

## **Appendix- 7 Estimation of Cost Borne by the Recipient Country**

The cost borne by the Government of Republic of Kiribati is estimated as AS\$ 100,205, which is broken down as follows:

**(1) Utilities: AS\$ 1,000**

- Electricity Supply, Water Supply, Telephone Line Laying

**(2) Fence, Gate and Gate House: AS\$ 33,743**

- Fence (420m)

- 2 Gates

- Gate House

**(3) Access Road: AS\$ 25,862**

- Widening/Pavement Existing Road (L=125m, B=10m)

- Compensation for Fruit Trees (Coconut Trees and Breadfruit Trees)

- Relocation of Existing Fence

- Relocation of Concrete Panel for Electricity and Telephone Line

**(4) Relocation of the Existing Marine Radio Equipment (MIRT): AS\$ 39,600**

## Appendix-8 Port Cargo Forecast

The 8th National Development Plan has started in January, 1996, but the Plan itself is still under draft and has not been officially approved yet. And the projections by sector for the plan period of 1996-99 have not been established. The 7th National Development Plan has set out the target real GDP growth rate of 5.0 % for the plan period of 1992-95 as well as sectoral projections. "Inerisland Transport Study Kiribati" executed by Asian Development Bank (ADB) in 1991 has forecast the growth rate of population in detail. "The Study on Ports Development in Kiribati" executed by JICA in 1994 has thoroughly reviewed the said relevant reports such as 7th National Development Plan and "Interisland Transport Study Kiribati", scrutinizing the related past economic and port cargo statistics and has set out the future economic framework. And the Study finally has established the Improvement Plan of Betio Port (target year 2000) and evaluated its economic and financial feasibilities.

The 8th National Development Plan, though it's still draft, has followed the principal policies of the 7th National Development Plan and emphasized the importance of improvement in sea transport sector in the island country. The present study will forecast port cargoes in target year 2000 scrutinizing the updated economic and port cargo statistics (1994 and 1995) after "The Study on Ports Development in Kiribati" and comparing with the forecast set out in the said "Study".

### (1) Future Economic Framework

The census of the population has been executed every 5 years since 1985. The results are shown in Figure A-8-1 including 1995.

Table A-8-1 Census of Population (1985 to 1995)

Year	South Tarawa	Other Gilbert Is.	Line & Phoenix Is.	Total
1985	21,439	39,936	2,669	64,044
1990	25,380	42,128	4,827	72,335
1995	28,350	43,407	5,901	77,658

Source : Statistics Office, MFEP

For the first 5 years from 1985 to 1990, the population has increased at an annual growth rate of 2.5 %, for the next 5 years from 1990 to 1995 at 1.4 % and for the whole 10 years from 1985 to 1995 at 1.9 %.

The study on population forecast of "Interisland Transport Study Kiribati" has assumed an annual rate of total population growth of 2.5 % by 2005. The population in Line and Phoenix Islands has been, reflecting the resettlement plan from Gilbert Islands, forecast to increase at an annual growth rate of 7 % until 2000 and 2.5 % thereafter. As shown in Table

A-8-2, the total population in 2000 and 2005 have been forecast as approximately 92,000 and 104,000, respectively.

**Table A-8-2 Population Forecast, Kiribati**

Year	South Tarawa	Other Gilbert Is.	Line & Phoenix Is.	Total
1985	21,439	39,936	2,669	64,044
1990	24,626	42,600	4,530	71,756
1995	29,107	45,442	6,354	80,903
2000	34,566	48,473	8,922	91,961
2005	43,956	50,000	10,094	104,050

Source : Statistics Office, MFEP

Comparing both populations by census and forecast, the growth rate from 1990 to 1995 is a little lower than the forecast. However, considering that there is no environmental impact to decrease the growth rate of population and the resettlement plan to Line and Phoenix Islands is still being promoted by the Government, it is expected that the population will gradually increase as forecast.

While, the 7th National Development Plan has set out the target real GDP of about A\$ 50 million with an annual growth rate of 5 %. The projected sectoral GDP is summarized in Table A-8-3. As shown in Table, the primary sectors of agriculture and fisheries are projected to grow at a higher rate than the average growth rate of 5.0 %. While, the largest sector of public services of government offices is given a low rate of 4.0 %.

**Table A-8-3 Projection of Gross Domestic Production at Factor Cost  
(1991, 1995)**

	Unit in A\$ '000		
	1991	1995	Rate of Growth (%)
1. Agriculture	3,110	3,920	6.0
2. Fisheries	4,685	6,130	6.8
3. Manufacturing and Mining	875	1,120	6.4
4. Energy and Water	795	965	5.0
5. Construction and Building	2,400	2,950	5.3
6. Wholesale and Retail Trade and Hotels	6,960	8,590	5.4
7. Transportation and Communication	6,790	8,250	5.0
8. Finance and Insurance	2,250	2,730	5.0
9. Real Estate and Ownership of Dwelling	1,035	1,190	3.5
10. Public Administration	12,740	14,900	4.0
11. Community Services	1,250	1,530	5.2
12. Less: Imputed Bank Charges	-2,080	-2,535	-5.1
<b>Total G. D. P. at Factor Cost</b>	<b>40,810</b>	<b>49,740</b>	<b>5.0</b>

Source : Statistics Office, MFEP

Of port cargoes in Betio Port, import cargoes for livelihood account for 80 % and export cargoes by primary industries such as copra, seaweed, etc. account for 20 %. As increasing population and GDP, the port cargoes in Betio Port is expected to gradually increase.

## (2) Export/Import Cargo Forecast

The 7th National Development Plan has set out the projection of export and import commodities shown in Table A-8-4.

**Table A-8-4 Projection of Export and Import Values  
by Major Commodity (1992 to 1995)**

Unit in A\$ '000

	1992	1993	1994	1995	Growth Rate
<b>Export</b>					
Copra	2,300	2,325	2,350	2,375	1.1
Fish	810	831	852	874	2.6
Seaweed	755	822	895	975	9.0
Petfish	370	381	392	403	3.0
Others	50	52	54	56	4.0
Re-export	630	730	846	981	16.0
<b>Total Export</b>	<b>4,915</b>	<b>5,141</b>	<b>5,389</b>	<b>5,664</b>	
<b>Import</b>					
Food	10,450	10,973	11,521	12,097	5.0
Beverage & Tobacco	2,342	2,400	2,460	2,522	2.5
Crude Materials	525	549	574	599	4.5
Minerals & Fuels	3,885	4,157	4,448	4,759	7.0
Oils & Fats	92	101	111	123	10.5
Chemicals	1,985	2,143	2,315	2,500	8.0
Manufactured Goods	4,318	4,534	4,761	4,999	5.0
Machinery, Transport & Equipment	8,817	9,435	10,095	10,802	7.0
Misc. Manufactured Goods	2,501	2,626	2,757	2,895	5.0
Misc. Commodities	219	231	244	257	5.0
<b>Total Import</b>	<b>35,134</b>	<b>37,149</b>	<b>39,286</b>	<b>41,553</b>	
<b>Trade Balance</b>	<b>-30,219</b>	<b>-32,008</b>	<b>-33,897</b>	<b>-35,889</b>	

Source : Statistics Office, MFEP

"The Study on Ports Development in Kiribati" has forecast export and import cargoes comparing this projection with the relevant reports such as "Interisland Transport Study Kiribati", etc., and the results of regression analysis on cargo statistics (See Tables A-8-5 to A-8-7).

The present study has examined the cargo forecast executed in "The Study on Ports Development in Kiribati" scrutinizing the related economic and cargo statistics in the recent two years (1994 to 1995). As the results, the forecast in the said "Study" has been evaluated to be proper and adopted in the present study. The detailed examinations are described in the subsequent sections.

**Table A-8-5 Export Cargo Forecast (1995 to 2005)**

Unit in freight ton						
Year	Copra	Fish	Seaweed	G. Cargo	Transship	Export Total
1995	7,054	910	1,308	809	3,773	13,854
1996	7,139	933	1,426	841	3,943	14,282
1997	7,225	957	1,554	875	4,121	14,732
1998	7,311	982	1,694	910	4,306	15,203
1999	7,399	1,008	1,846	947	4,500	15,700
2000	7,488	1,034	2,012	984	4,702	16,220
2001	7,578	1,061	2,193	1,024	4,914	16,770
2002	7,669	1,089	2,391	1,065	5,135	17,349
2003	7,761	1,117	2,606	1,107	5,366	17,957
2004	7,854	1,146	2,840	1,152	5,608	18,600
2005	7,948	1,176	3,096	1,198	5,860	19,278

Source : The Study on Ports Development in Kiribati

**Table A-8-6 Import Cargo Forecast (1995 to 2005)**

Unit in freight ton									
Year	Dry Cargo	Cont. Rate	Cont-ainer	TEU	Break Bulk	Bulk Fuel	Transship	TEU	Import Total
1995	40,866	0.85	34,736	1,828	6,130	9,853	3,772	199	54,491
1996	42,991	0.86	36,972	1,946	6,019	10,336	3,942	207	57,269
1997	45,266	0.87	39,347	2,071	5,879	10,842	4,120	217	60,188
1998	47,578	0.88	41,868	2,204	5,709	11,374	4,305	227	63,256
1999	50,052	0.89	44,546	2,345	5,506	11,931	4,499	237	66,482
2000	52,655	0.90	47,389	2,494	5,265	12,516	4,701	247	69,871
2001	55,393	0.90	49,853	2,624	5,539	13,129	4,913	259	73,434
2002	58,273	0.90	52,446	2,760	5,827	13,772	5,134	270	77,179
2003	61,303	0.90	55,173	2,904	6,130	14,447	5,365	282	81,115
2004	64,491	0.90	58,042	3,055	6,449	15,155	5,606	295	85,252
2005	67,844	0.90	61,060	3,214	6,784	15,897	5,858	308	89,599

Source : The Study on Ports Development in Kiribati

**Table A-8-7 Export/Import Cargo Forecast (1995, 2000, 2005)**

Unit in freight ton			
Year	Export Total	Import Total	Grand Total
1995	13,854	54,491	68,345
2000	16,220	69,871	86,091
2005	19,278	89,599	108,877

Source : The Study on Ports Development in Kiribati

### (3) Export Cargo

The export cargoes in Betio Port are classified to copra, fish, seaweed, general cargo and transship cargo. Based on the recent two years' data, the export cargo forecast in "The Study on Ports Development in Kiribati" has been examined as follows:

#### 1) Copra

Coconut production is a mainstay of the economy for both people's diet and cash income. As shown in Table A-8-8, copra production fluctuates significantly due to erratic rainfall with the maximum production of 14,406 ton in 1988 down to 5,603 ton in 1990. "The Study on Ports Development in Kiribati" has analyzed the past trend of copra export with regression method for the period of 1984-93 and though sharply fluctuating, a modest annual growth rate of 1.2 % has been calculated, which almost coincides with the target growth rate of 1.1 % of the national development plan (See Table A-8-4). Following the rate, the volume of export copra has been forecast to increase from 7,000 freight ton in 1995 to 7,500 freight ton in 2000 (See Table A-8-5).

As shown in Table A-8-8, the copra export volumes in the recent two years after "The Study on Ports Development in Kiribati" trend to increase with 9,300 freight ton in 1994 and 13,000 freight ton in 1995 which is a double of the forecast volume. However, the copra export, as obviously shown in Table, has a large fluctuation with a double of the previous year. Considering these examinations, the forecast done by "The Study on Ports Development in Kiribati" is evaluated to be proper and adopted in the present study.

**Table A-8-8 Total Copra Production and Export (1983 to 1995)**

Year	Total Prod. (M. T.)	Export Volume (F. T.)	Export Value F. O. B. (A\$ '000)
1983	6,948	5,854.9	2,158
1984	13,388	10,189.0	6,987
1985	8,483	8,516.5	4,719
1986	5,911	3,490.2	459
1987	6,026	3,898.0	1,173
1988	14,406	8,778.0	4,203
1989	9,924	8,622.0	3,166
1990	5,603	3,664.0	1,023
1991	8,861	5,308.0	1,625
1992	10,011	9,907.0	4,349
1993	10,489	8,587.0	2,348
1994	11,986	9,306.4	4,480
1995	10,804	13,113.6	6,367

Source : Production and Export Value by Statistics Office, MFEP and International Trade 1995, and Export Volume by KSSL Cargo Statistics

## 2) Fish

The 7th National Development Plan has set out the target annual growth rate of fish export of 2.6 % (See Table A-8-4). Following the rate, "The Study on Ports Development in Kiribati" has forecast that the fish export increase from 900 freight ton in 1995 to 1,000 freight ton in 2000 (See Table A-8-9). The recent export, as shown in Table A-8-9, has sharply decreased since 1993. However, neglecting this momentary drop-down and respecting the target growth rate of the national development plan, the above-mentioned forecast is adopted in the present study.

**Table A-8-9 Fish Export (1985 to 1995)**

	Unit in metric ton										
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Fish	1,038	1,524	685	1,456	2,567	861	146	397	286	53	71

Source : International Trade 1991, 1995

## 3) Seaweed

Export of seaweed commenced in 1986 mostly destined to Denmark and has been steadily increasing in recent years. Growth rate for the first five years from 1986 is as high as 99 % but for the mature period of the 7th National Development Plan, the growth rate has been set at more modest value of 9 % which coincides with a production plan of Atoll Seaweed Company (See Table A-8-4).

"The Study on Ports Development in Kiribati", according to the production plan of the company, has forecast that the export of seaweed increase from 1,300 freight ton in 1995 to 2,000 freight ton in 2000 (See Table A-8-5). The recent export, as shown in Table A-8-10, has rapidly increased in 1996 recording 562 freight ton even in August, 1996, which is expected to reach 1,000 freight ton by the end of 1996. This almost coincides with the 1996 forecast, 1,426 freight ton (See Table A-8-5). And the Atoll Seaweed Company has commenced to collect seaweed in Line Island using Christmas Island as a transship base in addition to the present collecting region of Gilbert Islands, which is expected to promote more export of seaweed from now. Considering these examinations, the forecast done by "The Study on Ports Development in Kiribati" is evaluated to be proper and adopted in the present study.

**Table A-8-10 Seaweed Export (1986 to August 1996)**

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	August '96
Seaweed	22	65	32	115	798	693	388	339	374	376	562

Source : Data upto 1994 by statistics Office, MFEP, and others by KSSL Cargo Statistics

Note : Unit upto 1994 in metric ton and others in freight ton.

#### 4) General Cargo

The other export of general cargoes include handicrafts, re-export, etc. In 1993, the volume of export cargo other than copra totaled at about 3,500 freight ton which exceeds the average of the previous years of about 1,000 freight ton. This can be explained by the fact that KSSL ship "Matangare" commenced a feeder service of transship cargoes to Tuvalu which totaled at about 2,400 freight ton in six months. The remainder of about 1,100 freight ton includes about 350 freight ton of fish, seaweed and about 750 freight ton of re-export, handicrafts, etc.

"The Study on Ports Development in Kiribati" has adopted the target annual growth rate of other export of 4 % (See Table A-8-4) and forecast that the export of general cargoes increase from 750 freight ton in 1993 to 800 freight ton in 1995 and 980 freight ton in 2000 (Table A-8-5). The recent export, as shown in Table A-8-11, trends to increase with slightly exceeding the forecast in 1995. The forecast done by "The Study on Ports Development in Kiribati" is evaluated to be proper and adopted in the present study.

Table A-8-11 General Cargo Export (1985 to 1995)

Year	Unit in freight ton										
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
General Cargo	563.7	662.3	742.6	732.8	1,275.8	485.7	350.5	435.1	750	710.3	1,011.3

Source : KSSL Cargo Statistics

#### 5) Transship Cargo

The feeder service of transship cargoes has been commenced destining to Tuvalu by KSSL ship "Matangare" in 1993. All the transship cargoes are carried in container. Cargo demand in Tuvalu has been forecast to grow at an annual rate of 4.5 % by UNDP report "Sea/Air Transport Study 1991". Sea transport capacity of Tuvalu is not enough to meet country's traffic demand, which results in dependence on ships of foreign flag. KSSL intends to continue to provide transshipment service to Tuvalu and "The Study on Ports Development in Kiribati" has assumed that the transship cargoes to Tuvalu will grow from 3,770 freight ton in 1995 to 4,700 freight ton in 2000 at 4.5 % per annum (See Table A-8-5). The recent export, as shown in Table A-8-12, has dropped down to 2,500 freight ton in 1995, but there is a lot possibilities that the transshipment service will be promoted more from now and the above forecast is adopted in the present study.

Table A-8-12 Transship Cargo Forecast (1993 to 1995)

Year	Unit in freight ton		
	1993	1994	1995
Transship Cargo	2,400	2,524	2,537.5

Source : KSSL Cargo Statistics



#### (4) Import Cargo

The import cargoes in Betio Port are classified to container cargo, break bulk cargo, bulk fuel and transship cargo. Based on the recent two years' data, the import cargo forecast in "The Study on Ports Development in Kiribati" has been examined as follows:

##### 1) Container Cargo

Major item of import cargoes is food accounting for about 30 % of all the imports and the second share is located by item of machinery, transport & equipment. The 7th National Development Plan has set the target annual growth rate of food and manufactured goods of 5 % (Table A-8-4). And the "Interisland Transport Kiribati" has set the annual growth rate of 5 % for total dry cargo imports in terms of cargo volume. "The Study on Ports Development in Kiribati" has analyzed the past trend of dry cargo imports handled through Betio Port with a regression method and given the annual growth rate of 5.2 %. Through the consideration of all the above, the said Study has set the annual growth rate of dry import cargoes of 5.2 %. Also, the containerization rate has been set at 85 % in 1995 and 90 % in 2000.

From the above examinations, "The Study on Ports Development in Kiribati" has forecast, as shown in Table A-8-6, the container cargo imports to increase from 35,000 freight ton in 1995 to 47,000 freight ton in 2000, and in terms of TEU, 1,800 TEUs in 1995 and 2,500 TEUs in 2000.

The recent import, as shown in Table A-8-13, has increased with slightly exceeding the forecast in 1995. The forecast done by "The Study on Ports Development in Kiribati" is evaluated to be proper and adopted in the present study.

Table A-8-13 Container Cargo Import (1989 to 1995)

Year	Unit in freight ton						
	1989	1990	1991	1992	1993	1994	1995
Container Cargo	22,638.7	29,044.6	26,196.6	25,380.9	31,079.9	32,849.0	38,827.1
TEU	1,243	1,547	1,373	1,294	1,549	1,519	1,917

Source : KSSL Cargo Statistics

Note : Import TEUs increased for Tungaru Hospital Project in 1990 and increase of TEU transshipped from Fiji to Tuvalu in 1995

##### 2) Break Bulk Cargo

Break bulk cargoes include vehicles, construction equipment, lengthy construction materials. Non-containerized cargoes out of dry import cargoes in the above calculation give the volume of break bulk cargoes. As shown in Table A-8-6, the volume of break bulk cargoes has been forecast to remain in order of 5,000 to 6,000 freight ton in 2000. The recent two years imports has exceeded largely the forecast with 8,000 freight ton in

1994 and 11,000 freight ton in 1995. This can be explained by the fact that the containerization has delayed a little later than the forecast. This much extent of differences can be neglected in the examination of whole import cargoes and the above forecast is evaluated to be proper and adopted in the present study.

### 3) Bulk Fuel

Fuel oil is imported in bulk from Fiji. Past trend of imported fuel shows a steady increase without a momentary drop-down in 1995 at an annual growth rate of 4.9 % in terms of volume (See Table A-8-14). Following the rate, the volume of bulk fuel is forecast to increase from the present level to 13,000 freight ton in 2000 (See Table A-8-6).

**Table A-8-14 Bulk Fuel Import (1989 to 1995)**

	Unit in freight ton						
Year	1989	1990	1991	1992	1993	1994	1995
Bulk Fuel	6,605.1	7,569.2	8,910.2	9,463.8	9,125.2	9,598.8	6,554.1

Source : KSSL Cargo Statistics

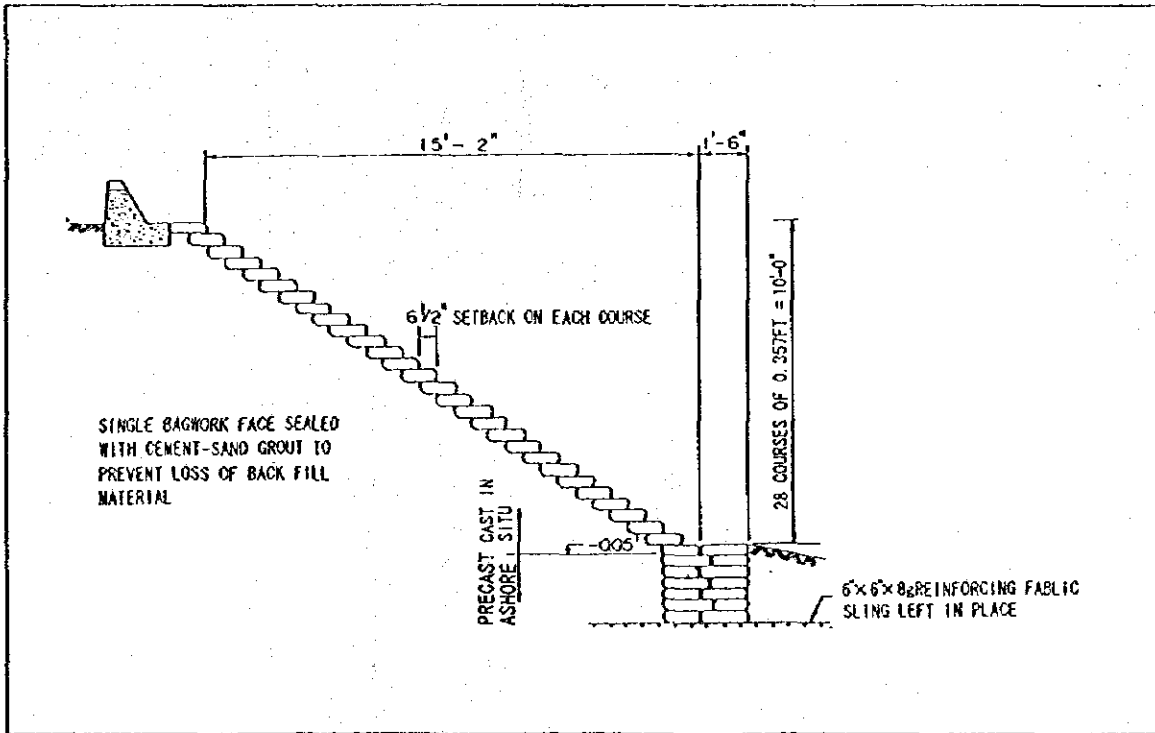
### 4) Transship Cargo

The same volume of transship cargoes is imported for transship service to Tuvalu as forecast in the previous section of export of transship cargoes.

**[APPENDICES B]**

## **APPENDICES B**

### **Figures and Tables**



**Figure B-1 Typical Cross Section of Mound Slope (East & West Mole)**

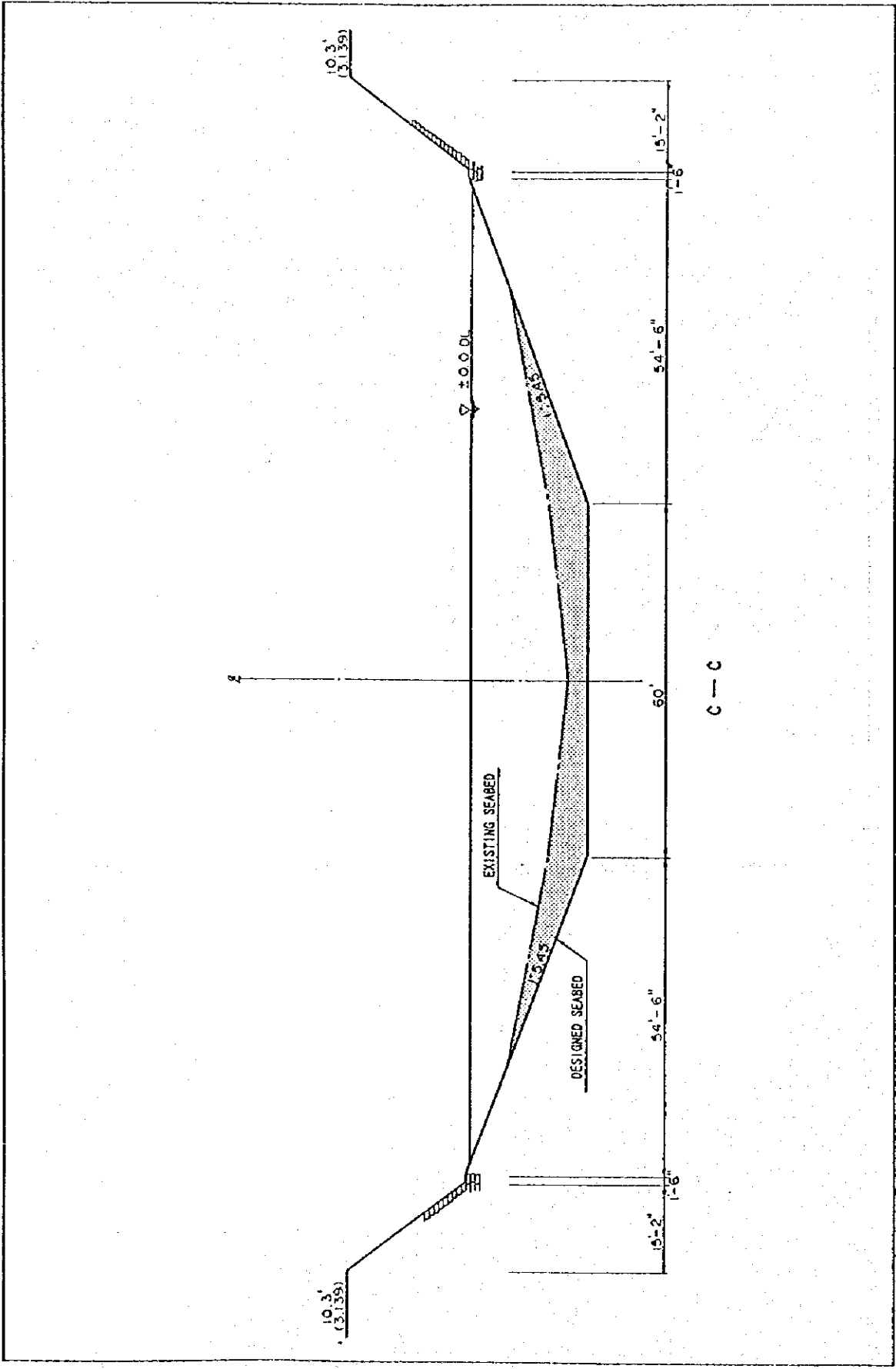


Figure B-2 Typical Cross Section of Approach Channel in Betio Port

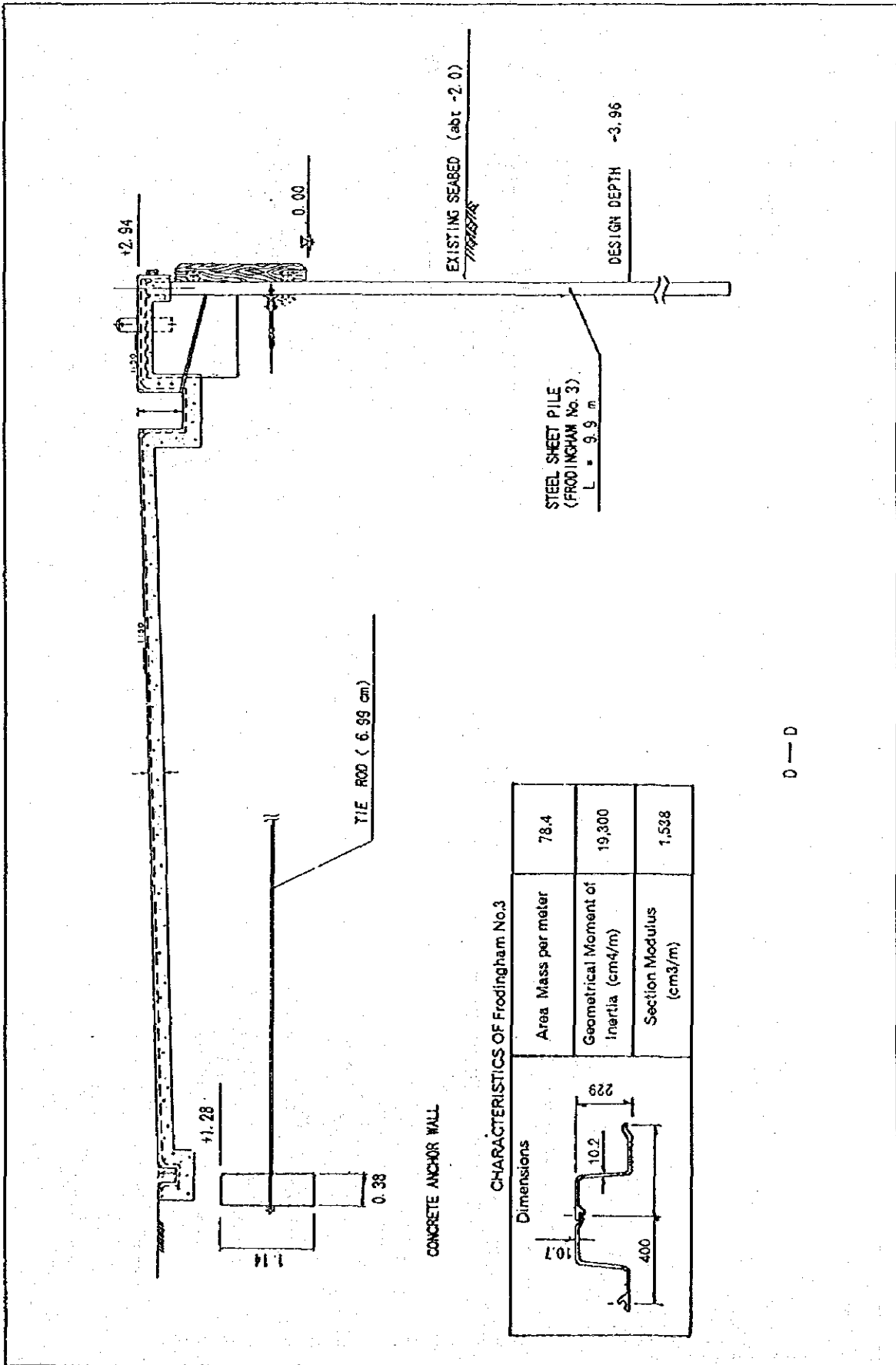


Figure B-3 Typical Cross Section of Wharf in Beto Port

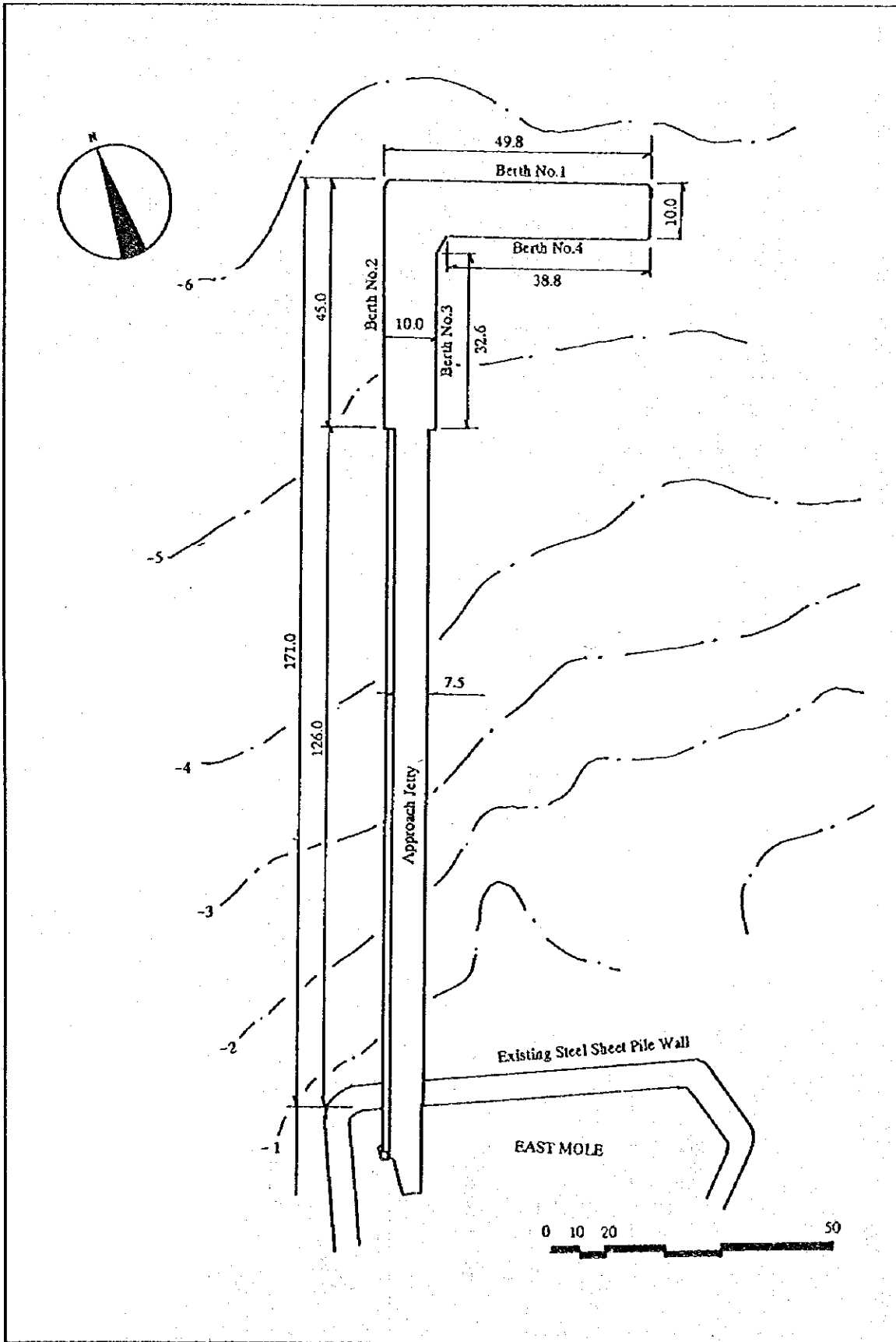


Figure B-4(1) Layout of Fisheries Jetty in Betio Port



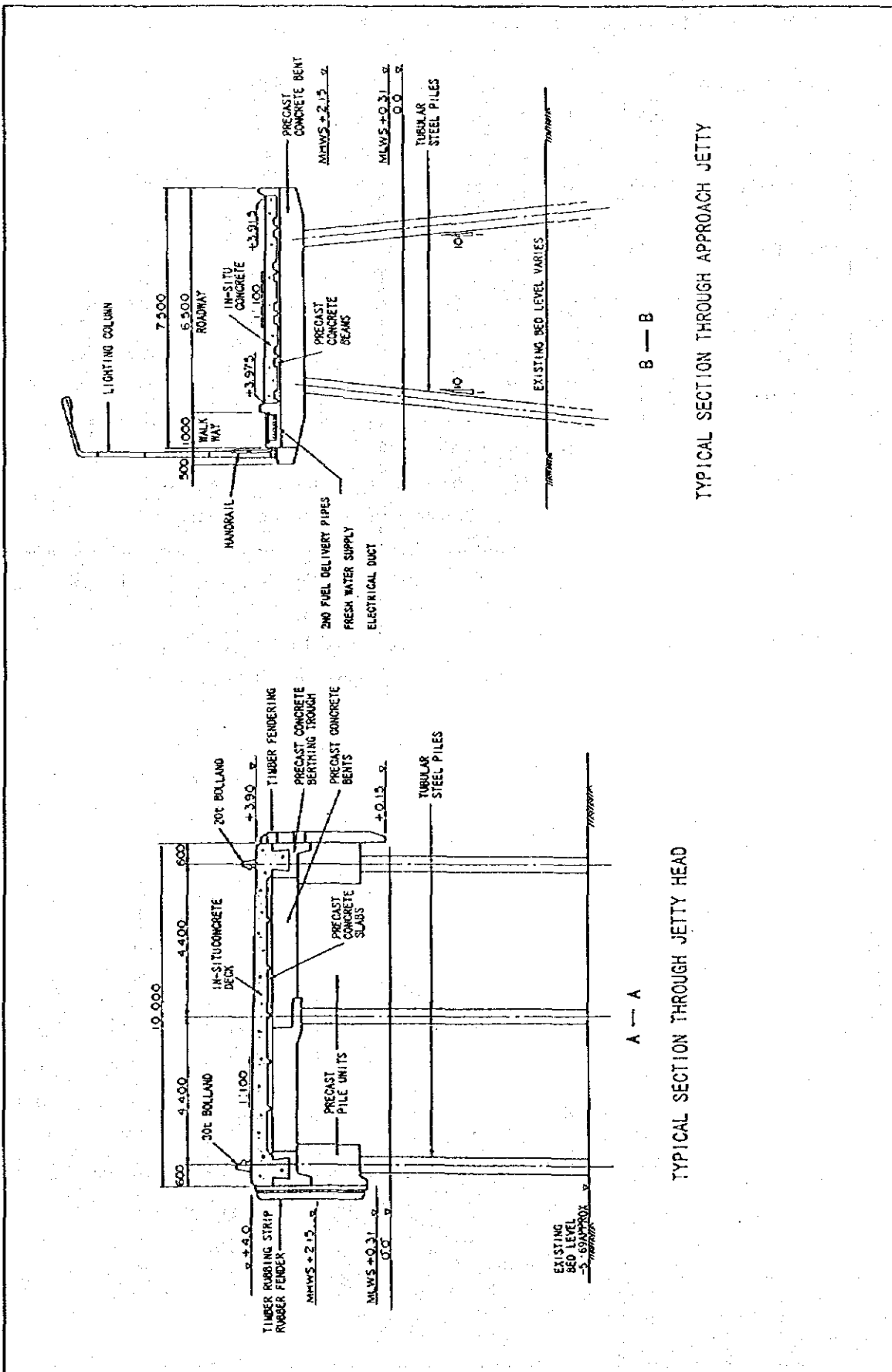


Figure B-4(2) Typical Cross Section of Fisheries Jetty in Betio Port

**Table B-1 Current Condition of Navigational Aids in Betio Port/Anchorage**

Charted Name	Aquisition Year	Current Condition
No.1 Buoy	1993	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
No.2 Buoy	1993	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
No.3 Buoy	1993	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
No.4 Buoy	---	Missing. Replacement of the buoy is recommended.
No.5 Buoy	1995	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
No.6 Buoy	1994	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
No.7 Buoy	---	Missing. Replacement of the buoy is recommended.
No.8 Buoy	---	Missing. Replacement of the buoy is recommended.
No.9 Beacon	1996	Tripod composed of steel pipes and unstable. No reflector and light
No.10 Buoy	1993	No rader reflector ans light. Rusted chain from wrecks is used and yearly replaced with the same.
Bikeman Island	1950's	Leading marker for approaching No.1 Buoy is used. Tripod of steel pipes with concrete foundation. No reflector and light.

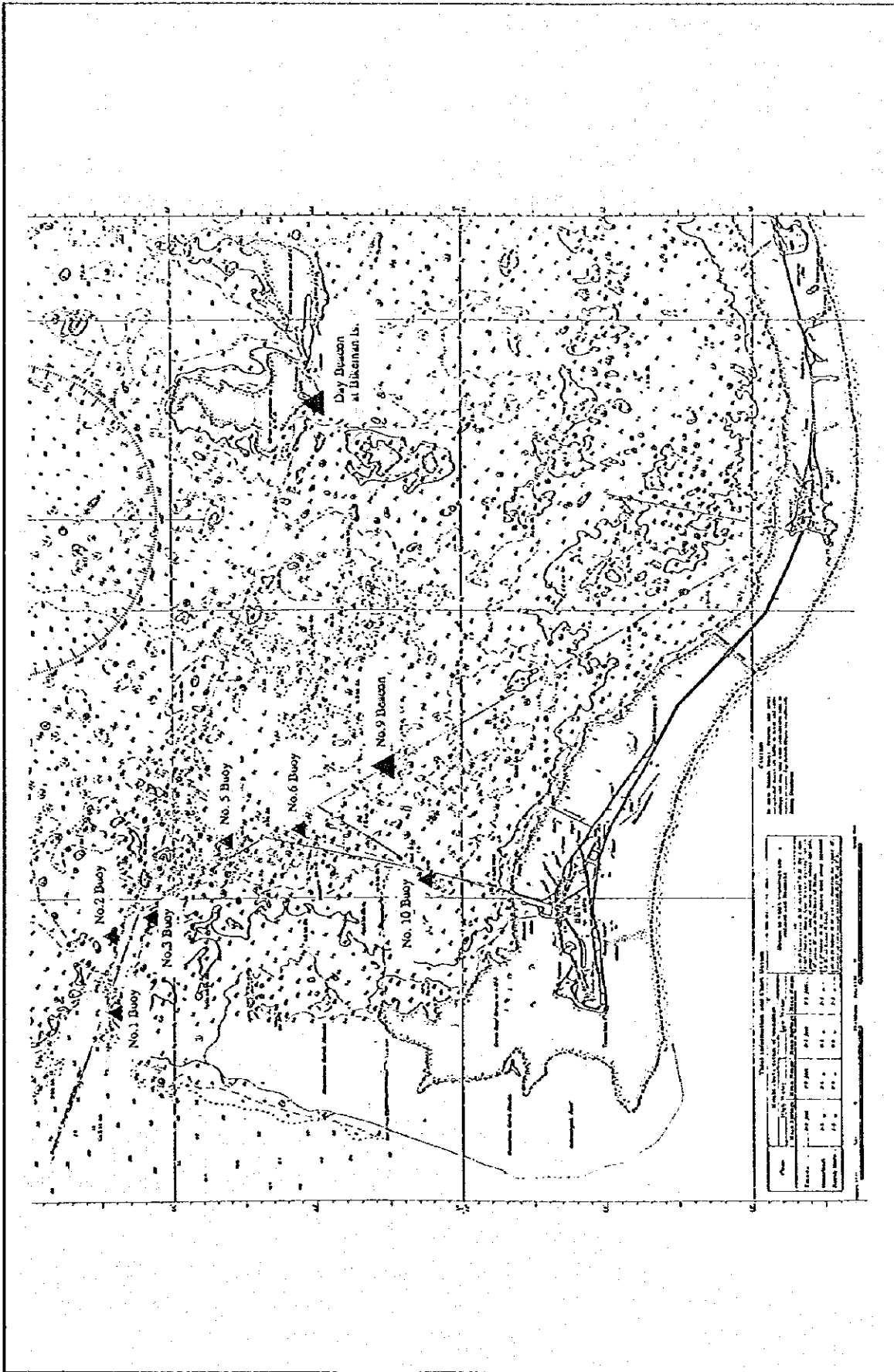


Figure B-5 Fairway and Navigational Aids

**Table B-2 Current Condition of East and West Moles in Bello Port**

Reference	Current Condition
(a)	Slipway concrete slab sunk with cracks and a cave-in
(b)	11 spots of 2 - 8m <sup>2</sup> bagwork sunk
(c)	15m <sup>2</sup> bagwork sunk, partially collapsed
(d)	3 spots of 10 - 23m <sup>2</sup> bagwork sunk
(e)	12m <sup>2</sup> bagwork sunk
(f)	7 spots of 2 - 10m <sup>2</sup> bagwork sunk
(g)	30m <sup>2</sup> bagwork sunk with several cave-ins
(h)	No bag and filling sand in the area of 25 m <sup>2</sup>
(i)	20m <sup>2</sup> bagwork sunk
(j)	18m <sup>2</sup> bagwork sunk
(k)	50m <sup>2</sup> bagwork sunk
(l)	9m <sup>2</sup> bagwork sunk with vertical tilt
(m)	16m <sup>2</sup> bagwork sunk
(n)	20m <sup>2</sup> bagwork sunk
(o)	3 spots of 2 - 6m <sup>2</sup> bagwork sunk
(p)	Connection with coral rocks and bags for surface protection is seriously deteriorated.



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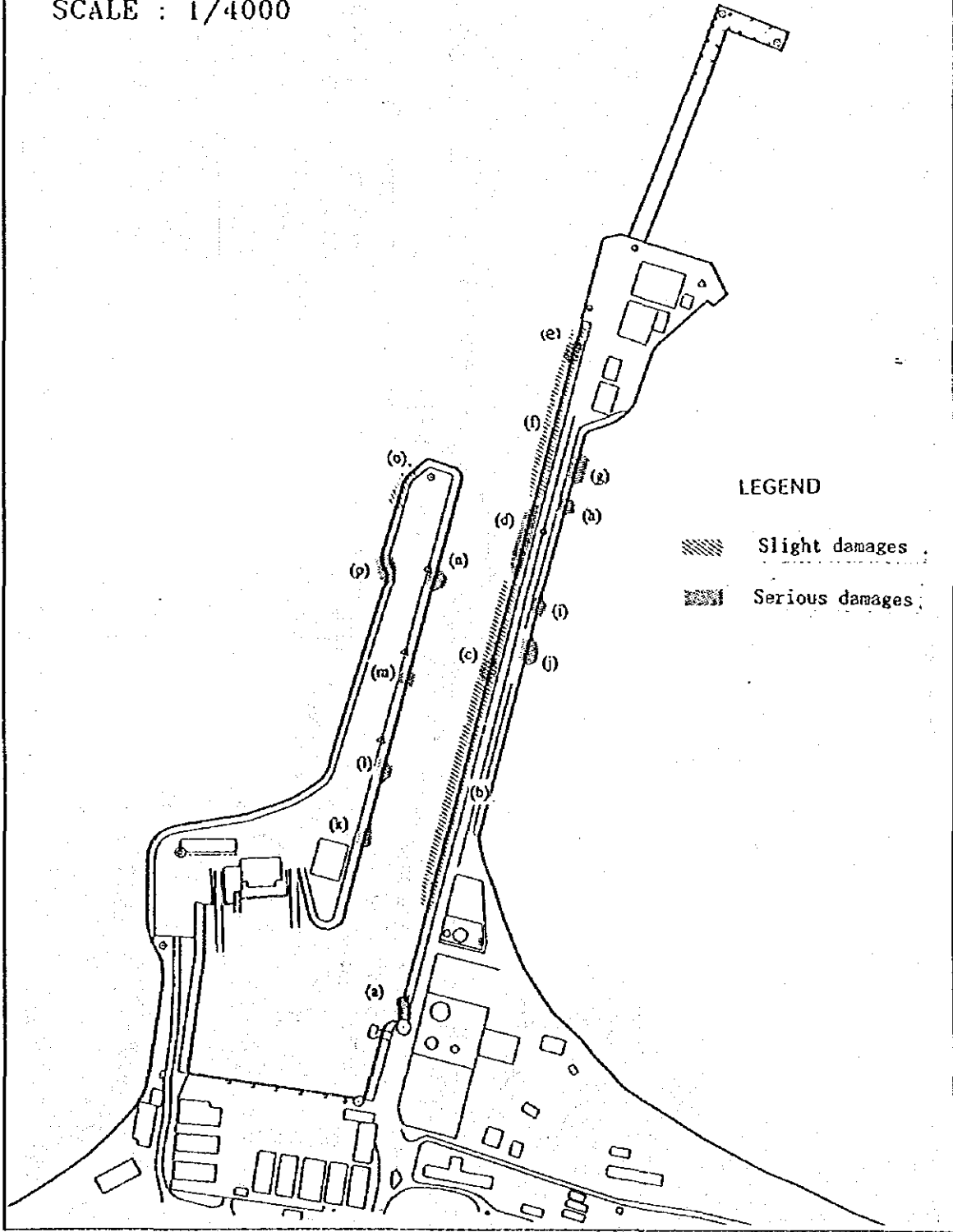


Figure B-6 Location of Damages of East and West Moles

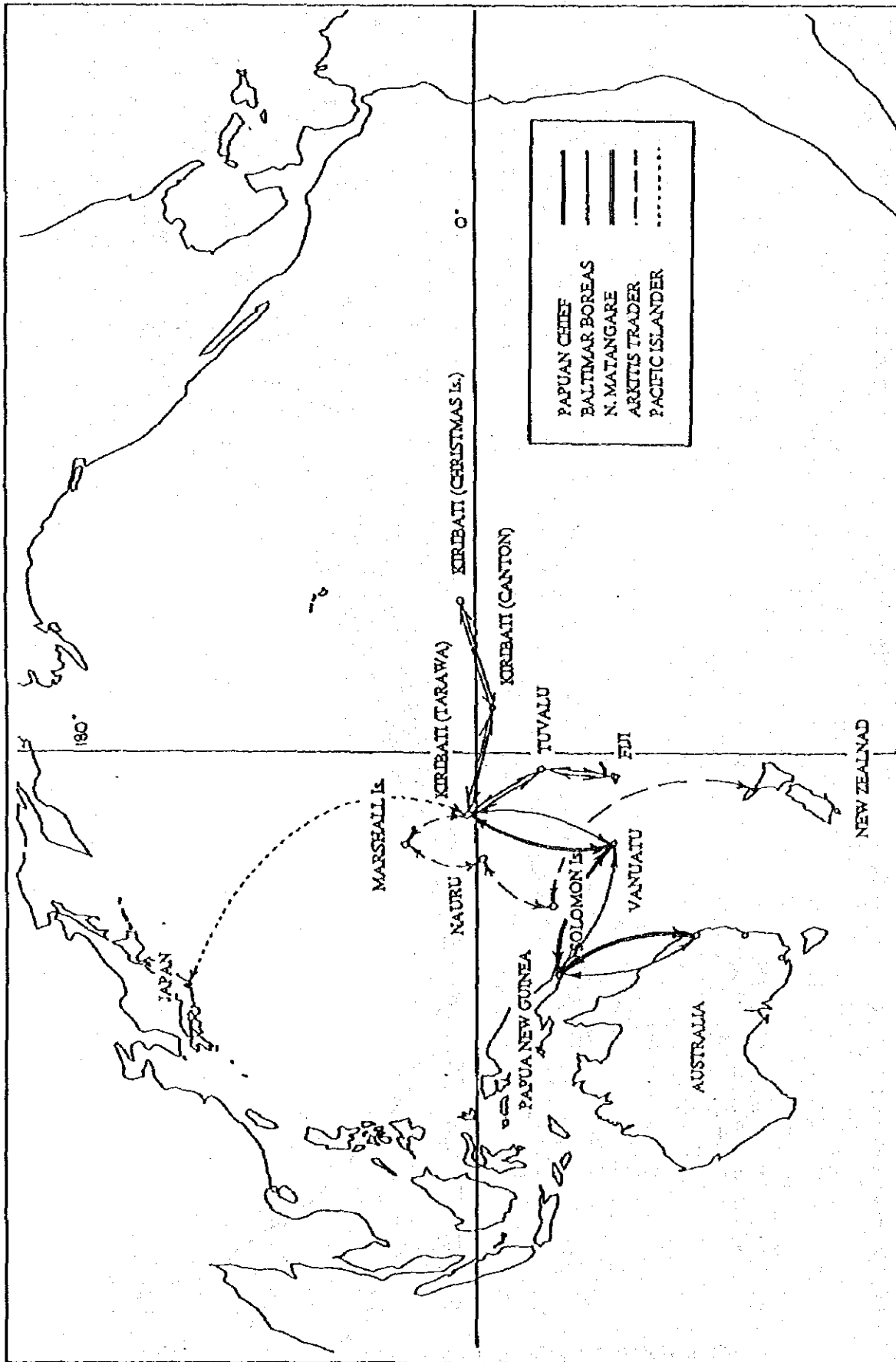


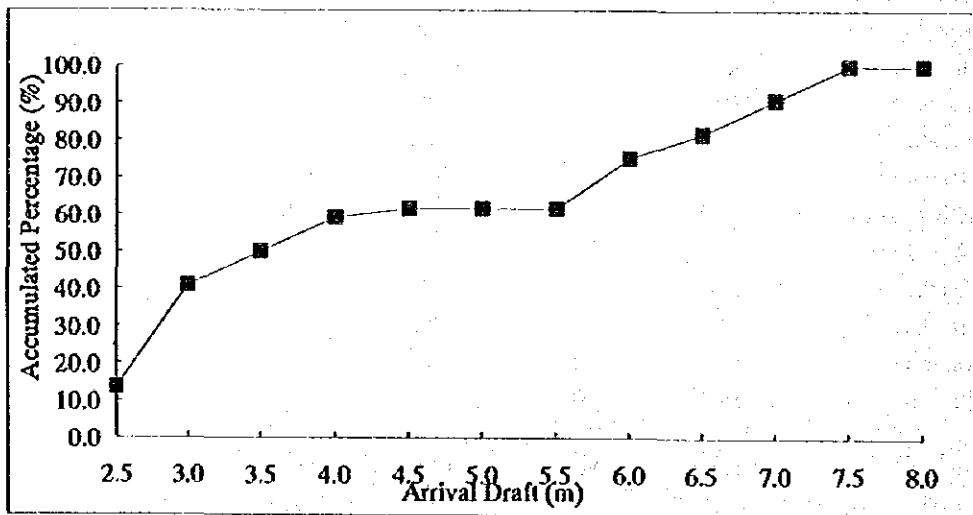
Figure B-7 Shipping Routes of Major Container Carriers

Table B-3 Dimensions & Arrival Draft of Cargo Vessels, 1995

No.	Vessel	LOA	Arrival Draft	DWT	NRT	HNDG HRS	IN-PORT HRS
1	Matangare	68	4.5	1,295	518	15	18
2	Arktis Carrier	80	3.0	2,950	999	273	316
3	Baltimar Boreas	91	4.0	3,182.6	1,107	48	51
4	Matangare	68	4.0	1,295	518	26	106
5	Maj Sif	115	6.9	1,690	4,953	45	48
6	Acoriano	80	3.5	2,950	999	42	46
7	Pacific Islander	144.93	7.2	15,670	4,724.93	51	53
8	Chi Feng Kou	117	7.0	1,950	5,407	229	248
9	Matangare	68	4.0	1,295	518	30	83
10	Maj Sif	115	6.5	1,690	4,953	55	67
11	Matangare	68	3.8	1,295	518	52	106
12	Pacific Islander	144.93	7.0	15,670	4,724.93	31	33
13	Papuan Chief	130	6.0	10,683.2	4,379	37	42
14	Acoriano	80	3.0	2,950	999	11	17
15	Matangare	68	3.0	1,295	518	22	60
16	Coral Chief	130	6.0	10,683.2	4,379	44	48
17	Matangare	68	2.9	1,295	518	42	47
18	Pacific Islander	144.93	7.0	15,670	4,724.93	23	25
19	Acoriano	80	3.4	2,950	999	33	35
20	Matangare	68	2.5	1,295	518	28	49
21	Highland Chief	130	5.8	10,683.2	4,379	33	35
22	Nei Momi	42	2.9	450	143	6	9
23	Matangare	68	3.0	1,295	518	36	47
24	Neptune	110	5.6	1,790	5,583	236	268
25	Acoriano	80	3.5	2,950	999	29	48
26	Matangare	68	2.8	1,295	518	73	94
27	Pacific Islander	144.93	7.2	15,670	4,724.93	44	48
28	Aleksandrov	113.2	6.0	9,595.19	3,600	52	55
29	Mataburo	42.5	2.0	524	157	9	13
30	Matangare	68	---	1,295	518	26	32
31	Acoriano	80	3.2	2,950	999	22	60
32	Matangare	68	3.0	1,295	518	---	---
33	Pacific Islander	144.93	7.1	15,670	4,724.93	26	28
34	Katika	61	2.0	500	150	2	5
35	Highland Chief	130	6.5	10,683.2	4,379	57	59
36	Matangare	68	2.8	1,295	518	21	119
37	Acoriano	80	3.0	2,950	999	44	48
38	Matangare	68	2.5	1,295	518	22	25
39	Coral Chief	130	6.0	10,683.2	4,379	52	54
40	Acoriano	80	2.6	2,950	999	33	35
41	Matangare	68	2.0	1,295	518	28	63
42	Pacific Islander	144.93	7.1	15,670	4,724.93	25	28
43	Aleksandrov	113.2	6.2	9,595.19	3,600	48	50
44	Matangare	68	2.0	1,295	518	39	65
45	Acoriano	80	2.7	2,950	999	22	25

**Table B-4 Accumulated Arrival Draft of Cargo Vessels  
Called at Betio Port, 1995**

Range of Draft	Nos. of Vessels	Accumulated Nos. of Vessels	
		Nos.	%
2.0 - 2.5	6	6	13.6
2.6 - 3.0	12	18	40.9
3.1 - 3.5	4	22	50.0
3.6 - 4.0	4	26	59.1
4.1 - 4.5	1	27	61.4
4.6 - 5.0	0	27	61.4
5.1 - 5.5	0	27	61.4
5.6 - 6.0	6	33	75.0
6.1 - 6.5	3	36	81.8
6.6 - 7.0	4	40	90.9
7.1 - 7.5	4	44	100.0
7.6 - 8.0	0	44	100.0



**Figure B-8 Accumulated Number of Cargo Vessels by Arrival Draft  
Called at Betio Port, 1995**



**Table B-5 Registered Domestic Vessels in Kiribati**

Vessels	Class	GRT (MT)	LOA (m)	Breadth (m)	Full Draft (m)	Owner
Mv Moanaraoi	DII	721.00	59.92	9.61	4.01	KSSL
Mv Momi	DII	450.46	42.50	9.60	3.00	KSSL
Nei Mataburo	DH	524.00	42.50	9.61	3.20	KSSL
Nei Nimanoa	CI	57.00	21.50	6.10	1.32	KSSL
Teitinraoi	CI	20.00	17.01	4.71	1.29	WKK
Nei Tituabine	CI	57.00	21.50	6.10	1.32	KSSL
Nei Tewenei	CI	34.00	10.00	3.00	1.08	FD
Teraoi	CI	65.00	---	---	---	KSSL
Riki	BH	19.00	11.54	3.68	1.95	KSSL
Tabuariki	BH	19.00	11.54	3.68	1.95	KSSL
Nei Bwaeao	CI	34.00	25.00	6.04	1.95	TML
Nei Moaika	CI	24.00	25.00	6.04	1.95	TML
Nei Martha	BII	---	36 FT	20 FT	3 FT	FERN
Teikaraoi	CI	7.29	10.22	3.75	2.45	FERN
Nei Angiraoi	LAI D UP	---	---	---	---	Nareau Shipping
Teitoinimarawa	---	---	---	---	---	---
Tokanikai	---	---	---	---	---	---
Nei Kaneati	CII	129.00	24.95	5.40	2.45	TML
Te Tiaroa	CII	32.00	16.60	3.62	1.50	TML
MAT I	DI	324.10	38.13	7.04	2.20	MOTE
Santo Antonio	BII	10.00	12.15	4.06	1.04	CM/ABA
Nei Moamoa	DI	608.00	52.45	9.00	4.00	TML
Nei Bwae	BII	20.45	12.19	6.65	1.24	ICC/ABA
Santo Mikaere	CII	---	12.80	6.30	0.40	CMC
Nei Tearintarawa	BII	5.00	28 FT	6 FT	0.05	---
KAO No. 1	DII	1,015.00	56.75	11.40	6.88	KB/JP
Nei Tekiboi	BII	5.00	4.00	1.02	1.05	KPC
Tetauu	DII	1,957.00	75.00	13.04	6.00	KB/Tanker
Kabanebane	BII	5.00	28 FT	6 FT	0.05	---
Judy Seirs	BII	20.45	12.19	6.65	1.24	---
Nei Tacang	CI	67.00	9.45	3.47	0.95	Norman
Teanoai	---	---	---	---	---	---
Nei Matangare	DII	1,295.00	68.64	11.80	4.02	KSSL
Marawanteoota	BII	20.00	13.00	7.40	---	---
Te Tiakawa No. 1	---	---	---	---	---	---
Tebaunraoi	CI	21.06	14.00	6.80	---	MAI

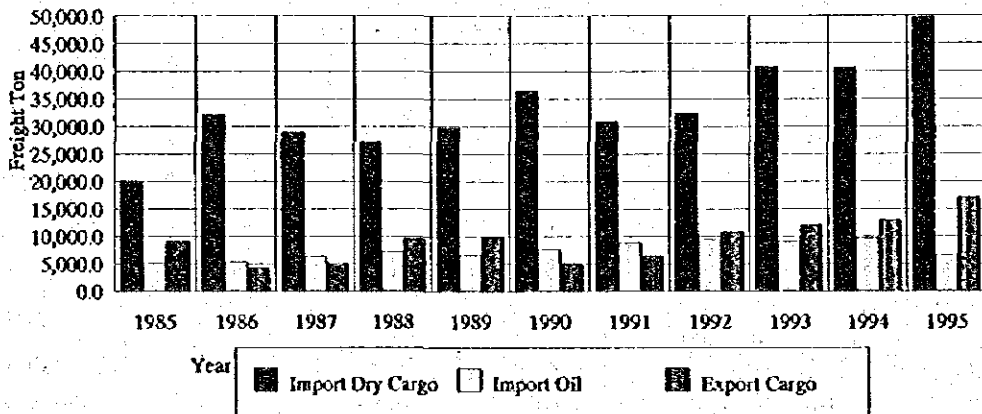


Figure B-9(1) Overseas Cargo at Bello Port, 1985-1995

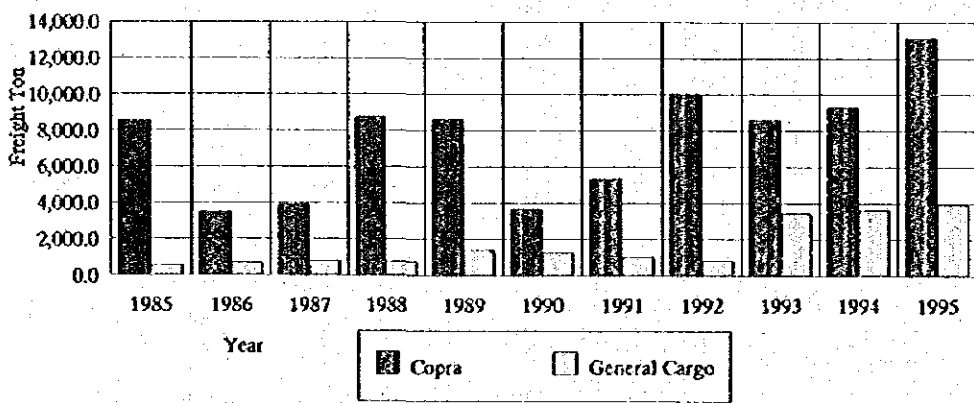


Figure B-9(2) Export Cargo at Bello Port, 1985-1995

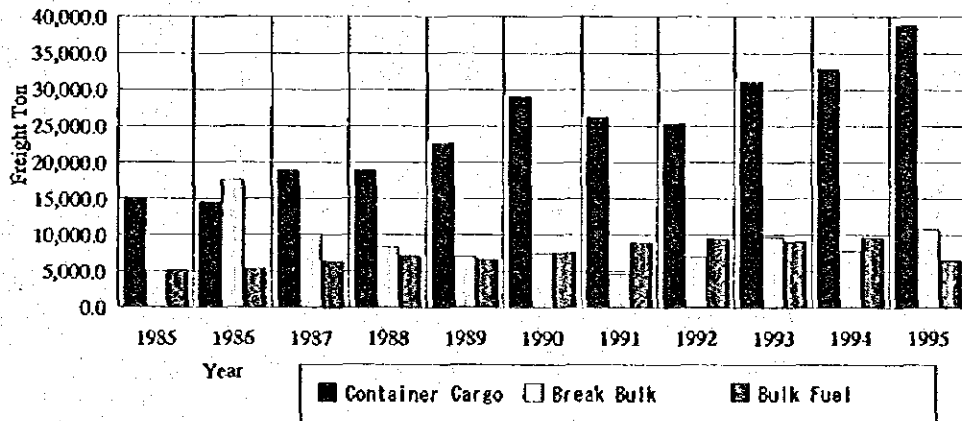


Figure B-9(3) Import Cargo at Betio Port, 1985-1995

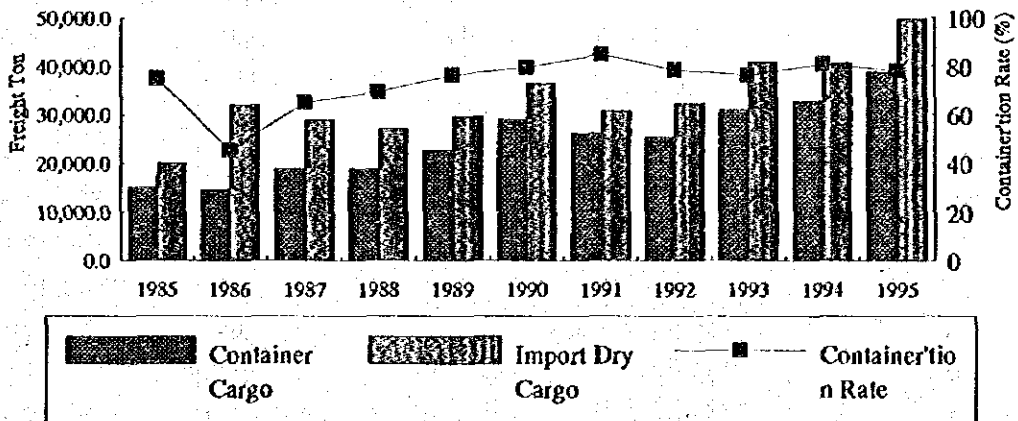


Figure B-9(4) Container Cargo at Betio Port, 1985-1995

**Table B-6(1) Domestic Cargo Statistics at Betio Port, 1985-1995**

Unit: Freight Ton

Year	Outgoing	Incoming	Copra	Total
1985	5,942.9	1,044.6	4,334.1	11,321.6
1986	5,722.9	1,109.7	2,758.6	9,591.2
1987	6,427.4	827.4	2,806.1	10,060.9
1988	8,908.3	942.3	8,717.8	18,568.4
1989	7,380.4	1,246.7	6,648.4	15,275.5
1990	7,134.5	1,267.7	3,249.1	11,651.3
1991	9,498.1	1,661.3	4,085.7	15,245.1
1992	11,624.9	2,038.2	5,049.2	18,712.3
1993	9,081.5	1,153.7	4,032.7	14,267.9
1994	10,909.5	1,522.6	8,259.9	20,692.0
1995	12,031.0	1,688.6	7,646.4	21,366.0

**Table B-6(2) Passenger Statistics at Betio Port, 1985-1995**

Unit: Persons

Year	Outgoing	Inter Is.	Incoming	Total
1985	3,184	1,241	2,863	7,288
1986	3,505	687	2,900	7,092
1987	4,375	498	3,910	8,783
1988	4,486	496	4,038	9,020
1989	4,356	1,227	4,150	9,733
1990	8,093	576	4,078	12,747
1991	7,787	950	5,530	14,267
1992	6,514	1,051	5,032	12,597
1993	4,696	863	5,199	10,758
1994	5,220	989	4,665	10,874
1995	3,618	329	3,137	7,084
Average	5,076	810	4,137	10,022

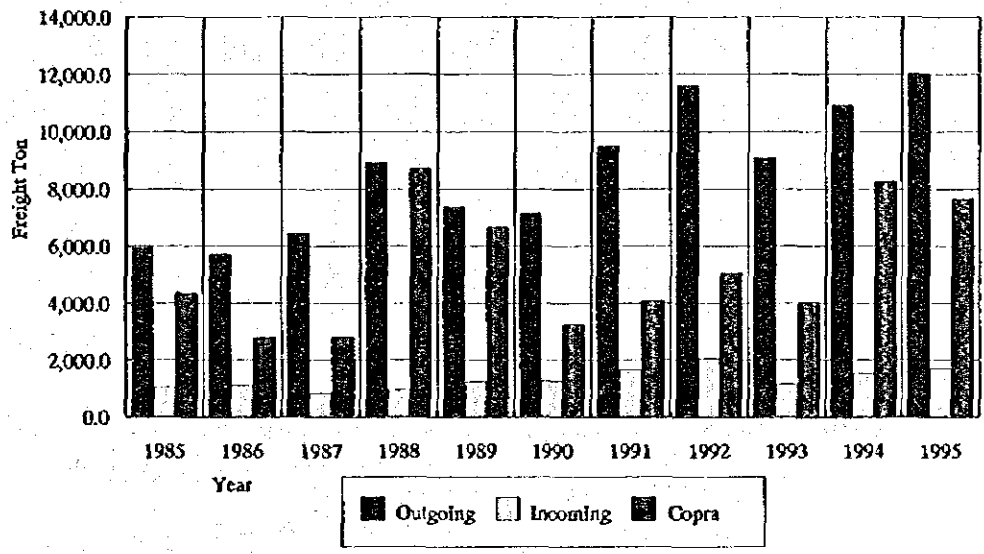


Figure B-10(1) Domestic Cargo at Betio Port, 1985-1995

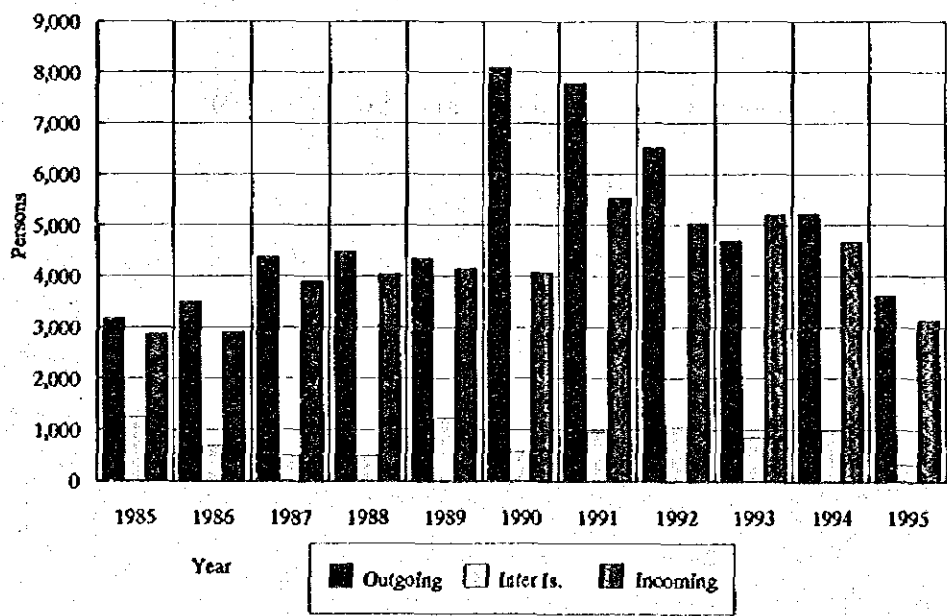


Figure B-10(2) Domestic Passenger at Betio Port, 1985-1995

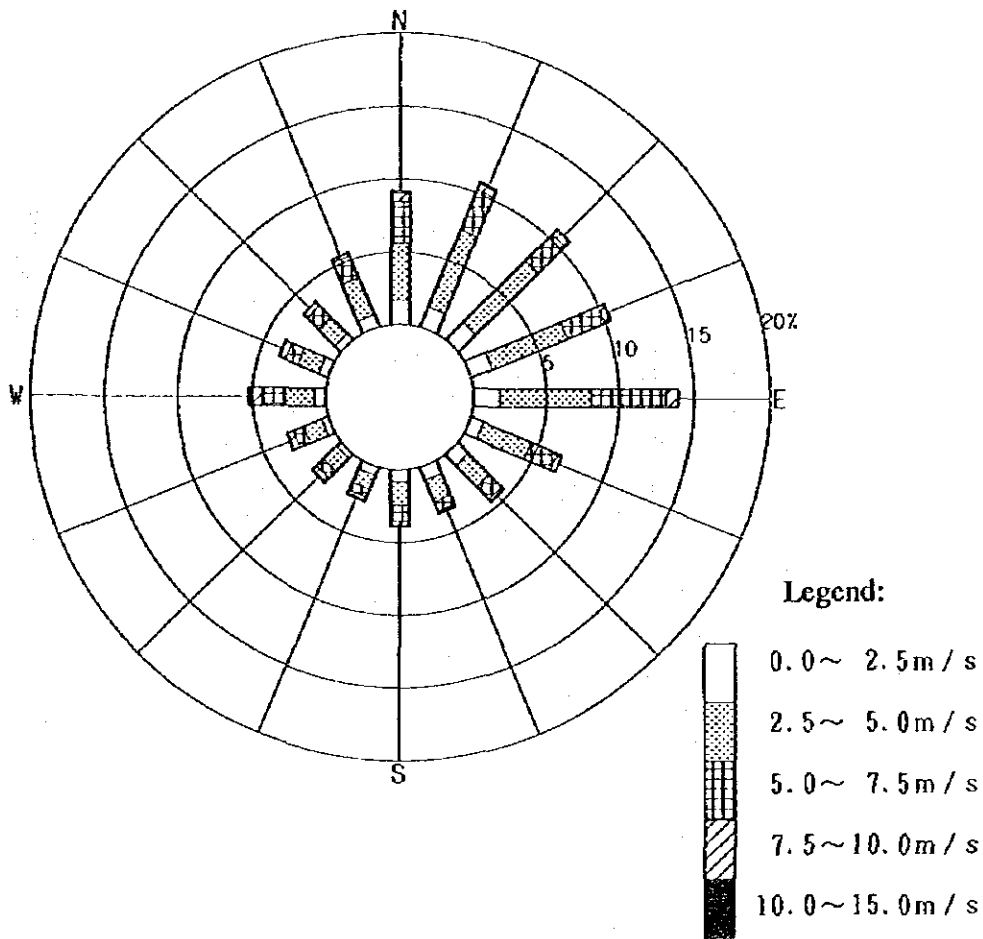


Figure B-11 Wind Rose in Betio (1991-1993)

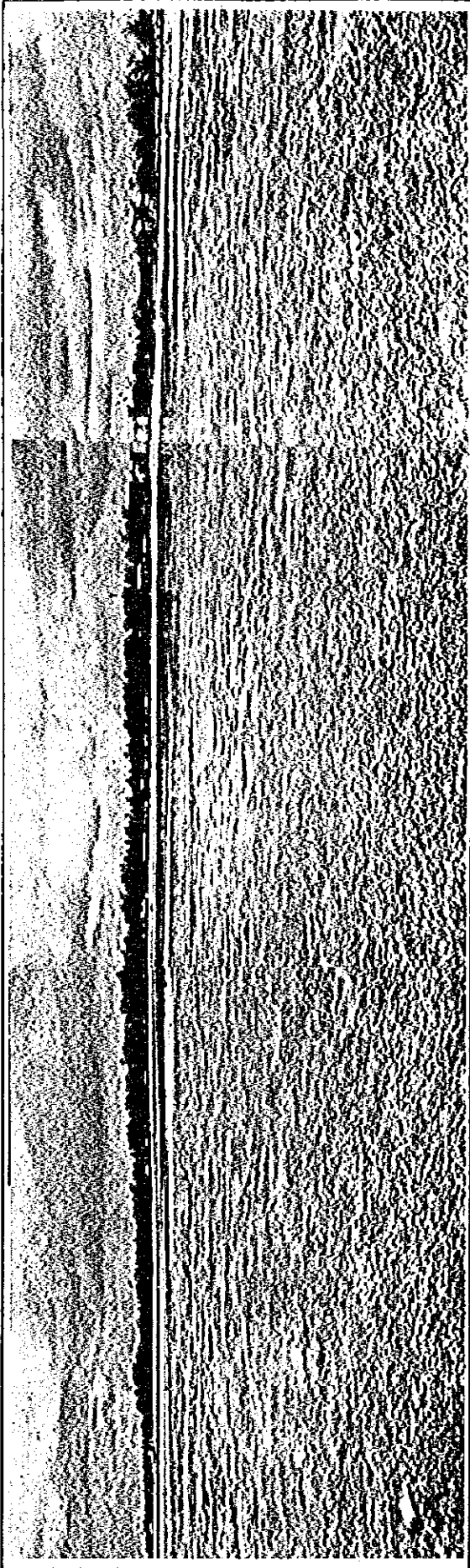


Photo : The Intertidal Zone of the Project Site and Surrounding Area

- Green algae, Halimeda sp. and marine crab, Calappa sp. are commonly observed at the sandy bottom. -











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