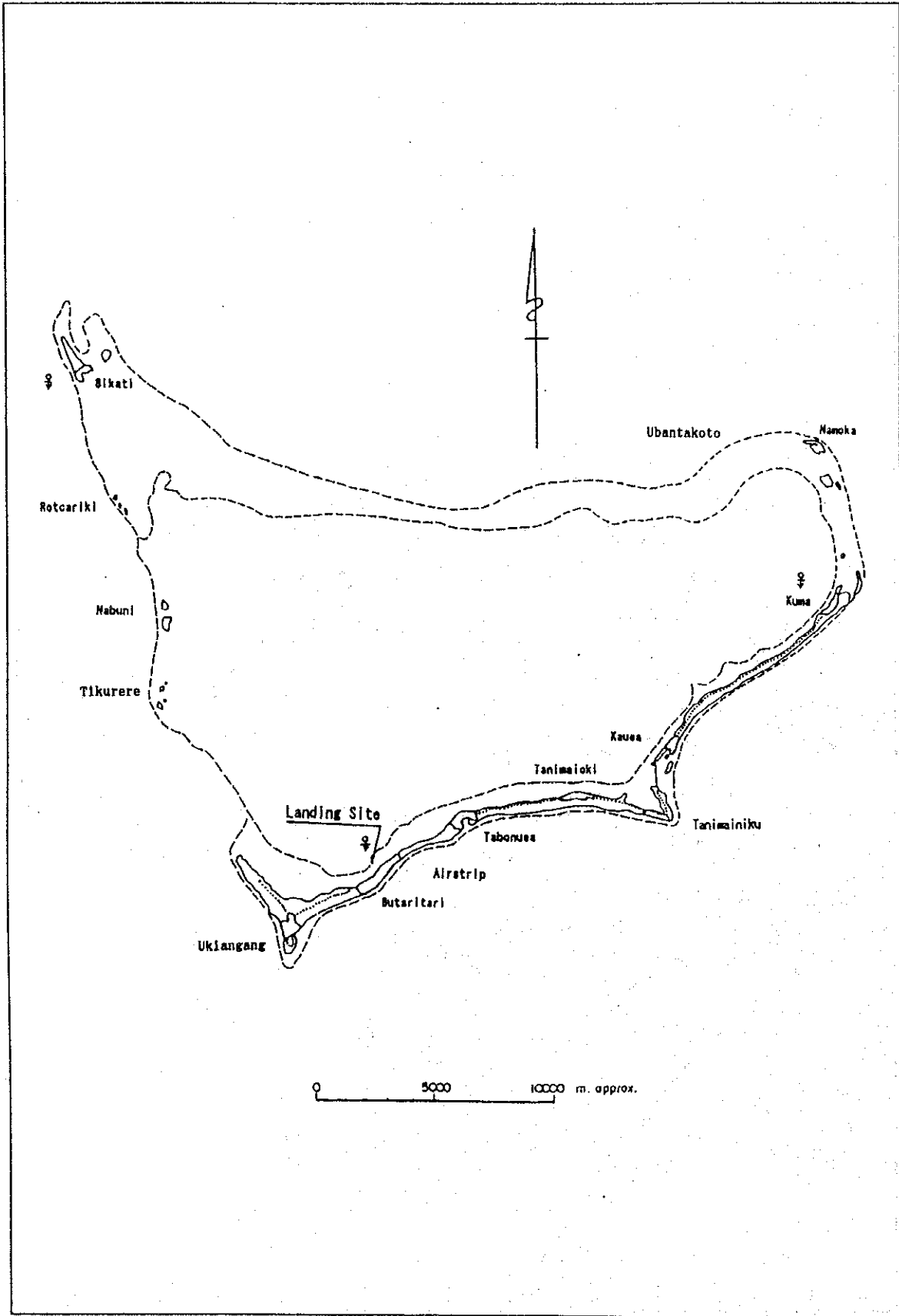
BETIO PORT



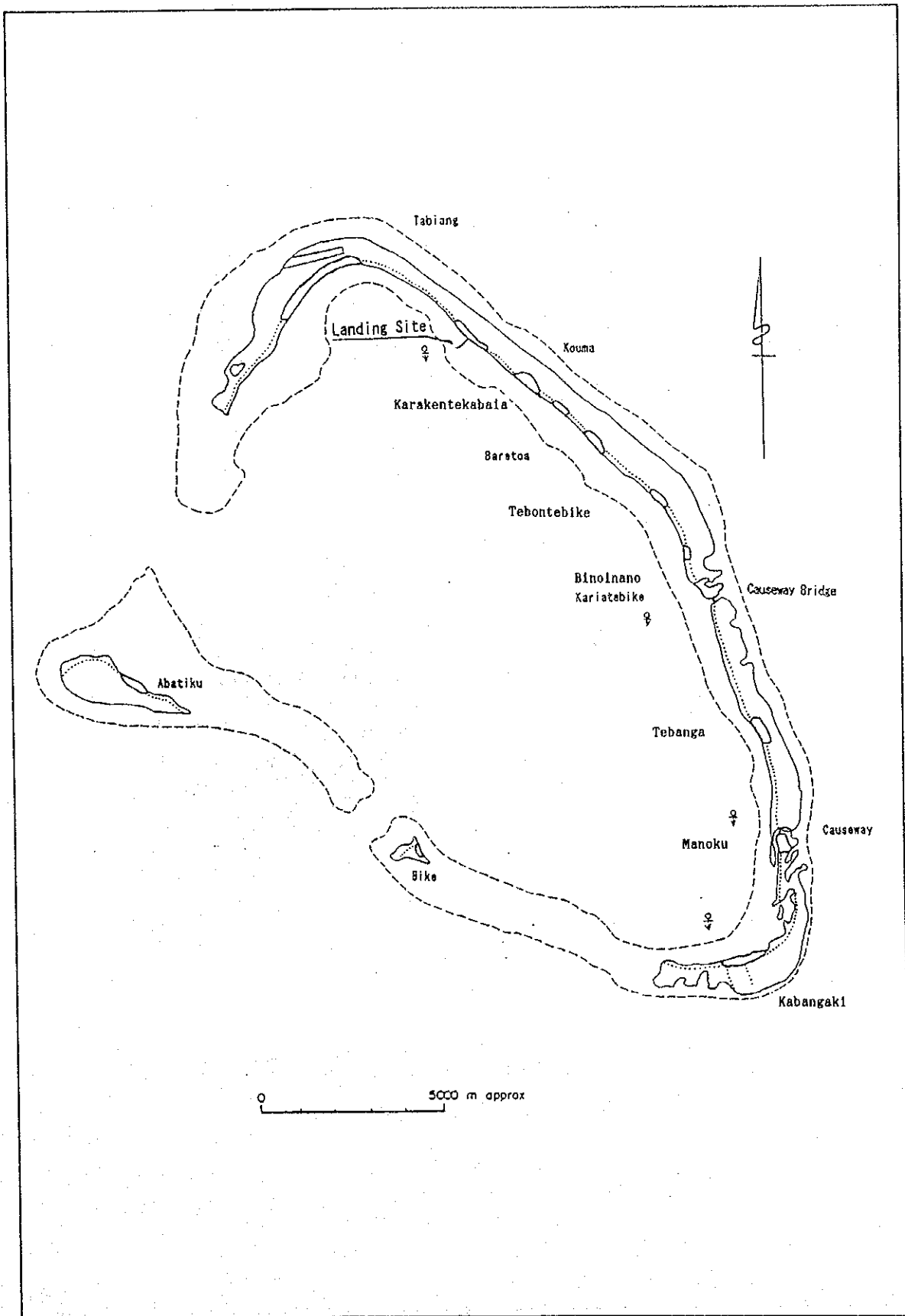
CHRISTMAS ISLAND



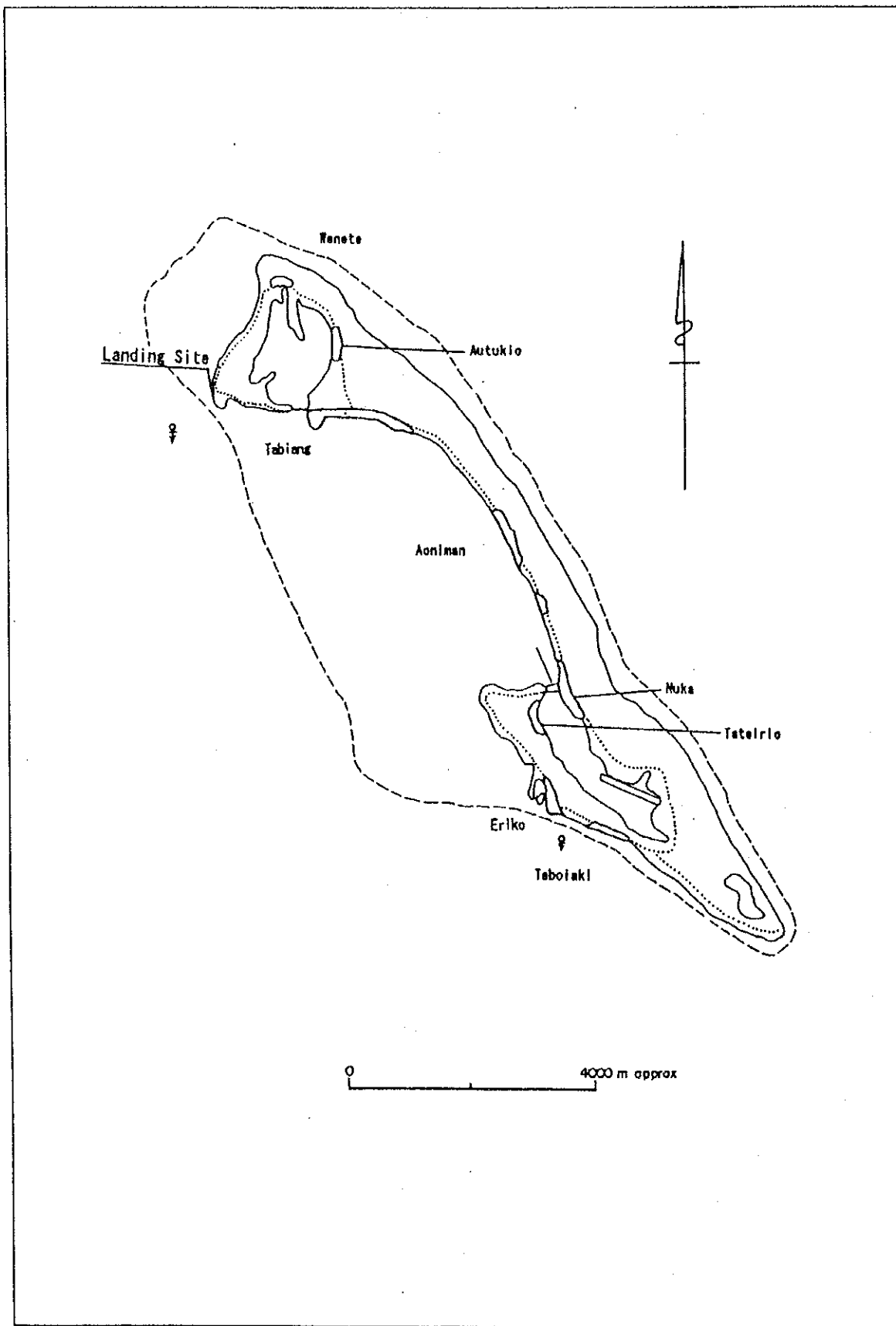
LONDON WHARF



BUTARITARI ISLAND



ABEMAMA ISLAND

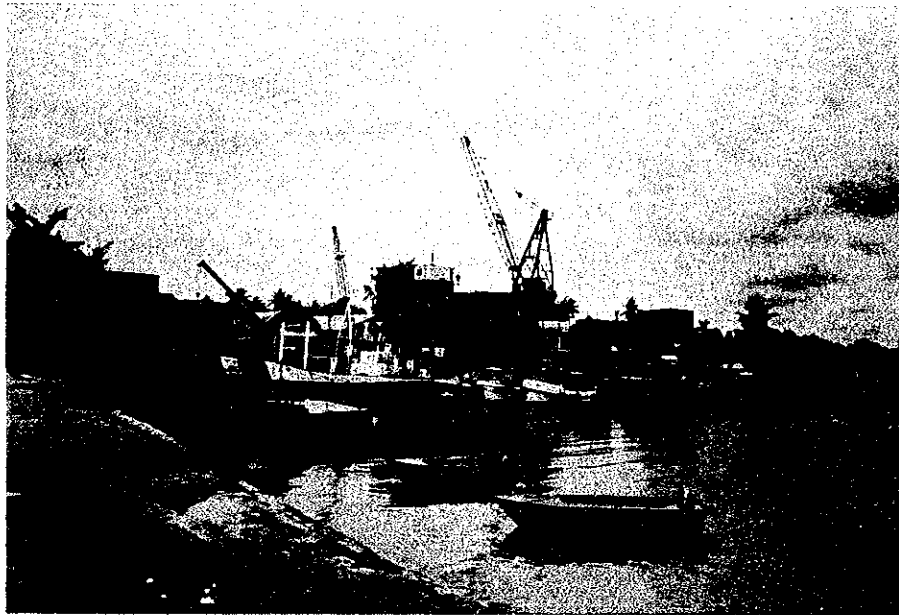


BERU ISLAND



BETIO PORT
TARAWA, KIRIBATI

Aerial View
at Spring
Low Tide



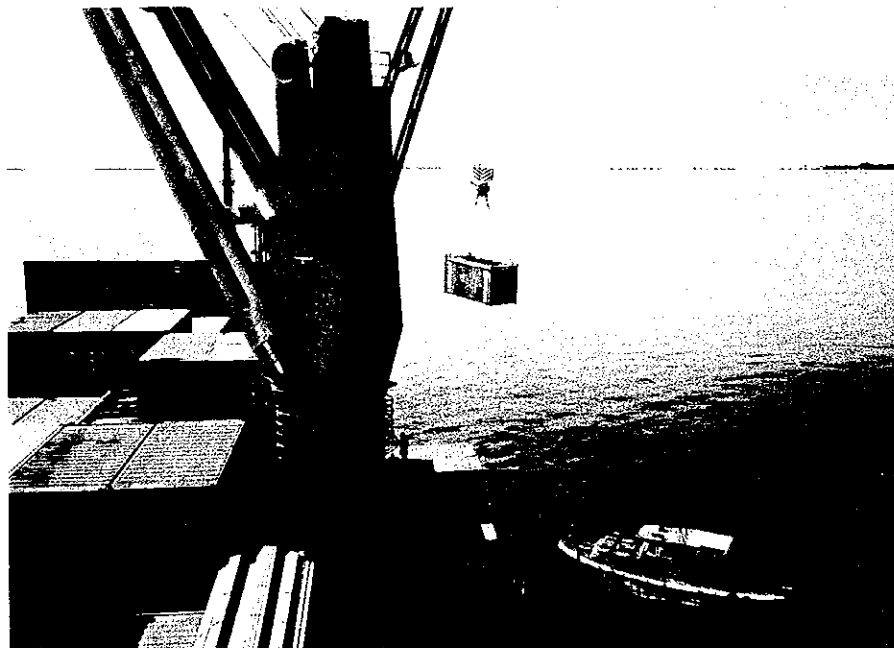
Container Yard
Fixed Crane,
Tug Boats,
Barges,
Landing Craft,
Pontoon Jetty
and Slipway



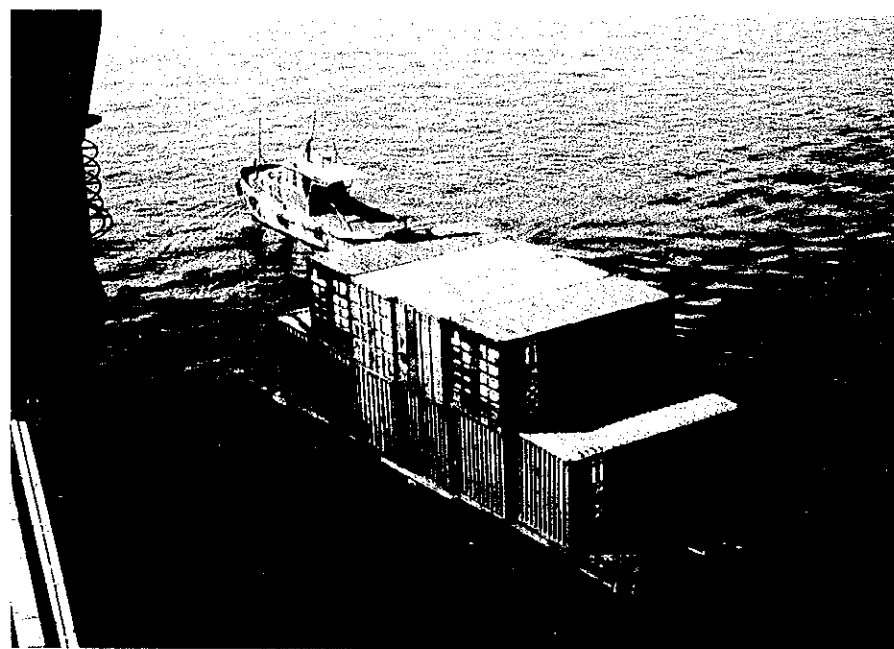
Fisheries Jetty
and
Fishing Boat



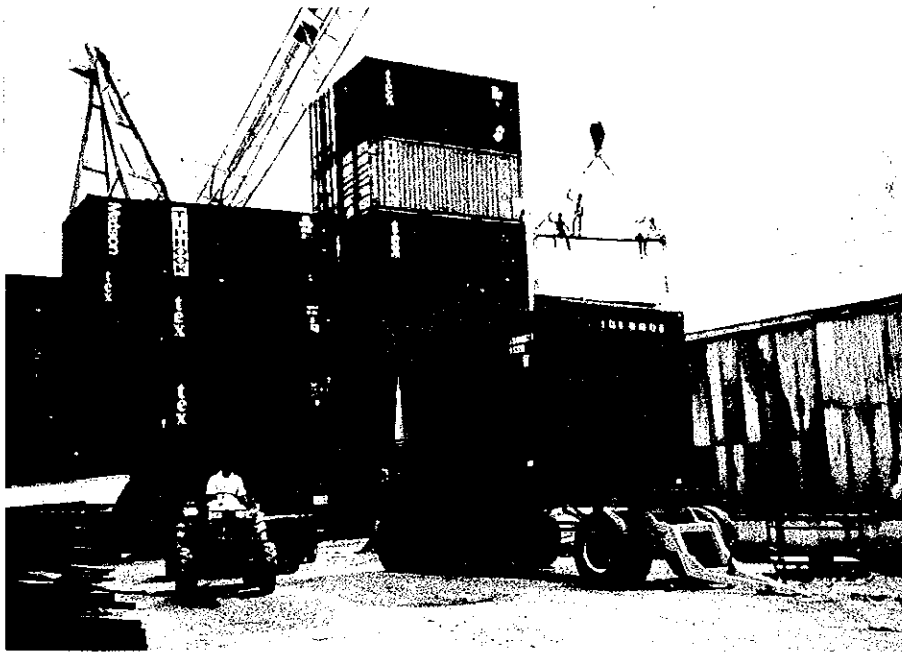
Typical Container
Carrier
Papuan Chief (CCS)
10,683 DWT



Loading
Empty Container
from Barge
to ship



Empty Containers
towed by
Tug Boat



Yard Equipment



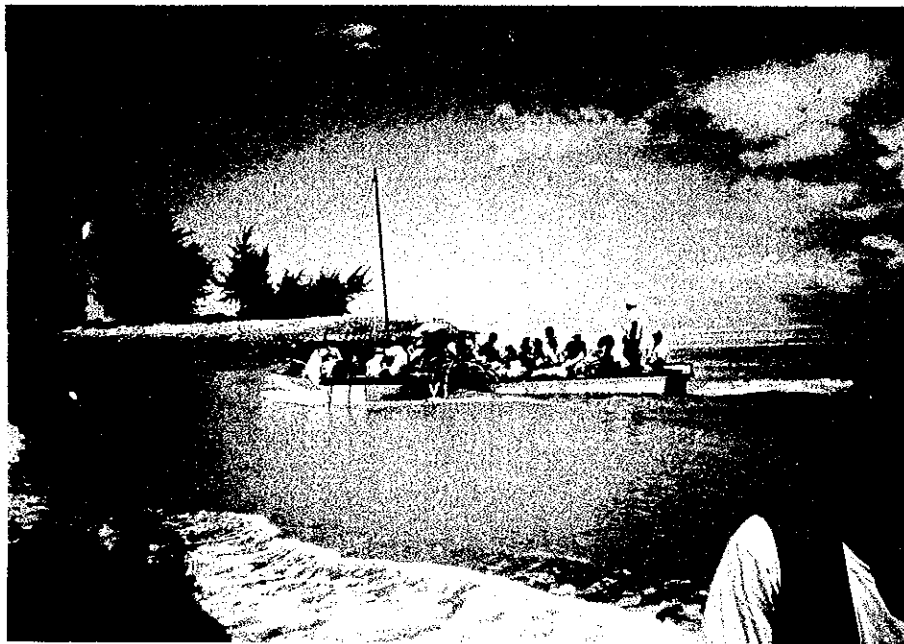
Unstuffing
Operation of
Bagged Food



Unloading
Operation of
Copra



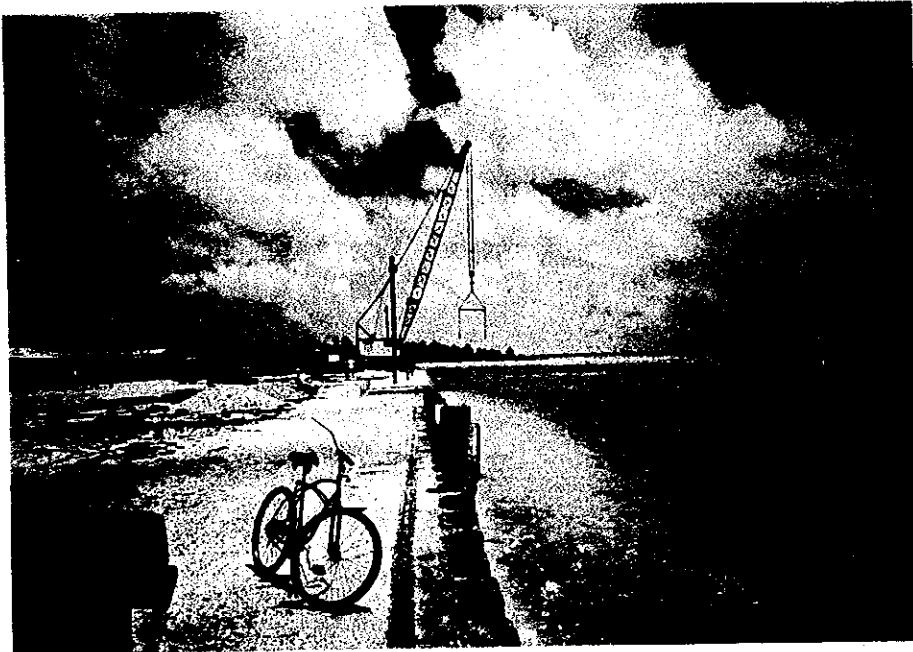
Disembarkation
of Passenger



Private Ship
Carring
Passengers



General Cargo
Shed

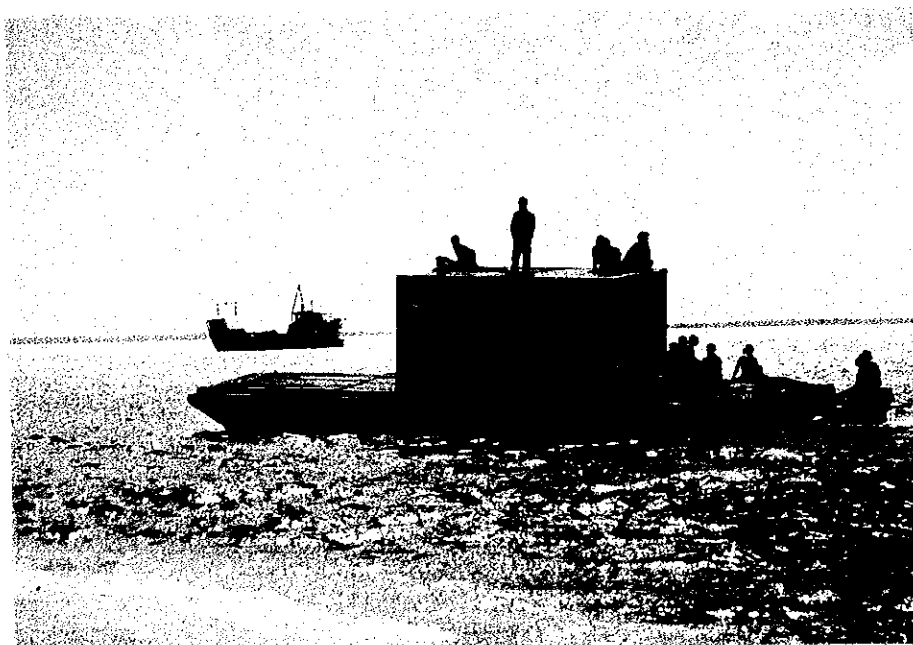


LONDON WHARF
CHRISTMAS ISLAND,

Steel Sheet Pile
Type Wharf and
Crawler Crane



Corroded Steel
Sheet Piles



Barge towed by
Two 40HP
Outboard Engines

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. Outline of Kiribati

The Republic of Kiribati consists of 33 islands scattering over 4,500 km east-west and 1,800 km north-south of wide expanse of the Central Pacific Ocean and has a present population of about 80,000. Tarawa atoll, where Betio Port is located, is isolated at a long distance of about 4,500 km from a major trade partner, Australia, about 4,300 km from New Zealand and 5,200 km from Japan. All most all the islands of the country consists of coral atoll with poor soil for agricultural activities and hence depends on import for most of foods and living necessities. Major export commodities are copra and fish however, trade balance has shown a heavy deficit since exhaustion of phosphate in 1979. Due to these peculiar geographical and social conditions, sea transport constitutes lifeline supporting its economic activities while, port facilities are indispensable infrastructure connecting sea and land transport for foreign and domestic cargoes. However, the major port of the country, Betio, the important port of Line Islands Group, London Wharf in Christmas Island and all the other outerisland ports suffer serious deterioration of port function due to long absence of improvement investment to port facilities.

2. Sea Transport Sector

The trade of Kiribati is largely imbalanced to excessive import and exports are limited to only two commodities of copra and fish. Major trade partners for import shows some diversification from Australia, New Zealand and EEC in early 1980s to inclusion of Japan, China and Fiji in recent years. Three shipping lines serve for foreign trade to Kiribati, namely Chief Container Line from Australia, Kiribati Shipping Service Limited from New Zealand and Fiji and Bali Hai Line from Japan. Frequency of the services is low due to small cargo volume and long distance to the country. An average number of ship's call at the port is 60 a year.

All the foreign cargoes are handled in Betio Port. In 1993, the port handled about 62,000 ton of foreign cargoes consisting of 50,000 ton of import and 12,000 ton of export as shown in Table 1. Following a world wide trend of containerization, most of import cargoes are handled in container with containerization rate of about 80 % in recent years.

Table 1 Export/Import Cargo Statistics (1983–1993), Betio Port

Year	Import						Export			G. TOTAL
	CONT'	TEU	B. BULK	TOTAL	B. FUEL	IM. TOTAL	COPRA	G. CARGO	EX. TOTAL	
1983	11,561.5	625	11,656.2	23,217.7	6,999.4	30,217.1	5,854.9	2,232.5	8,087.4	38,304.5
1984	13,485.7	687	8,924.7	22,410.4	6,572.8	28,983.2	10,189.0	1,522.4	11,741.4	40,724.6
1985	15,083.9	784	5,019.8	20,103.7	5,091.2	25,194.9	8,516.5	563.7	9,080.2	34,275.1
1986	14,511.4	733	17,562.0	32,073.4	5,295.2	37,368.6	3,490.2	682.3	4,172.5	41,541.1
1987	18,880.5	982	10,095.8	28,976.3	6,311.4	35,307.7	3,898.0	807.6	4,705.6	40,013.3
1988	18,845.4	932	8,299.1	26,784.5	7,125.9	33,910.4	8,778.0	764.8	9,542.8	43,453.2
1989	22,638.7	1,243	7,000.0	29,638.7	6,605.1	36,243.8	8,622.0	1,390.8	10,012.8	46,256.6
1990	29,044.6	1,547	7,417.1	36,461.7	7,569.2	44,030.9	3,664.0	1,283.7	4,947.7	48,978.6
1991	26,196.6	1,373	4,636.0	30,832.6	8,910.2	39,742.8	5,308.0	1,043.5	6,351.5	46,094.3
1992	25,380.9	1,294	6,949.4	32,330.3	9,463.8	41,794.1	9,907.0	823.1	10,730.1	52,524.2
1993	31,079.9	1,549	9,704.3	40,784.2	9,125.2	49,909.4	8,587.0	3,454.1	12,041.1	61,950.5

Most of domestic cargoes are carried by KSSL ships. In 1993, the volume of domestic cargoes carried by KSSL ships reached about 14,000 ton and number of passenger carried by KSSL ships recorded about 10,800 persons.

3. Present Conditions of Ports

Layout of Betio Port is shown in Figure 1 and as shown the port consists of major facilities of two breakwaters called as East and West Moles and the 2 m deep inner basin and 100 m long wharf. The port can not accommodate a large container carrier alongside the wharf and is currently a lighterage port. Cargoes are transferred from ship to shore or vice-versa by using a barge towed by tug, which is cumbersome, slow and costly with double handling.

The yard for container stacking and cargo storage is extremely small necessitating five to six high stacking. The fixed crane in the container yard plays a sole role to handle full containers.

The Fisheries Jetty is extended from the end of East Mole serving for fishing vessels, tankers, patrol boats and domestic cargo/passenger vessels.

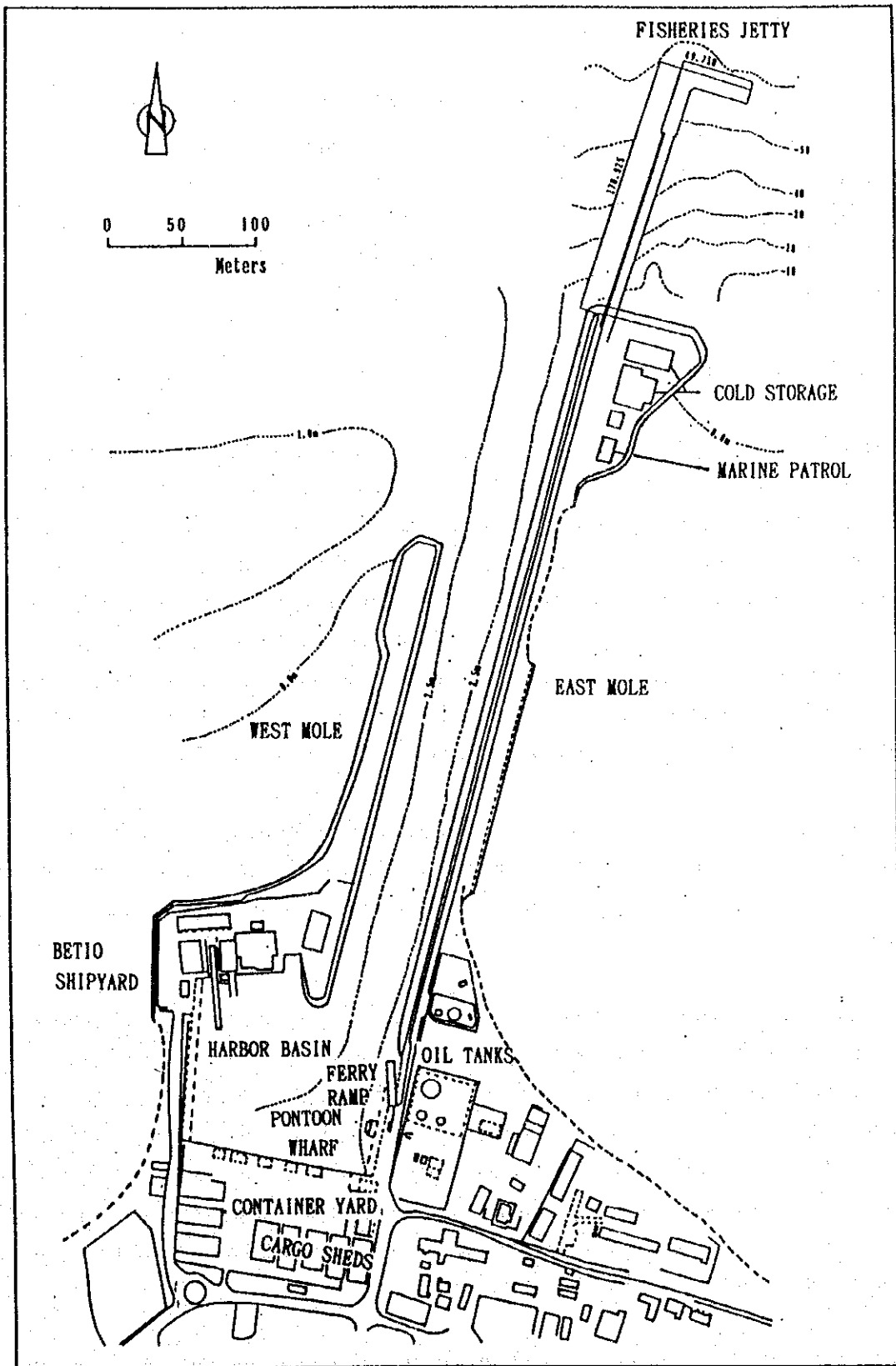


Figure 1 Layout of Existing Betio Port

- London Wharf in Christmas Island -

The wharf is of a steel sheet pile type 112 m long backed up with a wide yard. The wharf is shallowed with siltation in front from the original depth of 7.9 m to 0 to -5 m below chart datum line and does not allow direct berthing of ocean-going ship. The steel sheet piles have completely rusted out to the extent that immediate collapse is possible at any time. The number of ship's call remains constant at about 35 in recent years. Annual passenger traffic in Christmas is in order of about 400.

4. Problems and Constraints

Betio Port is a sole gate for foreign trade and a center of domestic sea transport. However, no significant improvement work has been done to the port since the development works of port facilities for small boats had been implemented about 30 years ago. In consequence, Betio Port confronts problems of inefficient and unsafe port operation due to deterioration of the facilities which are insufficient in capacity. Current situation of the deteriorated port is that the port could not maintain required port functions without urgent rehabilitation and improvement. Betio Port is not well provided for worldwide trend of containerization and is, among ports regularly called by container ships, now a sole port depending tug and barge instead of direct wharf handling in the Pacific region.

Container cargoes have increased in recent years in Betio Port to the extent that the cargo handling capacity has been saturated not allowing any further increase of cargo without considerably high increase of handling cost and time due mainly to insufficient area of container yard.

An insufficient area of the container yard is unquestionably a major constraint for efficient and safe port operation. An area for yard expansion is not available in the densely populated area close to the port. To handle increasing container cargoes in a small container yard, a high stacking within the reach of a fixed tower crane is an inevitable selection. However, it forces otherwise unnecessary repositioning operations of containers before reaching an intended container and blind operation of crane when a container behind a wall of highly stacked containers has to be worked. This situation of current Betio Port is not only inefficient but also unsafe.

Unavailability of a wharf deep enough to accommodate a container carrier necessitate a tug and barge operation. A tug and barge operation is another constraint which incurs otherwise unnecessary additional handling cost.

The above problems in the present port will be reflected in planning, development and improvement of Betio Port.

5. Port Management

The Betio Port is now being operated and managed by Kiribati Shipping Services Ltd. (KSSL) under the control of the Ministry of Transport, Communications and Tourism (MTCT). The Government intended to separate two functions possessed by the former organization, Shipping Corporation of Kiribati (SCK), and assign them to a new shipping company and a new port authority for efficient management and operation of Betio Port. However, only KSSL has been established and the company has taken almost SCK's business. The Government's intention still remains the same for efficient future port operation.

6. Conceptual Development Plan

- Planning Policy -

Given the isolation from major world markets and dispersal of land area of Kiribati, sea transportation is critical means for economic activities. Transport facilities are essential for international/domestic trades and social interaction of people. All the port facilities in Betio Port have become obsolescent and insufficient in capacity and have reached a point where the Betio Port could not fulfill its responsibility as a sole international sea gate without urgent and drastic improvement to the facilities. Betio Port is a nucleus of sea transport in the country, and to play its important role, both substantial improvement and urgent rehabilitation to the port facilities are required.

The target years of the conceptual development and improvement plans are set as 2005 and 2000 respectively.

Major improvement works include expansion of a container yard and minimization of barge operation. While the rehabilitation works include a repair to the existing corroded wharf, silted channel and basin, damaged east and west moles, deteriorated sheds, etc.

The world-wide trend in use of containers for almost all commodities is a phenomenon being witnessed in many ports both in developed and developing countries. A high productivity rate per ship is imperative to achieve a lower unit cost for the port and also a faster turnaround of the ship.

These objectives assume the following:

- i) Adequate equipment (including cranes, heavy forklift trucks, small forklifts for stuffing/unstuffing, etc.).
- ii) A spacious container storage yard for loaded and empty containers.
- iii) A skilled and knowledgeable work-force to plan, handle, and store TEUs in a proper and disciplined manner.
- iv) A system for the tracking, and slotting the containers with good selectivity to enable cargo-owners to get their cargo as quickly as possible.
- v) The active co-operation of cargo-owners and shipping agents.

- Demand Forecast -

The Seventh National Development Plan contains detailed description on past and future projected performance of the country's economy and has been thoroughly reviewed to be realistic and reasonable. The future economic framework has been set up following the projected economic growth rates given in the national development plan and future port cargoes to be handled in Betio Port is forecast as shown in Table 2.

As shown in the table, total volume of cargoes handled through Betio Port is forecast to rise from the present level of 60,000 t to 86,000 t in 2000 and 109,000 t in 2005.

The volume of export copra is forecast to increase from 7,050 ton in 1995 to 7,950 t in 2005. The export of seaweed is expected to increase to 2,000 t in 2000 according to the production plan of the company and 3,100 t in 2005. General cargoes including re-export, handicrafts etc., are forecast to rise from 750 t in 1993 to 980 t in 2000 and 1,200 t in 2005. Transship cargoes to Tuvalu via Kiribati will grow from 3,800 t in 1995 to 4,700 t in 2000 and 5,900 t in 2005 at 4.5 % per annum. All the transship cargoes are carried in container.

The import container cargoes are forecast to increase from the present level of about 35,000 t to about 47,000 t in 2000 and about 61,000 t in 2005. In terms of TEU, containers are expected to increase from 1,600 in 1993 to 2,500 in 2000 and 3,200 in 2005. Non-containerized cargoes is forecast to remain in order of 5,000 to 6,000 t throughout

Table 2 Export/Import Cargo Forecast, 1995-2005

(Freight Ton)

Year	Export						Import						Grand Total
	Copra	Fish	Seaweed	G. Cargo	Transship	Export Total	Container	G. Cargo	Bulk Fuel	Transship	Import Total		
1995	7,054	910	1,308	809	3,773	13,854	34,736	6,130	9,853	3,772	54,491	68,345	
1996	7,139	933	1,426	841	3,943	14,282	36,972	6,019	10,336	3,942	57,269	71,551	
1997	7,225	957	1,554	875	4,121	14,732	39,347	5,879	10,842	4,120	60,188	74,920	
1998	7,311	982	1,694	910	4,306	15,203	41,868	5,709	11,374	4,305	63,256	78,459	
1999	7,399	1,008	1,846	947	4,500	15,700	44,546	5,506	11,931	4,499	66,482	82,182	
2000	7,488	1,034	2,012	984	4,702	16,220	47,389	5,265	12,516	4,701	69,871	86,091	
2001	7,578	1,061	2,193	1,024	4,914	16,770	49,853	5,539	13,129	4,913	73,434	90,204	
2002	7,669	1,089	2,391	1,065	5,135	17,349	52,446	5,827	13,772	5,134	77,179	94,528	
2003	7,761	1,117	2,606	1,107	5,366	17,957	55,173	6,130	14,447	5,365	81,115	99,072	
2004	7,854	1,146	2,840	1,152	5,608	18,600	58,042	6,449	15,155	5,606	85,252	103,852	
2005	7,948	1,176	3,096	1,198	5,860	19,278	61,060	6,784	15,897	5,858	89,599	108,877	

the project period.

Fuel oil is imported in bulk from Fiji by tanker and unloaded at the Fisheries Jetty and is forecast to increase from the present level of about 10,000 t to 13,000 t in 2000 and 16,000 t in 2005.

Imported cargoes are distributed in the country either by road in South Tarawa or by sea to outer islands. Sea transport of cargoes to outer islands are done by three shipping networks, namely KSSL ships, private ship operators and informal sector.

– Passenger Transport –

Passengers are transported to a ship anchoring offshore by barge. Boarding on barge can be dangerous especially for children when sea is rough. In some cases, passengers have to wait on barge in a strong sunshine for a long time until the ship become ready for boarding. Further, an adequate facility for waiting is not available.

– Proposed Port Layout and Facilities –

Expansion of a container yard is a crucial factor in planning future development of Betio Port. However, land area necessary for future port development is not available on land near the existing Betio Port.

According to the land use plan authorized by the Ministry of Home Affairs, reef flat area east side to the Betio Port is defined as "Investigation Long Term Reef Reclamation Area".

Since a land area wide enough for developing future port is not available near the existing port, a reclamation work is necessary to create the land area required in the port development project.

Sites for future port development could be either east or west of the Moles or in between.

Following the result of consideration on site selection, three alternative plans can be proposed as shown in Figure 2. They are compared in various aspects of construction work, interference with the existing port, sea and land access, yard traffic, future land use plan, environmental aspect, etc.

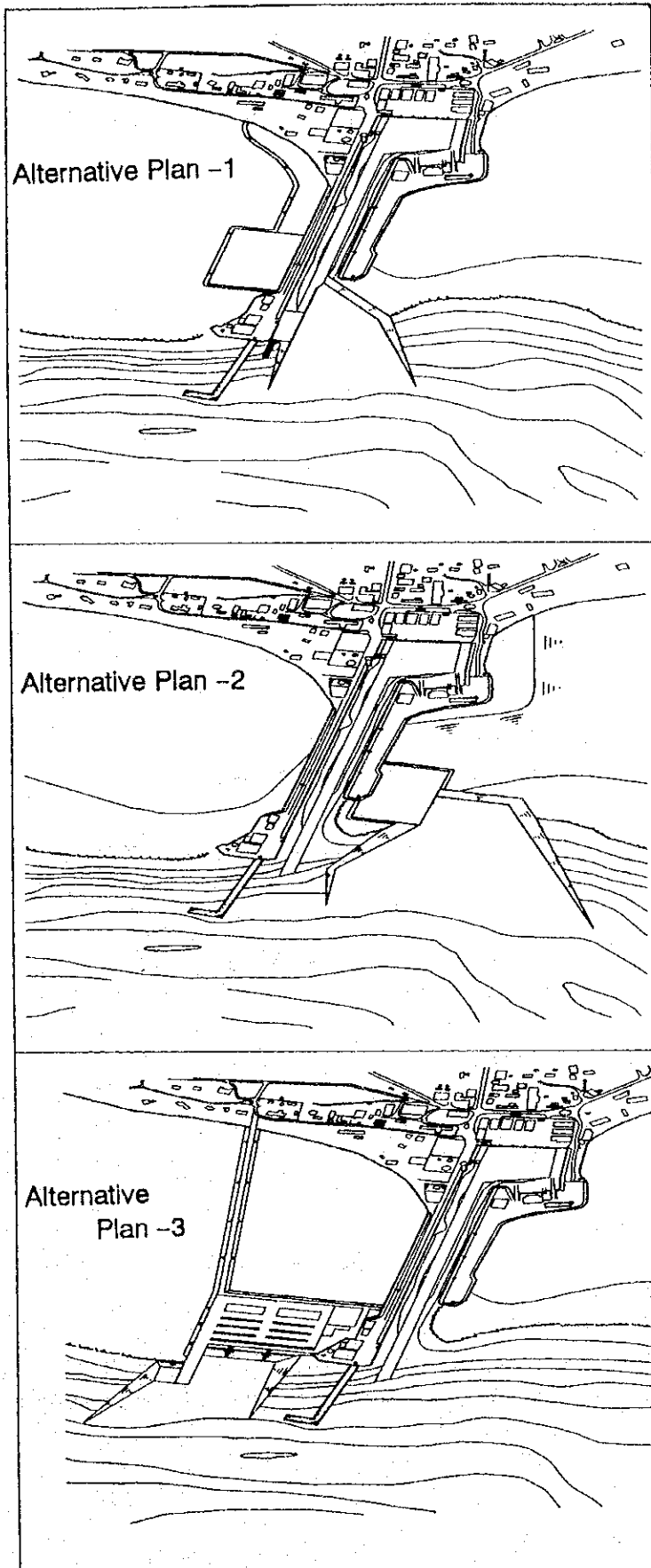


Figure 2 Alternative Conceptual Port Development Plans

Overall evaluation leads to selection of Alternative Plan 3, and the proposed layout plan is shown in Figure 3.

Major facilities are outlined below;

i) Wharf

Length 80m

Depth 6 m

ii) Container Yard

120m x 170m = 20,400 m²

561 TEU, 207 slots

iii) Sheds

20m x 55m = 1,100 m² (container cargo).

20m x 60m = 1,200 m² (copra).

iv) Cargo Handling Equipment

Cargo handling equipment required are listed in Table 3.

Table 3 List of Cargo Handling Equipment Required

Name	Capacity	Nos.
Mobile Crane	80 t	1
Forklift	25 t	2
Forklift	5 t	4
Tractor & Trailer	25 t	3

v) Passenger Terminal

Floor Area 650 m²

Rehabilitation works to the existing wharf is included in the project but an urgent repair works to the breakwaters and sheds are planned to be done by Kiribati Government.

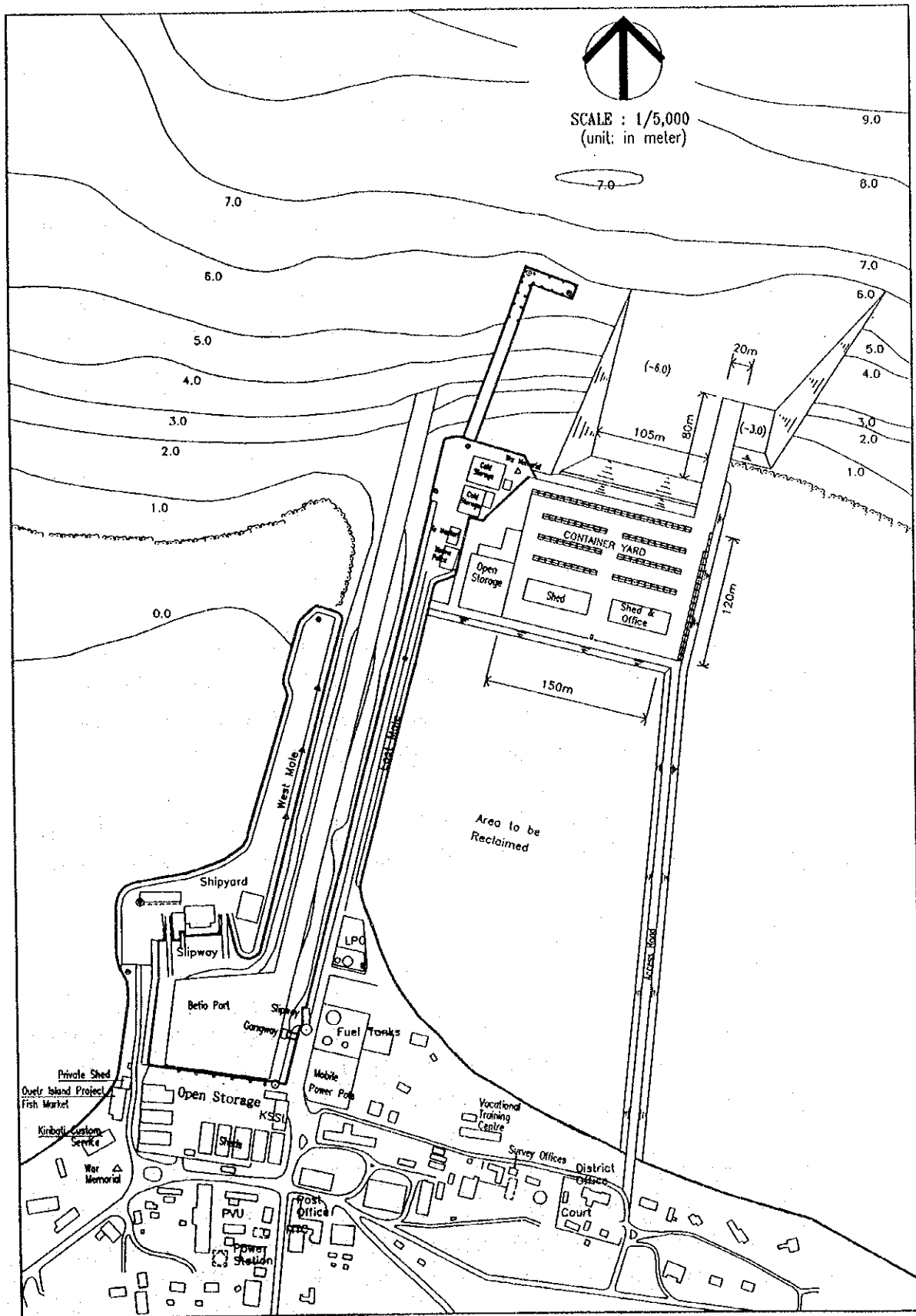


Figure 3 Proposed General Layout Plan
(Conceptual Development Plan)

- Construction Plan and Preliminary Cost Estimation -

Construction materials which are procurable in Kiribati are only sand and aggregates for concrete while almost labour can be locally recruited. In Kiribati construction works such as dredging, pile driving, etc. have been executed with the introduction of a foreign engineering. Heavy construction equipment such as a dredger, a floating pile driver, a floating crane and so on shall be mobilized from overseas. The other small construction equipment for a road construction, road rollers and motor graders, etc. are locally available.

The construction costs of conceptual plan for Betio Port are estimated as shown in Table 4.

- Development Plan of London Wharf -

In Seventh National Development Plan, great emphasis has been laid on development of outer islands. The resettlement plan to Line and Phoenix Islands will remove overpopulation in Gilbert Islands especially in Tarawa and and enhance balanced growth of economy in the country and Christmas Island will play important role in the plan.

The present facility is proposed to be rehabilitated to accommodate barges for transport of cargoes from a ship anchoring offshore. Proposed layout and project cost are shown in Table 5 and Figure 4.

- Maintenance Dredging Operation -

All the ports in Kiribati suffer from siltation, however, any measures to maintain channels and basins have not been taken for many years. It is understood that no maintenance was made due to unavailability of dredgers and shortage of maintenance budget.

Maintenance dredging is proposed in the conceptual plan for Betio Port. Work volume in Betio Port will not be much because sand deposition is expected to be small in a new basin. Therefore, an economical and minimum-size dredging system below is proposed to be rotated to many outer-island ports for maintenance dredging work.

* A crawler crane (25 t) with 0.6 m³ bucket mounted on a flat barge

Table 4 Summary of Construction Cost of
Conceptual Development Plan, Betio Port

Facility	Unit	Quantity	Construction Cost ('000 AU\$)		
			Total	Foreign Portion	Local Portion
1. Dredging	m ³	138,648	4,503	3,680	823
2. Aids to Navigation	LS	1	351	309	42
3. -6.0m Wharf	m	80	5,230	3,490	1,740
4. Rehabilitation of -3.0m Wharf	m	130	407	287	120
5. Slope Protection	m	775	2,921	1,450	1,471
6. Land/Road Area and Yard Pavement	m ²	33,600	8,708	3,504	5,204
7. Road Pavement	m	955	2,013	687	1,346
8. Shed	m ²	2,300	8,223	5,756	2,467
9. Passenger Terminal	m ²	650	687	480	207
Sub-total (1 to 9)			33,043	19,623	13,420
10. Cargo Handling Equipment	LS	1	3,776	3,776	0
11. Maintenance Dredging Equipment	LS	1	1,411	1,411	0
Sub-total (10 to 11)			5,187	5,187	0
12. Engineering Services	LS	1	3,088	2,007	1,081
13. Physical Contingency	LS	1	1,641	1,207	434
Grand Total			42,959	28,024	14,935

Table 5 Summary of Construction Cost of
Conceptual Development Plan, London Wharf

(Unit: '000 AU\$)

Facility	Unit	Quantity	Cost	Remarks
1. Dredging	m ³	16,100	700	-2.0m
2. Aids to Navigation	LS	1	300	4 light beacons
3. -2.0m Wharf	m	50	3,000	Steel pipe pile structure crown height +3.0m
4. Sea Wall	m	75	1,500	L-shaped concrete block structure
5. Container Yard Pavement	m ²	3,000	1,000	Concrete pavement, crown height +3.0m
6. Slipway	m	10	500	10m x 36m, slope 1 : 8
Sub-total (1 to 6)			7,000	
7. Cargo Handling Equipment	LS	1	4,600	A 80t Truck crane, a 200Hp tug boat, two 60 t barge, two 3t F/L, a 10t truck and a 5t truck with crane
8. Engineering Services	LS	1	700	
Sub-total (1 to 8)			12,300	
9. Physical Contingency	LS	1	2,000	
Grand Total			14,300	

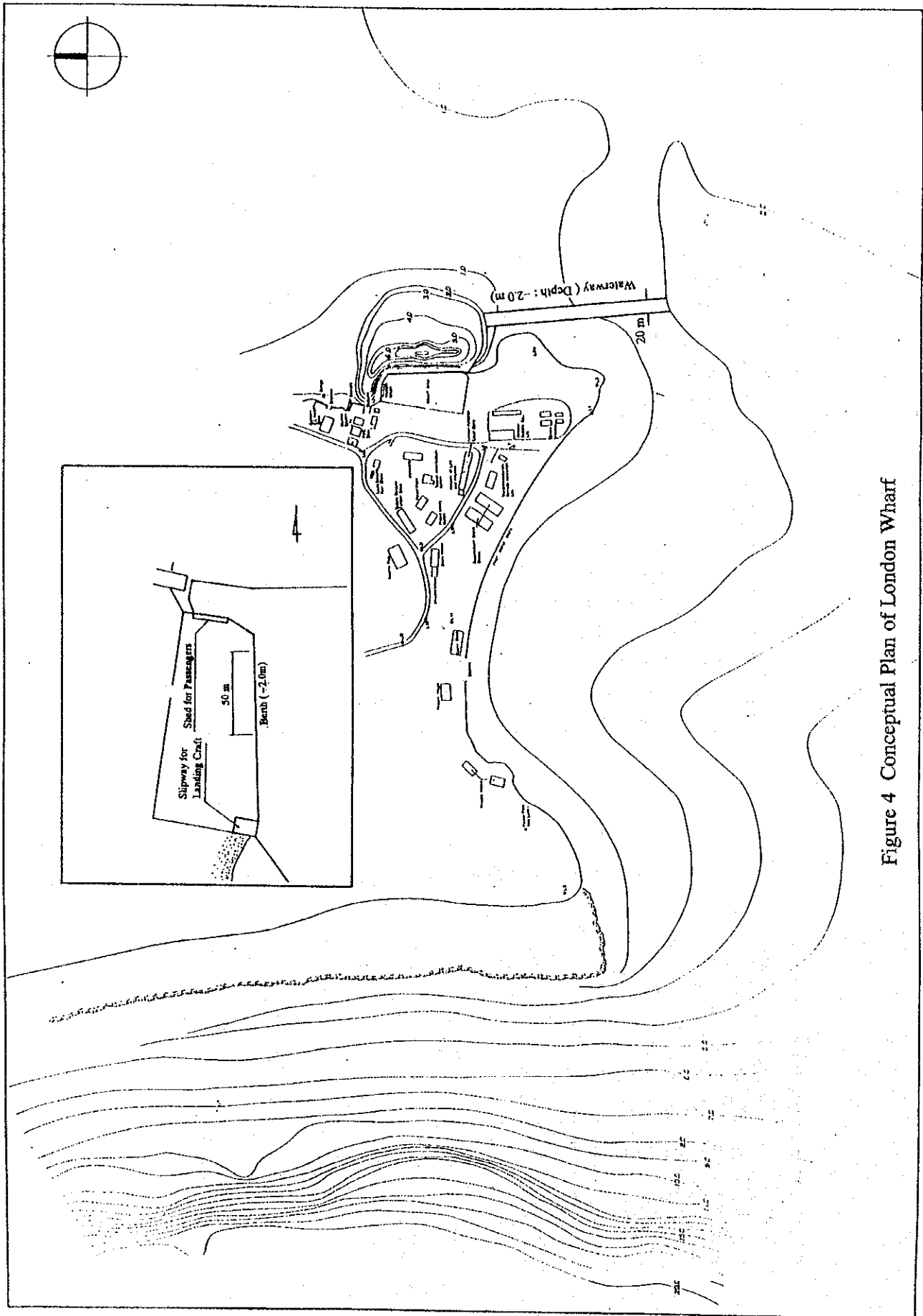


Figure 4 Conceptual Plan of London Wharf

7. Improvement Plan of Betio Port

- Planning Policies -

The target year of the improvement plan is set as the year 2000, five years before the target year of the conceptual plan. Volume of cargoes handled in the port is forecast about 20 % less than that in the conceptual plan. This small difference is to necessitate almost the same scale reinforcement of port capacity as that in the conceptual plan.

Project scope of the improvement plan is determined to meet a traffic demand forecast in the target year of 2000 in line with the conceptual development plan and project scale is determined to be economically feasible in terms of EIRR. The existing port facilities are planned to be efficiently used for copra export by barges, small vessels of private ship operators, informal sector and small fishing boats.

- Proposed Port Layout and Facilities -

Proposed layout of the container terminal is shown in Figure 5. As shown, the layout of civil structure is almost the same as those proposed in the conceptual development plan. Major differences in the plans are a smaller area of container yard, a cargo shed and an open storage and a smaller number of cargo handling equipment.

Required port facilities are outlined below;

i) New Wharf

The dimensions of a new wharf is the same as the conceptual plan. The new wharf is designed to be dredged -3 m at the back and can accommodate tug and barge and the other small ships.

ii) Container Yard

Total area of container yard is $100\text{m} \times 170\text{m} = 17,000 \text{ m}^2$ with stacking capacity of 436 TEU but is not paved for economical reason.

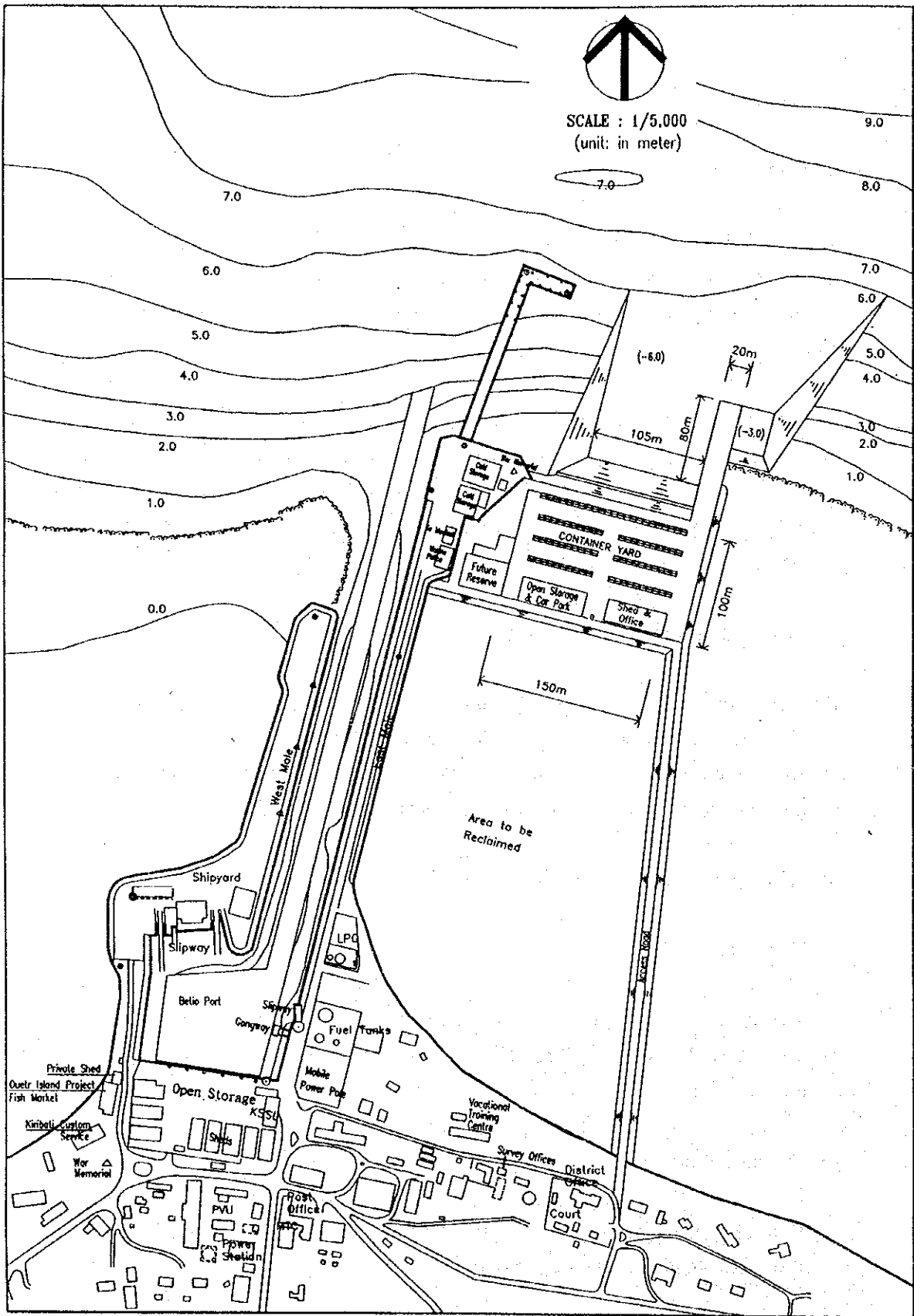


Figure 5 Proposed General Layout Plan
(Improvement Plan)

iii) Existing sheds

Floor area of three copra sheds is not enough and the shed No. 7 is planned to be converted to a copra shed to release overstacking and resulting inefficient handling. Export copra is planned to be stored in the existing sheds until the conceptual plan when the shed wide enough to store one export lot of copra is provided.

iv) Cargo Handling Equipment

Cargo handling equipment required are listed in Table 6.

Table 6 List of Cargo Handling Equipment Required

Required Equipment	Nos.
80 t Mobile Crane	1
Tractor/Trailer	(3)*
25 t Forklift	1
5 t Forklift	2

* denotes "existing and KSSL owned"

v) Passenger Terminal

A total floor area of the terminal is 560 m². Separation of passenger from cargo operation is essential for efficient and safe port operation and a fence shall be erected for segregation.

vi) Office for Kiribati Ports Authority

Staff organization at the stage of the improvement plan will be the same as that at the conceptual plan stage and requires an office with floor area of 350 m².

vii) Access Road

The new access road to the container terminal runs from the southeast corner of the container yard to the district court. Area of the shallow reef flat area in west to the access road is measured at 150m x 500m = 75,000 m². This area will provide an area for dumping rubbish collected in Tarawa and the surface will be covered with sand

taken from maintenance dredging operation. This spacious land area will release overpopulated Betio City from a serious shortage of land.

viii) Open Storage

The existing container yard is to provide an open storage to some extent and an area west of the new cargo shed supplements it.

ix) Rehabilitation Works to the Existing Wharf

To extend a life of the facility, the wharf is rehabilitated.

- East and West Mole, Cargo Sheds -

The urgent repair works to the damaged moles and sheds are necessary and are proposed to be done by the Government of Kiribati.

- Construction Plan and Cost Estimation -

The construction costs of improvement plan for Betio Port are estimated as shown in Table 7.

Table 7 Summary of Construction Cost

Facility	Unit	Quantity	Construction Cost ('000 AUS\$)		
			Total	Foreign Portion	Local Portion
1. Dredging	m ³	138,648	4,503	3,680	823
2. Aids to Navigation	LS	1	351	309	42
3. -6.0m Wharf	m	80	5,230	3,490	1,740
4. Rehabilitation of -3.0m Wharf	m	130	407	287	120
5. Slope Protection	m	775	2,921	1,450	1,471
6. Land/Road Area	m ²	29,000	1,718	1,204	514
7. Shed	m ²	800	2,341	1,639	702
8. Passenger Terminal	m ²	560	670	468	202
Sub-total (1 to 8)			18,141	12,527	5,614
9. Cargo Handling Equipment	LS	1	2,348	2,348	0
10. Maintenance Dredging Equipment	LS	1	1,411	1,411	0
Sub-total (9 to 10)			3,759	3,759	0
11. Engineering Services	LS	1	1,654	1,075	579
Sub-total (1 to 11)	LS	1	23,554	17,361	6,193
12. Physical Contingency	LS	1	1,641	1,207	434
Grand Total			25,195	18,568	6,627
13. Tax	LS	1	8	0	8
Grand Total excluding Tax			25,187	18,568	6,619

8. Management and Operation

- Present Organization -

The Betio Port is now being operated and managed by Kiribati Shipping Services Ltd. (KSSL) under the control of the Ministry of Transport, Communications and Tourism (MTCT). The Government intended to separate two functions of shipping company and port authority formerly possessed by Shipping Corporation of Kiribati (SCK) after its dissolution and to build two companies. However, KSSL has been only established and the company has taken almost SCK's business.

- New Port Organization -

In the Seventh National Development Plan, separation of SCK to KSSL and KPA is described as quoted below;

"To improve inter-island shipping services in the country, Shipping and Ports Divisions of the Shipping Corporation have been separated and two separate entities - Kiribati Shipping Services Ltd (KSSL) and Kiribati Ports Authority (KPA) have been established."

Obviously, Kiribati Ports Authority (KPA) to be established can not commence operations from a zero position, and some of the existing staff in the Port Section of KSSL, and the Marine Department should be taken over. For preliminary arrangement, the three key position of General Manager, Port Master and Operations Manager must quickly be filled as soon as the Act is brought into operations.

- Port Tariff -

The Consultants are of the view that the present Tariff list is not comprehensive nor descriptive enough, as there are several services which are being rendered and not charged. After the completion of the project, it is desirable for KPA to establish a new port tariff system reflecting the improvement of port services.

9. Environmental Examination

Initial Environmental Examination (IEE) has been conducted for various aspects and Environmental Impact Assessment (EIA) has been carried out on turbidity, sea level rise and heavy metal compound of Pb and Cu. With inspection of biota and suspended solids (SS) around the project site, the construction of a new port at the east side of the East Mole will not affect the environment due to rare biota and high value of SS around the site at present. Turbidity induced during dredging work is considered to be maximum value. Turbidity shall be observed on the three monitoring lines to measure SS concentration produced by the construction work. Such countermeasures as silt screens will be required to minimize dispersion of SS and appropriate chemical treatment shall be applied when necessary.

The height of the container yard is planed at D.L. + 4.00 m which keeps enough allowance from the estimated sea level in year 2100.

A bilge oil tank shall be installed to recover bilge oil from vessels.

A new port construction will not generate serious impacts to the environment if necessary countermeasures as stated above are taken.

10. Economic and Financial Analysis

The improvement plan is economically and financially evaluated with Internal Rate of Return (IRR) and financial statements.

- Economic Analysis -

The project costs and benefits are evaluated in monetary terms of shadow prices.

Costs of the project include capital investment, operation and maintenance costs while the major benefits are savings of ship operation costs and cargo handling costs. The other intangible benefits accrued by the project include improvement of safty and efficiency of navigation and passenger traffic, improvement of ship repair capacity of Betio Shipyard and improvement in environment with providing rubbish disposal area and increase in employment opportunities and incomes during the construction works of the project.

With implementation of the project, 90 % of the ships calling Betio Port will berth alongside a new wharf to load and unload cargoes there without assistance of tugs and barges. The benefit derived from the savings of ship's port time belongs to the shipping companies. However, it is now standard practice to include some of the benefits accruing to foreign carrier on the assumption that in the long run the benefit will filter through to the national economy, for example, through lower freight rates. Thus, in this study, it is assumed that 50% of the benefits belong to foreign ships will return to Kiribati as well as 100% of benefits for Kiribati ships accrue to Kiribati's economy giving about 70% of the total benefits brought to Kiribati.

The present container yard is extremely insufficient causing inefficient and unsafe yard operation. With implementation of the project, enough stacking slots will be provided in the yard with various container cargo handling equipment of a mobile crane, forklifts and tractors with chassis. The project will save costs of cargo handling through improved handling productivity.

The EIRR of the Implementation Plan for Betio Port is calculated as 2.74% based upon the tangible benefits in monetary terms except other intangible benefits. In the case that costs of the passenger terminal are excluded the figures rise to 3.21%. Calculation results of the EIRR are shown in Table 8. A sensitivity analysis in the table shows very limited difference of EIRR of about 1% due to change of costs or benefits.

Table 8 Results of Economic Analysis, EIRR

Case	Sensitivity analysis	EIRR(%)
		Shadow Price
Base		2.74
without Passenger Terminal		3.21
A	Construction Cost -10%	3.40
B	-ditto- +10%	2.18
C	Benefits -10%	1.91
D	-ditto- +10%	3.53
E	-ditto- +100%	9.50

Betio Port has long been left without any significant investment for improvement and maintenance since 1940s due to budgetary reason. At present, the port has reached to saturation in cargo handling capacity and safety of port operation is endangered. Obsolescent port facilities in Betio Port could lead to considerable loss of port function giving serious affect to the country's economy without urgent improvement of the project.

The project will bring uncountable associated benefits mentioned above. For this project, even though the economic calculation only takes into account the items which are easily quantified, the EIRR exceeds 2.5 %.

Therefore, this Improvement Plan is evaluated feasible from the viewpoint of the national economy.

- Financial Analysis -

The financial analysis is to appraise the financial feasibility of the project by the financial internal rate of return (FIRR) base on a cost-benefit analysis and to study the financial soundness of KPA management by financial statements consisted of Income and Expenditure, Source and Application of Funds and Balance Sheet.

After the completion of the project, 90 % of ships calling at the Port will be able to berth at wharf directly and receive improved services of shipping, cargo handling and storage. As results of the present study, it is difficult to execute the project without revise of the present Tariff in order to cover costs and profits. It is desirable for KPA to establish a new port tariff system reflecting the improvement of port services. For the present study, a revised tariff is used for the calculation of incomes in and after 1997.

For cost-benefit analysis, costs of the project include capital investment, operation and maintenance costs while the benefits are increase in incomes and decrease in operating costs achieved in the cases of "With and Without" the project.

The FIRR is calculated at 1.67 %, indicating that the improvement plan is feasible as it attains the same level of 1 % as the interest rate of foreign loan.

The financial soundness of Kiribati Ports Authority to be established is studied with estimated Financial Statements (Income and Expenditure, Source and Application of Funds and Balance Sheet) prepared for the period from the year 1995 to the year 2000.

Based on the calculation of income and expenditure, consideration of long term loan conditions and changes in fixed assets, the improvement plan is evaluated to be financially feasible.

11. Conclusion and Recommendation

The Republic of Kiribati scattering over wide expanse of the Central Pacific Ocean largely depends on sea transport for its economic activities. The existing port facilities hamper sound growth of country's economy and in turn growth of port cargoes. The improvement plan is recommended to be urgently implemented as proposed in this study to improve the present operation toward eventual promotion of the country's economy. The current constraints in port operation will be removed by the improvement plan as outlined below;

i) Container Yard

Area of the existing container yard is too small and yard operation is extremely inefficient and unsafe. Provision of a new wide area will allow introduction and smooth traffic of heavy cargo handling equipment and significantly improve handling productivity.

ii) Wharf

The wharf is 2 – 3 m deep and the approach channel and basin are too small to accommodate a large container carrier which necessitates a cumbersome and costly double handling by tug and barge. A 6 m deep wharf with wide approach channel and basin is planned to release the port from a container handling by barge for most of foreign and all the domestic cargoes.

iii) Cargo Shed

The existing copra sheds are insufficient in floor area resulting in inefficient operation. Provision of a new general cargo shed will allow floor area of the existing general cargo shed to be used for copra storage and improve productivity of copra handling.

iv) Navigation Aids

The existing navigation aids are not provided with adequate lantern and radar reflector. For safe and efficient navigation of ship, all the existing navigation aids will be equipped with lanterns and radar reflectors to allow night navigation.

v) Passenger Terminal

Domestic passengers are forced to bear inconvenience of no waiting room and transfer between wharf and ship by barge. Inconvenient and unsafe conditions of present passenger traffic will be removed with provision of a new passenger terminal and wharf.

vi) Maintenance Dredging Equipment

An adequate maintenance dredging operation has not been done for many years ruining port function in not only Betio Port but also ports in outerislands. A clam shell type dredging equipment mounted on barge will sweep out this problem.

vii) Port Authority

The organization for port administration is non-existent at present and Betio Port is not properly administered nor operated. A new Kiribati Ports Authority is proposed by amalgamating Marine Department of MTCT and Port Section of KSSL with some reinforcement. An adequate port management and operation is indispensable for efficient use of the port facilities proposed in the improvement plan.

viii) Environment

An adequate area for dumping rubbish generating from Betio City is not provided and environmental preservation becomes increasing concern recently. A wide area between a new access and the existing East Mole is to provide an area for rubbish dumping and contribute to preservation of city environment.

- Recommendation -

- i) The improvement plan as proposed in the study is recommended to be urgently implemented for efficient and safe port operation. During the construction work, the proposed monitoring system for possible environmental impact is recommended to be established.

- ii) For efficient and smooth management and operation of Betio Port, the proposed Kiribati Ports Authority is recommended to be established in the earliest possible opportunity. All the proposed port facilities and equipment shall be under appropriate control and management of a new Ports Authority in order to operate and maintain them efficiently and effectively.

An appropriate training programme of administration staff shall be worked out including recruitment of foreign experts.

- iii) The present port tariff shall be reviewed and revised toward sound financial state of a new Ports Authority.
- iv) A shallow reef flat area west of a new access road is planned to be used for rubbish dumping. The procedure and management to eventually create a land area shall be carefully examined by concerned authorities.
- v) A maintenance dredging plan shall be worked out for Betio Port and all the other local ports through consideration of dredging schedule based on siltation rate, dredging volume, etc. for efficient domestic sea transport.

Training programme for planning staff and crew shall be carefully planned for maximizing utilization of the dredging equipment.

CHAPTER 1
OUTLINE OF THE REPUBLIC OF KIRIBATI

1. OUTLINE OF THE REPUBLIC OF KIRIBATI

1.1 General

The Republic of Kiribati consists of 33 Islands in three archipelagic groups: the Gilbert, Phoenix and Line Islands, which are scattered over five million square kilometers of the Central Pacific Ocean at the point where the International Date Line cuts the Equator. The nation's Exclusive Economic Zone (EEZ) covers more than three million square kilometers of water. The land area of all of the islands however, is a mere 810 square kilometers.

The population of Kiribati is about 72,000 and is increasing at 2.3 per cent per year. Almost 40 per cent of the population is below 15 years of age while average life expectancy is only 53 years. Some 93 per cent of the people are located in the Gilbert Islands and the main population concentration (40 per cent) is on the Island of Tarawa, which is the seat of Government and focus of economic activity. The remaining seven per cent of the population live in the Line and Phoenix Islands.

Most islands in Kiribati comprise atolls and the environment is physically and economically restricted. Low rainfall severely limits agricultural potential, except in the northern Line Islands. The predominantly rural society depends mainly on subsistence agriculture and fishing. The phosphate resources at Banaba, which previously accounted for over 80 per cent of export earnings, were depleted in 1979. Principal sources of cash income and exports are copra, fish and handicrafts which totaled about A\$4 million in 1990. In 1990, Kiribati had an annual trade deficit of about A\$31 million which was offset by remittances from overseas. Kiribati is vulnerable to fluctuating world prices in copra and apart from efforts to develop the rich fish resources in the three million square kilometers of EEZ, development plan strategies focus on self reliance.

1.2 Geography and Climate

1.2.1 Geographical Conditions

The Gilbert Islands comprise 16 islands situated between latitude 3° 20' north and 2° 42' south and longitude 172° 41' and 176° 55' east. The Phoenix Islands totals 8 islands situated approximately halfway between the Gilbert and Line Islands and is situated between 2° and 5° degrees south and 170° and 175° west. The Line Islands form an open chain of 8 islands stretching from 4° 43' north (Washington) to 11° 25' south (Flint) and 160° 25' west (Washington) to

150° 14' west (Caroline). These Island groups are very widely dispersed with Banaba Island in the west, some 3,870 km from Christmas Island in the east. The distance between Flint Island in the south and Washington Island in the north is over 2,000 km.

Apart from Banaba which rises to a height of 87 metres, all other "islands" are either coral atolls, comprising a number of "islets", a reef and a lagoon, or single coral islands with a reef close to shore. Tarawa is a typical atoll formed by a narrow strip of reef surrounding a central lagoon of varying depth with islands created by the erosion and subsequent deposition of fragments of coral reef and algae on the coral reef platform.

The total land area of Kiribati, as measured by the Geography Division of the United States Bureau of Census, is 810.54 square kilometers of which Christmas Island with a land area of 388.39 square kilometers makes up about half. The total land area of the Gilbert Islands (including Banaba) is 285.52 square kilometers, the Line and Phoenix Islands together comprising 525.02 square kilometers.

With the exception of Banaba, islands in Kiribati rarely rise more than three metres above mean sea level. As all islands are coral islands, soils are mainly shallow and alkaline, lack significant nutrients and minerals and have little water retaining ability.

1.2.2 Climatical Conditions

The climate is tropical oceanic with little temperature variation between day and night and throughout the year. Humidity is high, the monthly and long term mean for relative humidity for Tarawa being always above 70%. Wind speeds are moderate and only some years wind speeds exceed 15 knots for a limited number of days. From April to September the easterly trade winds predominate, while westerly winds are encountered during the period of October to March. The islands are particularly prone to strong winds during December and January. Temperatures fluctuate between maximum and minimum means of 25°C to 31° C with less than a 13° C difference between extreme maximum and minimum temperatures during the year.

1.3 Socioeconomic Situations

The economy of Kiribati has been stagnant showing very slow growth due mainly to a) lack of enterprises and other skilled manpower, b) lack of capital, c) geographical condition of remote and scattered islands, d) fragmented population and e) infertile atoll soil.

The government of Kiribati expects some promising features of economic growth in the areas like fisheries, small industries and tourism.

In the Seventh National Development Plan, the objectives of the plan are set up as follows;

- i) Achieve a higher real economic growth of 5 % per annum;
- ii) Increasing diversification of the economy in production leading to greater self-reliance and generation of cash employment;
- iii) Maintain greater economic and financial stability.

1.3.1 Population

The de facto population of Kiribati increased to 72,335 in the 1990 Population Census with an annual growth rate of 2.3 % over the period from May 1985 to November 1990. Distribution of population by island is shown in Table 1-3-1(1) and Figure 1-3-1. As shown, the population of Kiribati showed very slow increase of about 0.4 % of annual growth rate during the period from 1931 to 1947, and thereafter increased at almost the same annual rate of 1.9 % up to 1990. This increase has been, as shown in the figure, absorbed mainly in South Tarawa.

Remarkable features of distribution of population in the latest census of 1990 are;

- 1) 93.3 % of total population concentrate in Gilbert Islands which occupy 33.7 % of the total land area of Kiribati while only 6.7 % in Line and Phoenix Islands groups.
- 2) and 50.8 % of the population in Gilbert Islands live in two islands of Tarawa and Abaiang which land area account for only 17% as shown in Table 1-3-1(2).
- 3) these two islands absorbed 84.0 % of population increase in the Gilbert Islands group since 1985. Urban population density of South Tarawa reached to 1610 persons/km², which is about five times that of Japan.
- 4) Northern Line Islands group shows remarkable population increase of 11.5 % due to government resettlement plan absorbing 25.7 % of total country's increase since 1985.

1.3.2 Gross Domestic Product

The country has small manufacturing industry and highly dependent on copra and fish export for foreign currency earning. Remoteness to world economy centers weakens competitiveness of the country's products and limits scale and growth of industrial promotion. After cessation of major export resource of phosphate mining, Kiribati became independent in 1979. And the country experienced a sharp fall of economic activities in 1980; GDP declined from A\$ 38 million to A\$ 25 million and export earnings by as much as 80 % as shown in Table 1-3-2 and Figure 1-3-2.

Table 1-3-1(1) Census Population by Island, 1931-1990

Growth Rate % 85-90	1931	1947	1963	1968	1973	1978	1985	1990	Increase		
	Apr.	June	Apr.	Dec.	Dec.	Dec.	May	Nov.	%	85-90	%
Banaba	2,607	2,060	2,706	2,192	2,314	2,201	46	284	0.4	238	2.8
39.20											
Makin	724	969	1,292	1,387	1,445	1,419	1,777	1,762	2.4	-15	-0.2
-0.20											
Butaritari	1,673	1,824	2,611	2,714	2,971	3,149	3,622	3,774	5.2	152	1.8
0.80											
Marakei	1,649	1,803	2,213	2,180	2,212	2,335	2,693	2,863	4.0	170	2.0
1.10											
Abaiang	2,592	2,823	3,370	3,271	3,296	3,447	4,386	5,233	7.2	847	10.0
3.30											
N.Tarawa)		1,911	1,813	2,026	2,268	2,227	3,205	3,648	5.0	443	5.2
2.40											
S.Tarawa)	3,013	1,671	6,101	10,616	14,861	17,921	21,393	25,380	35.1	3,987	47.1
3.20											
Maiana	1,406	1,425	1,688	1,710	1,413	1,688	2,141	2,180	3.0	39	0.5
0.30											
Abemama	893	1,174	2,060	2,126	2,300	2,411	2,966	3,218	4.4	252	3.0
1.50											
Kuria	223	315	729	958	821	803	1,052	990	1.4	-62	-0.7
-1.10											
Aranuka	293	366	533	738	781	850	984	1,002	1.4	18	0.2
0.30											
Nonouti	2,255	2,004	2,229	2,408	2,223	2,284	2,930	2,814	3.9	-116	-1.4
-0.70											
N.Tabiteuea)		2,909	3,022	3,303	2,850	2,975	3,171	3,201	4.4	30	0.4
0.20											
S.Tabiteuea)	3,702	880	1,060	1,116	1,092	1,182	1,322	1,331	1.8	9	0.1
0.10											
Beru	2,241	2,231	2,337	2,412	2,318	2,212	2,702	2,909	4.0	207	2.4
1.40											
Nikunau	1,674	1,592	1,908	2,029	1,845	1,829	2,061	1,994	2.8	-67	-0.8
0.60											
Onotoa	1,639	1,491	1,993	1,960	1,997	2,034	1,927	2,100	2.9	173	2.0
-1.60											
Tamana	989	883	1,254	1,422	1,392	1,349	1,378	1,385	1.9	7	0.1
0.10											
Arorae	1,451	1,558	1,760	1,830	1,626	1,527	1,470	1,440	2.0	-30	-0.4
-0.40											
Total Gilberts	29,023	29,884	40,679	46,398	50,025	53,843	61,226	67,508	93.3	6,282	74.3
1.80											
Washington		158	373	437	458	416	451	936	1.3	485	5.7
14.20											
Fanning	467	259	521	376	340	434	445	1,309	1.8	864	10.2
21.70											
Christmas	38	52	477	367	674	1,265	1,737	2,537	3.5	800	9.5
7.10											
Canton	31	984	1,018				24	45	0.1	21	0.2
12.10											
Total Line	536	1,453	2,389	1,180	1,472	2,115	2,657	4,827	6.7	2,170	25.7
11.50											
& Phoenix Other nes	192	176	268	157	429	255					
Total Kiribati	29,751	31,513	43,336	47,735	51,926	56,213	63,883	72,335	100.0	8,452	100.0
2.30											

Notes: (1) Other nes. include mainly those on ships on census night
-in 1985 and 1990 people on ships were incorporated with the
population of the island which the ships were anchored at during the Census
(2) In 1985 Census, many people on Banaba refused to fill in the Census questionnaire

Source: Population Census Reports (1921-1990)

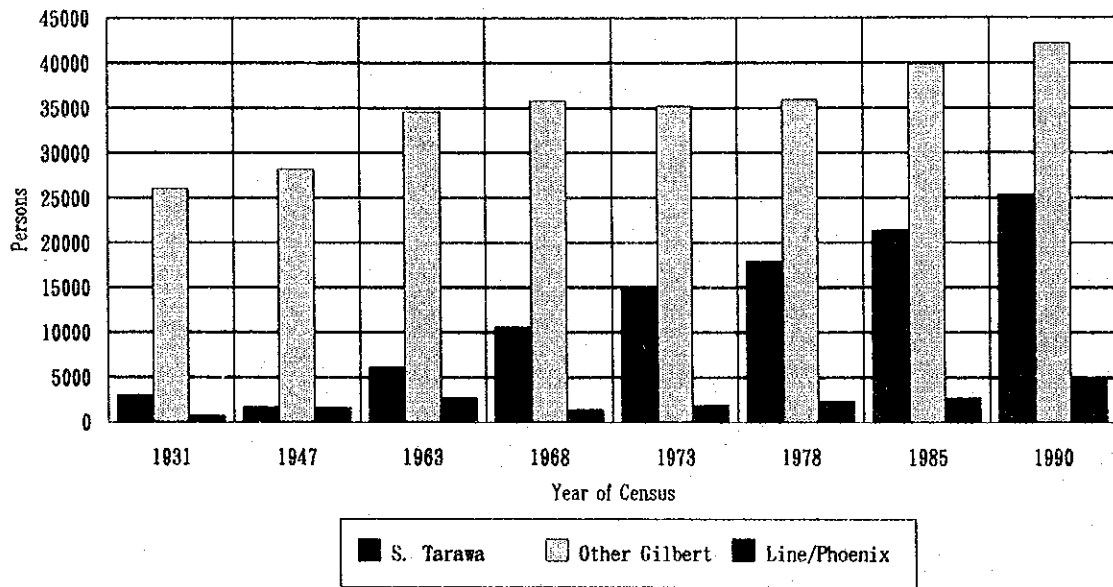


Figure 1-3-1 Census Population by Island, 1931-1990

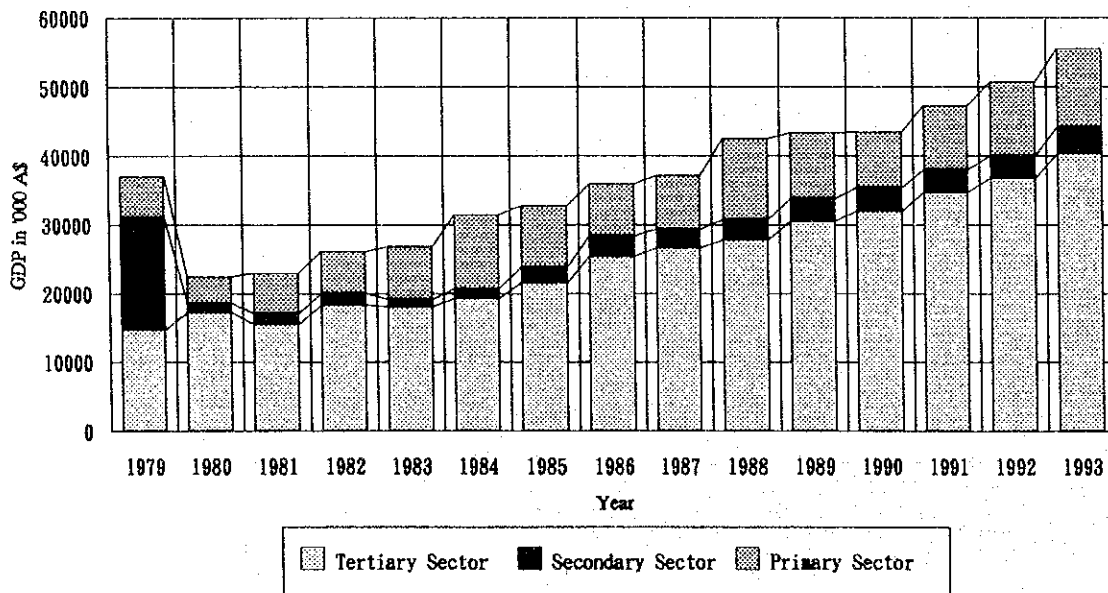


Figure 1-3-2 Gross Domestic Product, 1979-1993

Table 1-3-1(2) Land Area and Population Density, 1990

Island	Land Area (km ²)	%	Population	Population Density
Gilberts Islands				
Banaba	6.29	0.78	284	45.2
Makin	7.89	0.97	1,762	223.3
Butaritari	13.49	1.66	3,774	279.8
Marakei	14.13	1.74	2,863	202.6
Abaiang	17.48	2.16	5,233	299.4
N.Tarawa	15.26	1.88	3,648	239.1
S.Tarawa	15.76	1.94	25,380	1,610.4
Maiana	16.72	2.06	2,180	130.4
Abemama	27.37	3.38	3,218	117.6
Kuria	15.48	1.91	990	64.0
Aranuka	11.61	1.43	1,002	86.3
Nonouti	19.85	2.45	2,814	141.8
N.Tabiteuea	25.78	3.18	3,201	124.2
S.Tabiteuea	11.85	1.46	1,331	112.3
Beru	17.65	2.18	2,909	164.8
Nikunau	19.08	2.35	1,994	104.5
Onotoa	15.62	1.93	2,100	134.4
Tamana	4.73	0.58	1,385	292.8
Arorae	9.48	1.17	1,440	151.9
Gilberts Total	285.52	35.23	67,508	236.4
Line Islands				
Washington	9.55	1.18	936	98.0
Fanning	33.73	4.16	1,309	38.8
Christmas	388.39	47.92	2,537	6.5
South Line Group	64.89	8.01	0	0.0
Line Total	496.56	61.26	4,782	9.6
Phoenix Islands				
Canton	9.15	1.13	45	4.9
Other Phoenix Group	19.31	2.38	0	0.0
Phoenix Total	28.46	3.51	45	1.6
GRAND TOTAL	810.54	100.00	72,335	89.2

Table 1-3-2 Gross Domestic Product by Economic Activity, 1979-1993

(AS '000)

SECTOR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Agriculture	4,026	1,528	3,012	2,846	3,340	5,986	8,939	7,561	3,045	5,688	3,633	2,656	3,674	4,550	4,060
Fisheries	2,008	2,327	2,842	3,296	4,293	4,827			4,751	6,073	5,938	5,368	5,579	6,120	7,283
Mining	15,031	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacturing	304	321	456	494	508	620	705	723	761	762	820	840	875	920	975
Electricity and Water	541	328	398	456	661	840	797	732	871	832	1,129	1,035	759	800	868
Construction	934	992	1,121	1,126	616	798	1,607	2,227	1,980	2,200	2,380	2,620	2,360	2,300	2,875
Wholesale and Retail Trade															
and Hotels	2,353	3,212	3,290	4,478	3,455	3,374	4,439	4,634	5,000	5,500	6,050	6,650	6,900	7,250	7,939
Transport and Communications	2,137	3,871	3,702	6,032	4,766	4,069	5,341	5,727	5,750	6,100	6,340	6,630	7,130	7,130	7,950
Finance and Insurance	193	144	637	582	595	791	1,470	1,932	1,980	2,000	2,190	2,190	2,480	2,200	2,343
Ownership of Dwelling	502	636	628	452	754	575	896	952	798	977	970	913	960	1,010	1,085
Public Administration	6,382	7,322	6,819	6,678	7,727	7,562	8,351	8,837	8,420	8,703	9,866	10,013	11,745	12,336	13,508
Community/Social Services	449	456	491	527	543	526	836	1,040	1,093	1,148	1,200	1,230	1,250	1,300	1,398
Less: Imputed Bank Charges	-114	-111	-572	-643	-484	-796	-1,211	-1,602	-1,850	-1,900	-1,050	-2,010	-2,080	-2,000	-2,000
GDP at factor cost	34,745	21,025	22,865	26,424	26,774	29,173	32,170	32,763	32,599	38,083	38,566	38,135	41,062	43,916	48,284
Plus: Indirect Taxes	4,085	3,925	3,985	3,938	3,682	3,916	4,360	4,980	5,309	5,199	5,319	5,851	6,387	6,961	7,450
Less: Subsidies	1,786	2,491	3,859	4,260	3,657	1,615	3,733	1,800	728	786	501	556	189	171	166
GDP at market prices	37,044	22,460	22,991	26,103	26,799	31,475	32,797	35,943	37,180	42,496	43,384	43,430	47,260	50,706	55,568

The Government of Kiribati has initiated successive national development plans toward economic and financial stability. Despite the unfavourable economic situation, a real GDP has shown modest positive increase of about 1 % since 1980. In the economy of Kiribati, remittances from abroad, interests and dividend income on RERF and fishing license fees occupied large share of GNP. These have improved the external account position to off-set a large trade deficit shown in Table 1-3-3 in the recent years.

1.3.3 Trade

The trade of Kiribati is largely imbalanced to excessive import as shown in Table 1-3-3. Exports are limited to only two commodities of copra and fish accounting for about 10 - 15 % of GDP as shown in Table 1-3-4. While, imports accounted for about 80 % of GDP. The large deficit of external account is offset by remittance of seamen and other workers from overseas. During ten year period from 1980, imports increased from A\$ 18.3 million to A\$ 34.5 million at annual growth rate of 6.5 %, while exports rose from A\$ 2.6 million to A\$ 3.7 million at an annual rate of 3.6 %. Thus, the trade deficit widened from A\$ 15.7 million to A\$ 30.8 million in the same period.

Major trade partners for import shows some diversification from Australia, New Zealand and EEC in early 1980s to inclusion of Japan, China and Fiji in recent years.

1.4 Transport Sector

1.4.1 Sea Transport

The geographic nature of the country, wide dispersion of islands over vast expanse of ocean, poses serious difficulty in developing basic infrastructure of administration, communication and transportation as well. Lack of adequate port facilities in turn limits sound growth of country's economy.

Table 1-3-3 Balance of Trade Summary
1987-1991
(A\$'000, F.O.B)

	1987	1988	1989	1990	1991
Domestic Exports	2,118	5,848	5,973	3,009	3,414
Re - exports	751	822	462	672	748
Total Exports	2,869	6,671	6,435	3,681	4,162
Total Imports	25,142	28,185	28,596	34,446	33,237
TRADE BALANCE	-22,273	-21,514	-22,161	-30,765	-29,075

Source: International Trade Report 1991, Statistics Office, MFEP

Table 1-3-4 Major Domestic Exports by Volume
1987-1991
(in metric tons)

Commodity	1987	1988	1989	1990	1991
Copra	4,437	11,790	10,175	4,682	7,817
Fish	658	1,456	2,567	861	146
Seaweed	65	32	115	789	693
Shark Fins	1.0	2.0	1.1	1.1	1.0
TOTAL	5,161.0	13,280.0	12,858.1	6,342.1	8,657.0

Source: Statistics Office, MFEP

(1) International Sea Transport

Three shipping lines serve sea transport to Kiribati, namely Chief Container Line, Bali Hai Line and Kiribati Shipping Services Limited. Frequency of the services is low due to small cargo volume and long distance to the country.

All the foreign cargoes are handled in Betio Port. In 1990, the port handled about 62,000 ton of foreign cargoes consisting of 50,000 ton of import and 12,000 ton of export. Remarkable feature of cargo composition in Betio Port is large share of imbalanced import cargoes and overwhelming share of copra in export cargoes. Following a world wide trend of containerization, most of import cargoes are handled in container with containerization rate of about 80 % in recent years.

(2) Domestic Sea Transport

Most of domestic cargoes are carried by KSSL ships. In 1993, the volume of domestic cargoes carried by KSSL ships reached about 14,000 ton consisting of outgoing cargoes of 9,000 ton, incoming cargoes of 1,000 ton and incoming copra to Betio Port of 4,000 ton. Peculiar feature of cargo composition mentioned above is reflected in domestic cargo share.

The private ship operators have been allowed for domestic sea transportation in 1989 and at present have share of about 40 % of copra and general cargoes in Northern and Central Gilbert Island. They are presently operating four vessels, namely MV Itinraoi, MV Mat I, MV Teikaroi and MV Tovata.

Informal sector, church and Island Council, offers shipping services for short distance mainly to/from Abaiang.

1.4.2 Air Transport

All the international passengers are carried by air in the country's international airport at Bonriki. The other international airports in the country are Cassidy in Christmas Island and Canton in Phoenix Group. Two airline companies, Air Nauru and Air Marshall render two flights a week. Number of international passengers carried by two airline companies was recorded at about 8,000 in 1991. The international airport in Bonriki is now being expanded under Chinese assistance.

Air Tungaru render domestic air service and in 1991 carried 27,000 passengers by two Trilanders and a CASA. Air Tungaru commenced flight service between Christmas Island and Fanning/Washington in 1993.

About 360 ton was recorded in 1991 as foreign cargoes by air. A share of international cargoes in Kiribati is overwhelmed by sea cargoes as more than 99 % of the total cargo volume, and the air cargo volume shares only less than 1% of the total 165 ton among the total air cargo volume is shared by domestic cargoes handled by Air Tungaru.

1.4.3 Land Transport

All the islands in the country, except for Christmas Island, are small in size and therefore the need of road transportation is relatively low compared with sea and air transportation. In South Tarawa, the length of road is 70 km of which 35 km is tar sealed and the remainder gravel surfaced. Road from Betio Port is tar sealed strong and wide enough to carry heavy container traffic.

Number of vehicles registered in South Tarawa is about 900 consisting of 200 cars, 540 motor cycles, 40 trucks, 90 buses and others.