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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

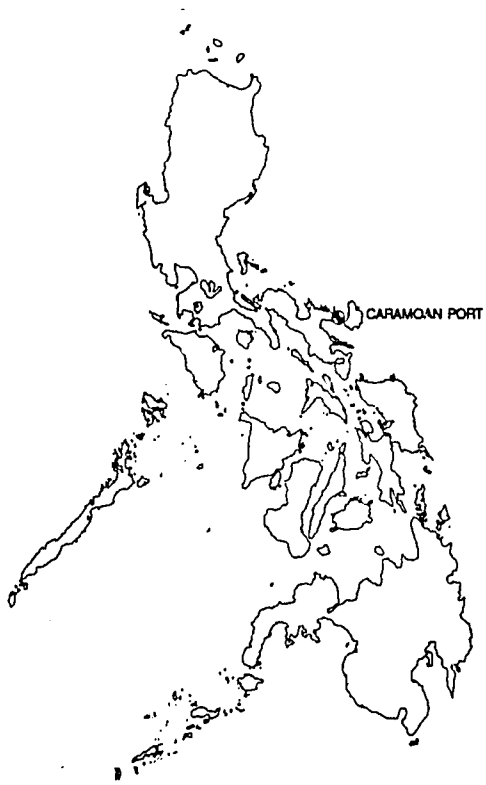
RURAL INFRASTRUCTURE FUND PROJECT

(AID PROJECT NO. 492-0420)

FEASIBILITY REPORT

THE PORT OF
CARAMOAN
LUZON ISLAND

SEPTEMBER 1990



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I.
SUMMARY

I. SUMMARY

A. INTRODUCTION

The Port of Caramoan is an active port on the coast of the Lagonoy Gulf. Caramoan Port is located in Barangay Guijalo of Caramoan Municipality, Province of Camarines Sur, on Luzon Island in Region V. Figures 1-1 and 1-2 locate and detail the port site.

B. EXISTING PORT

The existing Port of Caramoan comprises a 182-meter long rock causeway, a passenger and cargo landing platform with stairs and a protective seawall. The port lacks adequate draft for medium and large bancas at low tide along the west bank. The port is surrounded by developed infrastructure and commercial enterprises.

C. ECONOMIC OVERVIEW

Caramoan Port is the most active port in Lagonoy Gulf, serving as a transit point for passengers and cargo within the region. The Caramoan Peninsula remains the major source of forest products for the urbanized municipalities of Pili, Naga and Legazpi.

Caramoan Port is an important trade center for the local region and is capable of making significant contributions to the community with the improved port facilities.

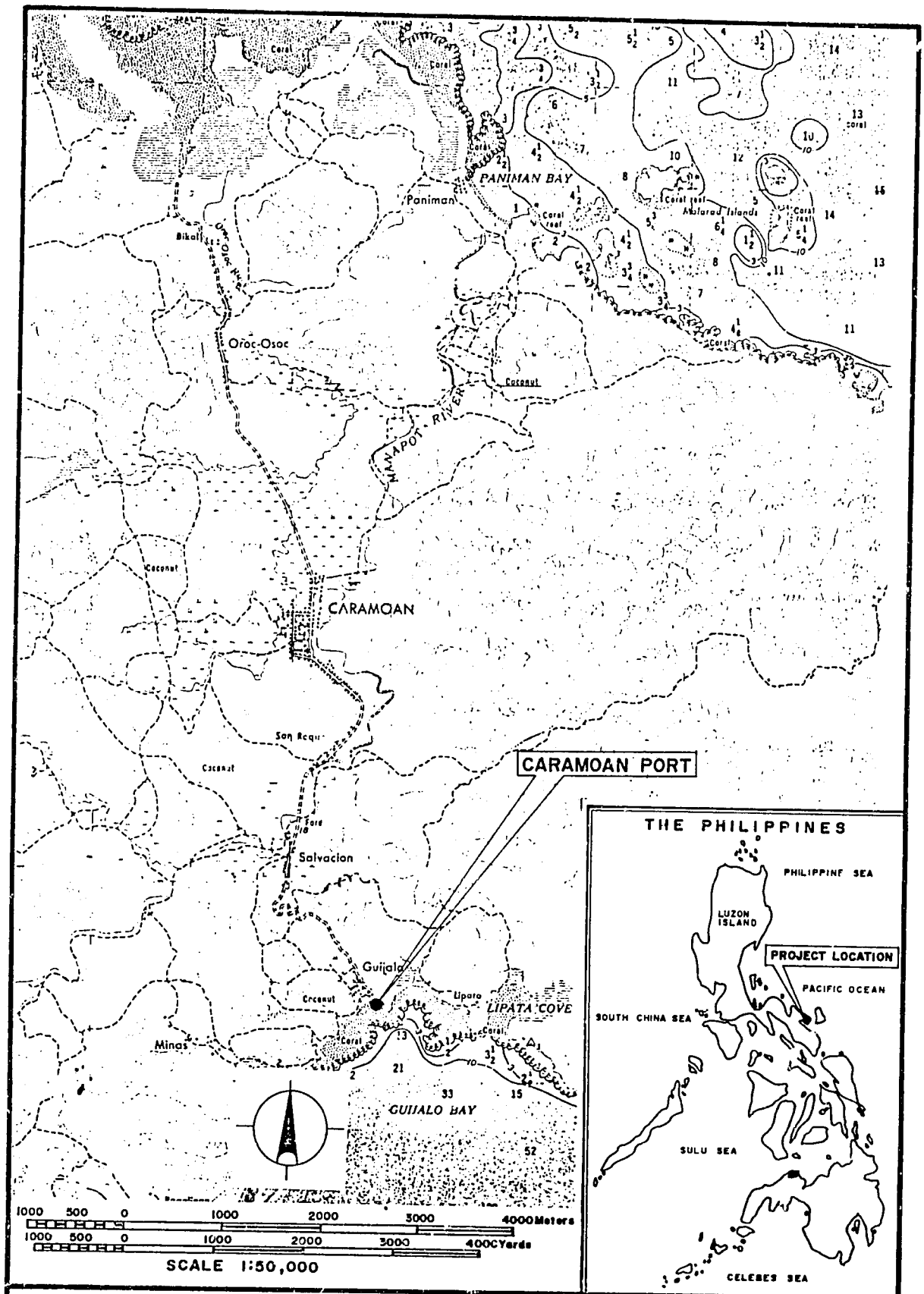
D. PROPOSED PORT SUBPROJECT

The proposed improvements to the existing facilities include, a fifty-meter extension of the existing rock causeway with reinforced concrete stairlandings on both sides, a vehicle turn-around area on the causeway, a reclamation area near the shore and a port building with a passenger waiting area, offices and cargo storage rooms.

E. COST CONSIDERATIONS

The construction cost for the proposed facility is estimated at P. 8,536,000.

The cost of maintenance for the first year is estimated to be 2% of the initial investment and is projected to increase 8.5% annually.



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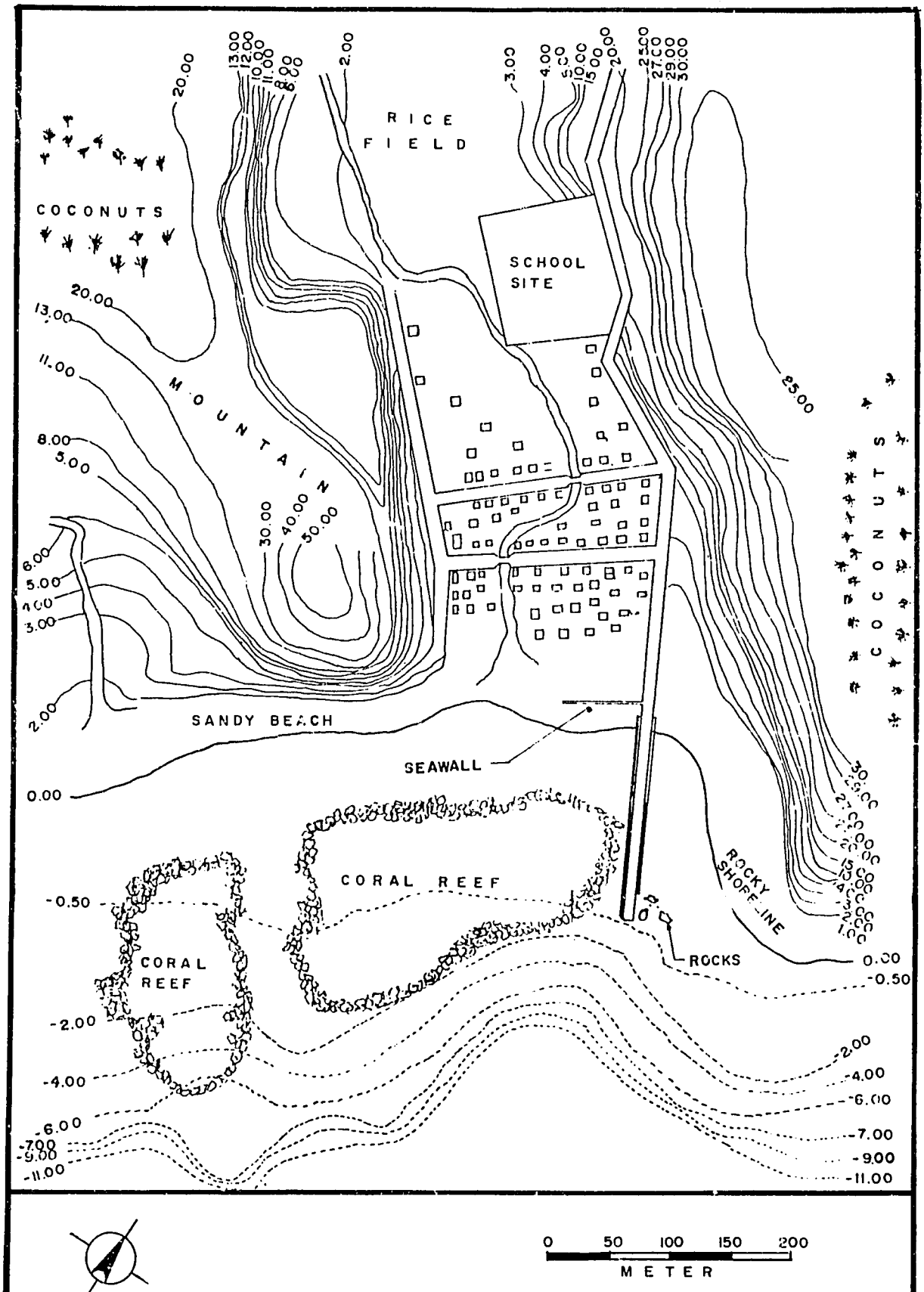
LOCATION MAP

FIGURE 1-1



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

CARAMOAN PORT AREA MAP

FIGURE 1-2

FS/CARAMOAN

F. SOCIAL SOUNDNESS

The proposed improvements at Caramoan Port are socially sound. The area residents will benefit from the upgrade of the existing facilities as it will enhance their business transactions and improve their social interactions.

With the proposed port improvements, travel between Catanduanes Island and Caramoan will be possible for larger bancas at all times. The port will also serve additional passengers from the Ports of Sabang and Sagnay.

G. ECONOMIC EVALUATION

The proposed development program for the Port of Caramoan is economically feasible at an EIRR of 16.16%.

Therefore, the Consultant proposes constructing the proposed development of Caramoan at an estimated economic cost of P. 7,083,000 and a financial cost of P. 8,536,000.

H. ENVIRONMENTAL ASSESSMENT

Construction activities proposed for the Caramoan Port subproject will not result in the significant disruption of the physical or natural environment. However, approximately 1,000 square meters of marginal algae and coral reef area will be directly displaced by the causeway extension and vehicle turn-around area.

The completed port facilities will improve access to the remote Caramoan Peninsula and may contribute to secondary environmental impacts related to anticipated economic development. Secondary impacts may include a non-sustainable increase in the exploitation of deep-sea fishery resources and the introduction of marble mining in the vicinity of Caramoan National Park. The mitigation of secondary impacts associated with improve port access could include implementation of existing GOP laws and regulations and introduction of community-based awareness programs encouraging sustainable development and ecologically sensitive port use.

The area where port improvements are proposed has been subjected to disturbances in the past and is unlikely to include archaeological or culturally significant features.

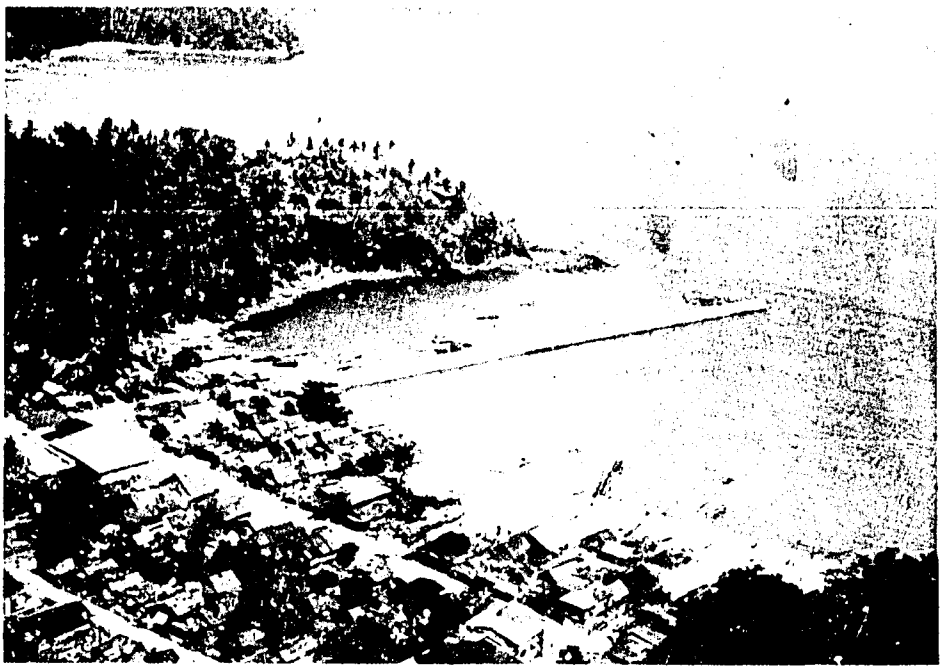


PHOTO 1: AERIAL VIEW OF CARAMOAN PORT; TO THE EAST

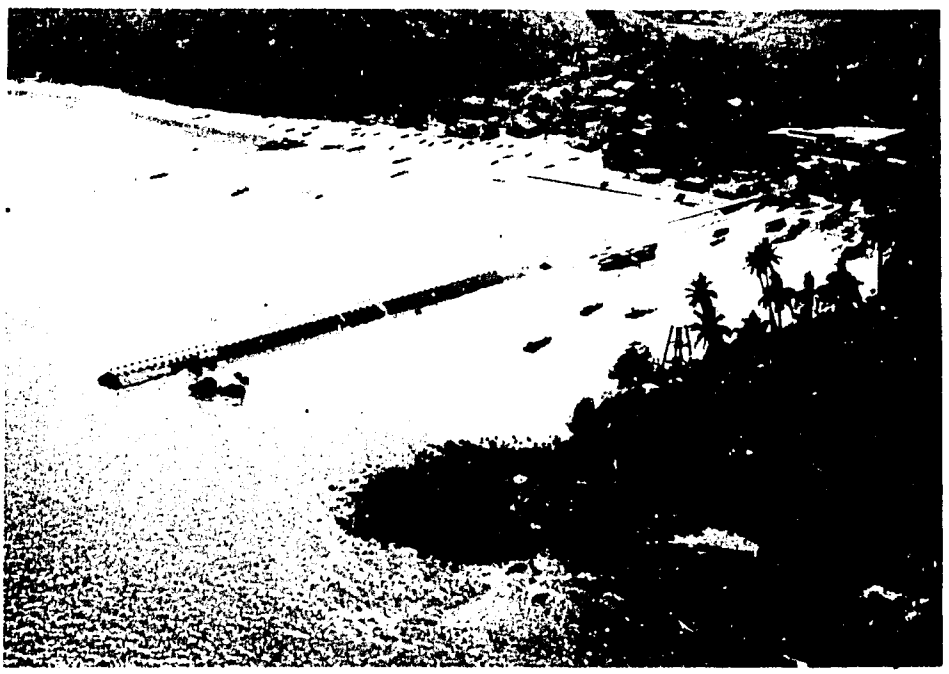


PHOTO 2: AERIAL VIEW OF CARAMOAN PORT; TO THE WEST

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II.
ECONOMIC OVERVIEW

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II. ECONOMIC OVERVIEW

A. PROFILE OF PROVINCE AND HINTERLAND

The proposed feeder port improvement is located in Barangay Guijalo in Caramoan Municipality. Guijalo is one of the forty-nine barangays of Caramoan Municipality of which nineteen are coastal barangays. Caramoan is one of the thirty-five municipalities of the Province of Camarines Sur.

The Port of Caramoan at Guijalo is located at Latitude 13°47.7' N and Longitude 123°50.4' E. Caramoan is another port within an interactive Lagonoy Gulf network that also includes the Ports of Gatchitorena, San Andres (Cab Cab), Presentacion, Sabang, Sagnay (Nato), and Tabaco as well as the numerous other smaller communities along the coast near Caramoan, Garchitorena and on Lahuy Island.

The **importance** and **future role** of the Guijalo Port will continue to be important to the Lagonoy Gulf trade and commerce. Guijalo Port is the busiest port in the gulf and is used as a transit point for passengers and cargos from San Andres and Garchitorena to Sabang, Sagnay or Tabaco Ports and vice-versa (Figure 2-1).

The Caramoan Peninsula continued to be the major source of forest products for the urbanized municipalities of Pili, Naga and Legazpi.

The **existing facility** comprises a 182-meter rock causeway, a passenger and cargo landing platform with stairs and a protective seawall. At low tide, the causeway on the west side has insufficient draft for medium and larger bancas. However, the east side of the causeway has a deeper water draft and is generally congested with bancas. The port has a well developed infrastructure with many booking offices, private waiting rooms, sari-sari stores and restaurants.

The **zone of influence** for Caramoan Port includes the Municipalities of Caramoan and adjacent barangays of Lagonoy and Garchitorena with a combined **population** in excess of 64,000 including 2,300 families dependent upon fishing for their livelihood. The total hinterland extends northeast to the Municipality of Garchitorena and inward to the whole of Lagonoy Gulf north and east of Tabaco as well as the Island Province of Catanduanes (Figure 2-1).

B. TRANSPORT SYSTEM PROFILE

The proposed subproject port is linked to Caramoan by a two-kilometer winding, mountainous paved road. Caramoan is linked to each of its surrounding forty-nine barangays by paved or all-weather gravel roads.

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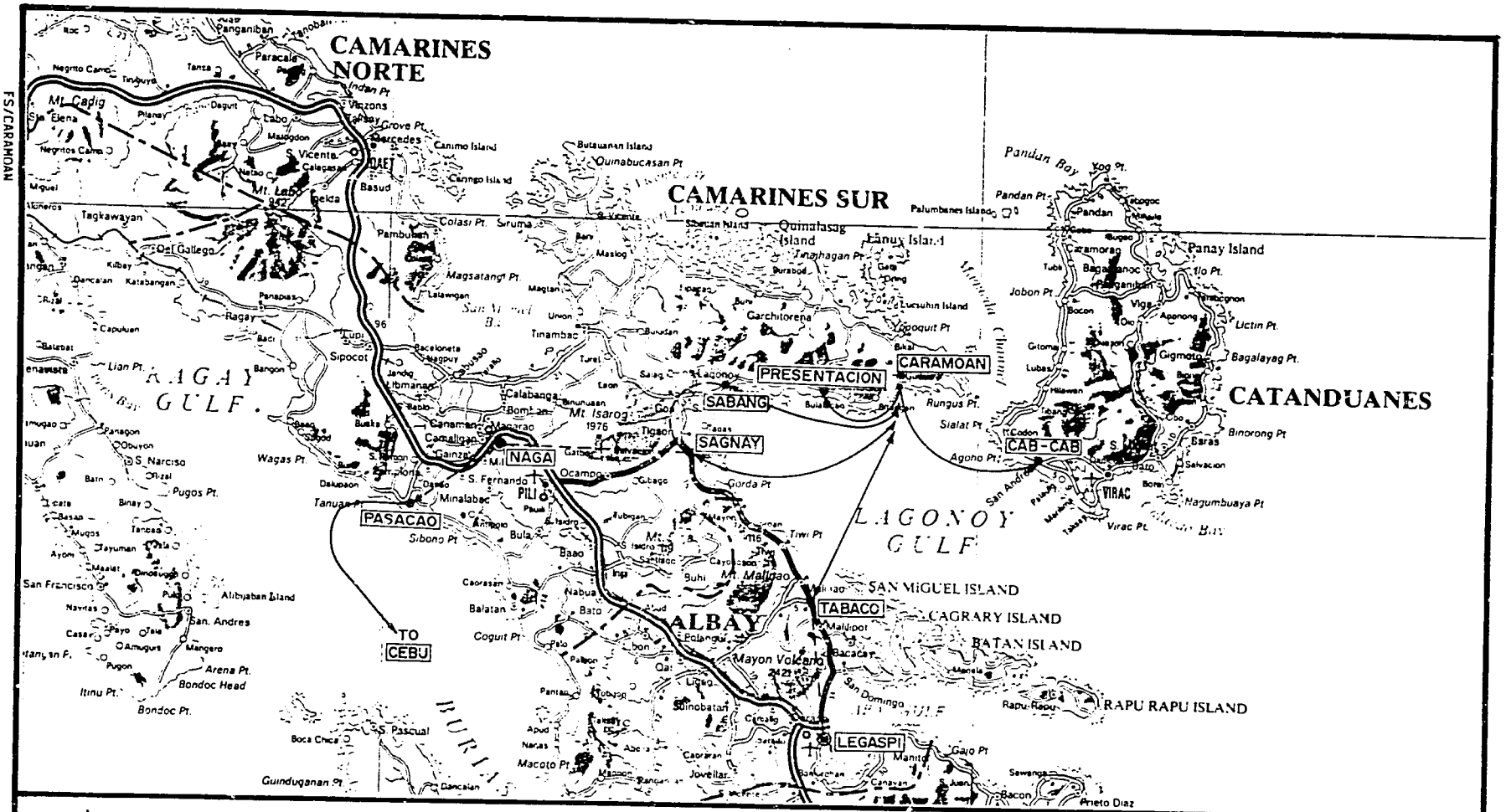

LEGEND :

BANCA ROUTE

ROAD TRANSPORT

0 20 40 60 80 Km

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492 - 0420

CARAMOAN PORT GUIJALO - LAGONOY GULF NETWORK

FIGURE 2-1

FS/CARAMOAN

There are large-motor banca passenger and cargo services between Caramoan and Sabang three times daily. These scheduled services make intermediate stops at the intervening small communities, including Presentacion, where passengers and cargos are brought ashore by small paddle bancas. There is similarly scheduled twice-daily service to Cab Cab (San Andres) on Catanduanes Island, daily service to Sagnay and thrice-weekly service to Tabaco.

From Sabang, there are frequent bus and jeepney schedules to San Jose, Goa, Pili and Naga. From Sagnay there are frequent jeepney schedules to Tigaon, Goa, Pili and Naga.

From Naga, there are frequent daily jeepney schedules to Pasacao and from Pasacao there are daily inter-island sailings to Cebu.

Also from Naga, there are frequent daily bus schedules to Daet and Manila and a daily flight service to Manila.

From Tabaco, there are frequent daily bus services to Legazpi, Naga and Manila.

From Legazpi, there are frequent daily bus schedules to Naga, Daet and Manila and a daily flight service to Manila.

In addition, Philippine National Railways maintains a daily passenger service and at least a weekly freight service between Naga and Manila.

C. SOCIO-ECONOMIC CHARACTERISTICS OF THE ZONE OF INFLUENCE

Camarines Sur is a predominantly (79%) rural province. Residents are overwhelmingly Bicolano, but include 4% Tagalogs. With a family income of P. 21,771 in 1985, the province is about average for the Philippines. The main source of income is agriculture-related for over half of the Camarines Sur families (54%), compared with 48% for Region V (Bicol) and 38% for the Philippines as a whole. As shown in Table 2-1, the poor are primarily small farmers, while the rich are non-agricultural wage earners or recipients of remittances from abroad.

The educational level in Camarines Sur falls below the Philippine average. In 1980, five out of six residents (85%) were literate but only one-fourth (27%) entered high school. For the Philippines as a whole, one-third (33%) entered high school. Employment was only slightly below the Philippine average. It was considerably higher for men (80%) than for women (15%). Three-fourths (76%) of the men and 21% of the women who were employed were working in agriculture.

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TABLE 2-1

FAMILIES BY MAIN SOURCE OF INCOME AND TOTAL FAMILY INCOME FOR CAMARINES SUR

Main Source Of Income	Total	Family Income (Pesos) Under 10K	10K-14K	15K-19K	20K-29K	30K-39K	40K-59K	60K & Over
		Percent of Families						
Agricultural Wages/Salaries	13.8%	27.4%	17.3%	10.8%	3.0%	5.0%	0.0%	0.0%
Non-Agricultural Wages/Salaries	21.6	8.9	25.6	18.3	26.2	32.3	24.6	41.3
Agricultural Entrepreneurial	40.1	44.7	41.8	51.8	39.5	14.9	29.5	11.9
Non-Agricultural Entrepreneurial	8.9	4.7	8.1	2.1	16.3	17.4	29.5	4.6
Other	15.6	14.3	7.2	17.0	15.0	30.4	16.4	42.2
	100%	100%	100%	100%	100%	100%	100%	100%
Total Families (Thousands)	206.5	49.9	52.5	35.0	39.2	14.5	5.5	9.9

SOURCE: National Census & Statistics Office. 1987. 1985 Family Income and Expenditures Survey, Vol. II. Manila: NCSO.

Most families (58% urban and 55% rural) owned the land where they lived. Five out of eight (62%) urban homes and 15% of rural homes had electricity. The piped water supply was far below Philippine standards. Only 32% of urban homes (compared with 58% for the Philippines) and 11% of rural homes (compared with 15%) obtained drinking water from a faucet. Almost three-fourths (72%) of urban households and 91% of rural households cooked with charcoal or wood. Seven out of ten urban homes (71%) and 58% of rural homes had radios.

In Camarines Sur, there were fifty-one commercial fishing operators in 1980 who hired a total of 739 fishermen. Most commercial fishermen (85%) worked over 150 days per year. These operators ran ninety-seven boats totalling 2,900 tons and caught a total of 8,803 tons of fish. In addition, there were 12,211 municipal fishing operators who caught 10,541 tons of fish using 9,872 fishing craft for an average of 163 days each.

In 1980, there were 2,443 farms in Caramoan Municipality. One-third (34% compared with 17% for Camarines Sur) were over five hectares. Half (48% versus 50% for Camarines Sur) were fully owned, and 41% (compared with 34% for Camarines Sur) were sharecropped.

In 1980, 6% of the population of Caramoan lived in 257 fishing households. Some 563 household members fished at least occasionally and 160 were fulltime fishermen. There were 177 fishing craft which operated for an average of 168 days each. A total of 257 municipal fishing operators reported a total catch of 474 tons of fish.

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III.
PORT THROUGHPUT

III. PORT THROUGHPUT

A. INTRODUCTION

The Caramoan feeder port site in the Barangay of Guijalo was surveyed on four levels between February and June of 1990. There was an initial engineering reconnaissance survey in February, an environmental "flyover" in May, an environmental site visit in June and an economic survey, also in June (Appendix B, Exhibits 1 through 3).

Appendix B displays the data base used to forecast port throughput. This data was collected during an early reconnaissance survey, expanded from secondary data sources and subsequently finalized after a more specific economic survey (Exhibits 4 through 9).

The aforementioned surveys, data and projections form the basis for the economic evaluations of all proposed feeder port projects.

The subproject Port of Caramoan at Guijalo is one of two ports serving the Municipality of Caramoan. This port is by far the more important of the two with respect to passengers and inbound small consumer cargos but may be of secondary importance with respect to the landing of marginal (inner-coastal) fish for local consumption.

Both ports interface with communities on the Caramoan Peninsula as far as Garchitorena on the Philippine Sea. West of Garchitorena populations are serviced by the merchants of Naga and Pili mainly through the Municipal Port of Tinambac, but also through the two Municipal Ports of Siruma. East of Garchitorena populations are serviced by the merchants of Naga and Pili through the Ports of Sabang and Sagnay via the Port of Caramoan (Guijalo). The merchants of Legazpi and Tabaco are served through the Port of Tabaco via the Port of Caramoan (Figure 2-1).

B. THROUGHPUT FORECAST

Existing throughput was developed from a comprehensive survey and network analysis of the interactive Lagonoy Gulf network that encompasses Sagnay at Nato, Sabang, Presentacion, San Andres on Catanduanes and Tabaco (Exhibit 9).

A minor diversion of passengers and cargo from marine to road transport will take place after the completion of the Lagonoy to Caramoan highway sometime after 1992. However, as a considerable expansion of the active hinterland to Caramoan will accompany the opening of this new highway and since the highway will traverse the Caramoan Peninsula inland, no major overall passenger cargo diversions have been projected.

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1. FISH TRAFFIC

Fishermen were surveyed to determine the fish landed from marginal (inner-coastal) and commercial (deep-sea) activities.

In the absence of definitive fish stock estimates or other positive indications of surplus fish stocks, fish landings are not projected to increase at Caramoan Port over the forecast period. The increased consumption of fish due to projected population increases is anticipated to be met by aquaculture. Current commercial landings will likely be maintained since they represent special fish, such as blue marlin, in high demand in richer urban centers (Table 3-1).

2. CARGO TRAFFIC

a. Rice, Bagged Cargos and Bottled Cargos

Rice, bagged cargos and bottled cargos are derived from the Consultant's survey and subsequent network analysis.

Rice consumption is relatively income inelastic. This condition of general income inelasticity has been applied to other **bagged cargos** and as well to **bottled cargos**. This latter commodity indicates a currently high consumption.

In any case, rice, bagged cargos and bottled cargos have been collectively projected to increase with the population increase of Camarines Sur of 1.77% per year. Any major diversion from Caramoan to road transport after 1992 has been discounted since any growth in the newly-open hinterland exiting through Caramoan will likely counter such losses.

b. Fuel, Consumables and Others

Fuel movements are derived from the Consultant's survey and subsequent network analysis.

Consumables, representing all manner of consumer goods, vegetables and fruits were derived from the Consultant's survey and subsequent network analysis. This category is not entirely consistent when comparing one port with another due to substantial differences in the manner in which cargos are recalled or recorded. Consequently, consumables are considered to be either the surveyed consumable tonnages or 20% of the surveyed other tonnages, whichever are the greater.

Others, is a residual category reserved for cargos that do not easily fit into the other aforementioned categories. Typical examples are ice and abaca.

Throughput of fuel, consumables and other cargos has been projected by the following formula:

$$F = P + I*E_1$$

Where:

F: Annual growth rate for identified cargos

P: Annual growth rate of population for the province

I: Annual growth rate of per capita income for the province

E_1: Elasticity of demand for identified cargos to change in per capita income for the province

The growth rates described above (P and I) for each province are shown in Exhibits 4 and 5.

E_1, the elasticity of demand for fuel and consumables is assumed to be 0.5. Therefore, the estimated annual growth rate for fuel and consumables at Caramoan Port is 4.27%.

c. Cargo Allocations

Where definitive origin/destination data was deficient, cargos were allocated to the network in proportion to the surveyed passenger distribution (Exhibit 9).

3. PASSENGER TRAFFIC

Growth in passenger traffic is based on the macro-economic analysis of household expenditures on transportation.

The formula used is:

$$T = P + I*E_2$$

Where:

T: Annual growth rate for passenger travel

P: Annual growth rate of population for the province

I: Annual growth rate of per capita income for the province

E_2: Elasticity of passenger travel demand to change in per capita income for the region

The growth rates and demand elasticity described above (T,P and I), for each province and for different transport modes are shown in Exhibits 4, 5 and 6.

The elasticity of passenger travel demand to change in per capita income for regional travel is assumed to be the same as that for jeepney travel as determined by previous DPWH studies (Exhibit 6).

The estimated annual growth rate for regional passenger travel through Caramoan Port is 4.27%.

4. VESSEL THROUGHPUT

Daily commercial vessel throughput was determined by survey and represents effective vessel throughput except during periods of inclement weather.

Commercial vessels are defined as those registered vessels in excess of three DWT. Commercial vessels are projected to increase at the same rate as passenger travel.

Table 3-1 displays the throughput projections described above for passengers and cargos.

TABLE 3-1

CARAMOAN PORT THROUGHPUT PROJECTIONS

COMMODITY	1989/90 SURVEY	1992 PROJECTED	2001 PROJECTED	2011 PROJECTED
FISH (i) (tons per year)				
1 Off shore	150	150	150	150
2 Marginal	510	510	510	510
3 Ipon	0	0	0	0
4 Bangus	0	0	0	0
5 Transhipped	0	0	0	0
Total:	660	660	660	660
% of 1992:	100%	100%	100%	100%
CARGO (tons per year)				
1 Rice (ii)	1,054	1,092	1,301	1,551
2 Consumables (iii)	872	948	1,440	2,188
3 Bagged Cargos (ii)	1,461	1,513	1,803	2,149
4 Bottled Cargos (ii)	5,725	5,929	7,067	8,422
5 Fuels & Oils (iii)	802	872	1,325	2,012
6 Others (iii)	364	396	601	913
Total:	10,278	10,750	13,537	17,235
% of 1992:	96%	100%	126%	160%
PASSENGERS (per year)				
1 Local (5%)	14,800	16,091	24,444	37,134
2 Regional (60%)	177,600	193,091	293,329	445,604
3 Inter-Island (35%)	103,600	112,636	171,109	259,936
(iv) Total:	296,000	321,818	488,882	742,674
% of 1992:	92%	100%	152%	231%
VESSELS (per day)				
1 Scheduled	6.0	6.2	7.4	8.8
2 And/Or Unscheduled	14.0	14.5	17.3	20.6
3 Scheduled Inter-Island	0.0	1.0	1.2	1.4
4 And/Or Unscheduled	0.0	0.0	0.0	0.0
(v) Total:	20.0	21.7	25.9	30.8
% of 1992:	92%	100%	119%	142%

SOURCE: Consultant's surveys

Basis: (1992 Projections)

(i) 510 tons marginal fish not projected to increase and diversion
150 tons commercial fish not projected to increase.

(ii) 8,534 tons rice, bagged and bottled cargos projected to increase with population at 1.77% per year (Exhibit 5).

(iii) 2,216 tons projected to increase at a rate equal to the product of population growth, income growth and an income demand elasticity of 0.5. This is the same formula used to to determine the growth in banca travel demand (Exhibit 6).

(iv) 321,818 passengers increasing at 4.27% per year or the same rate as for banca travel demand (Exhibit 6).

(v) 21.7 vessels per day projected to increase at the same rate as passenger travel (Exhibit 6).

IV.
ENGINEERING DESIGN

24

IV. ENGINEERING DESIGN

A. DATA COLLECTION

1. RECONNAISSANCE SURVEY

A reconnaissance of the Port of Caramoan was conducted on January 19 to 21, 1990.

Prior to the visit to the port, the survey team conferred on January 18, 1990 with the DPWH Regional Director, Mr. Mario Talatala and his staff in Legazpi City.

In Pili, Camarines Sur, the team met in the DPWH Second District Engineering office with the following officials:

Engr. Boanerges Relativo	-	District Engineer, Camarines Sur
Engr. Alfonsito Padua	-	Assistant District Engineer
Engr. Rolando Arroyo	-	Chief Planning and Design Section
Engr. Herminio Odiado	-	Civil Engineer
Engr. Gualberto Pasiona	-	Head Survey Unit

The team reached the port site by first travelling from Naga City to Sabang Port in San Jose on a sixty-six kilometer concrete and asphalt road. Then the team took a 2-1/2 hour motor boat ride across the Lagonoy Gulf, in rough seas, from Sabang Port to Caramoan Port. The Lagonoy Gulf can have very rough water since it is directly open to the Pacific Ocean.

2. EXISTING FACILITY

The existing facility (Appendix C, Plates C-1 through C-6). consists of a 182 meter long rock causeway with a three-meter wide deck (Figure A-5). There is a 172 meter long concrete stairlanding on the west side of the causeway. On the east side, a seventy-two-meter concrete stairlanding is provided.

A sixty meter long seawall perpendicular to the causeway was constructed near the shore.

Generally, the facility is in good condition except for minor cracks and concrete spalling on the rock causeway slope and stairlandings.

3. METEOROLOGICAL AND HYDROLOGICAL CONDITIONS

a. Climate

The climate of Caramoan can be categorized as tropical with heavy rains.

Climatological data for the Caramoan area is not available. The nearest weather station to Caramoan is in Legazpi, Camarines

Sur. Climatological data recorded at this station is used as reference due to its proximity to the subproject port site (Exhibits 13 and 14).

b. Rainfall

Legazpi has a total annual rainfall average of 3,300 millimeters, which is evenly distributed throughout the year. The greatest daily rainfall ever recorded in Legazpi was 485 millimeters (Exhibit 14).

c. Temperature

The coolest month is January, which averages 25.3°C. The warmer months are May and June, which average 28.1°C each.

Daily temperatures vary between a minimum of 23.2°C and a maximum of 30.7°C. The coldest recorded temperature for the area is 13.9°C while the highest recorded temperature reached 37.3°C.

d. Winds

Northeast winds prevail over the area from January to June and October to December. Maximum wind speeds are approximately four meters per second. Southwest to west winds occur from July to September. The highest wind ever recorded in Legazpi was fifty-seven meters per second.

The port is exposed to the southwest. Winds at the port site could become very strong during the typhoon and southwest monsoon seasons.

e. Tides

No tide readings are taken at the port site.

The tidal data for the Port of Caramoan as referred from National Mapping and Resource Information Authority (NAMRIA) are as follows:

Tidal Type:	Semi-Diurnal
Mean Range (MLW-MHW):	1.22 meters
Diurnal Range (MLLW-MHHL):	1.46 meters

f. Waves

The maximum wave height calculated for Caramoan Port using typical storm data is approximately three meters.

4. SITE TOPOGRAPHY AND HYDROGRAPHY

No subcontractor topographic/hydrographic survey has yet been done for Caramoan Port. Available topo/hydro data was supplied by the DPWH Second Engineering District Office

(Appendix A, Figures A-3 and A-4). This data has been compared with surveys and photographs recently taken at the port site.

The port is situated on relatively flat ground. It is bounded by mountains on the north, east and west. A river runs across the community and discharges near the west end of the seawall.

5. AVAILABILITY OF CONSTRUCTION MATERIALS

Materials required from the immediate area for construction of the port facilities include:

- Sand
- Gravel
- Rocks

The above materials are available at the sites indicated in Figure A-6. Round timbers to be used as fender piles must be procured from Manila. Other building materials are readily available in major cities of Region V and in Manila.

6. SOIL SUBSURFACE CONDITION

The predominant rock type at Caramoan is an extensive reef limestone with sporadic, terrace gravel deposits. This is overlain by mostly submarine andesites, basalt flows intercalated with pyroclastics and clastic sediments. Recent deposits and coral reefs form the beaches.

Caramoan Port is partly founded on recent deposits of marine clastic sediments of medium to fine sand with coral and shell fragments and partly on coral reef.

7. SEISMIC CONDITIONS

The Philippines is located along the peripheral boundary of the Pacific earthquake belt. The Bicol Region, where Caramoan Port is located, experiences an average of four perceptible seismic shocks per year. Earthquake intensities of over 5.0 on the Richter Scale are not uncommon in the Philippines (Figure A-7). Only very recently (July 16, 1990) an earthquake of intensity 7.7 on the Richter Scale hit Central Luzon and caused severe damage. Design of any structure at Caramoan will take into account earthquake forces.

B. PRELIMINARY DESIGN

1. PROPOSED FACILITY

The proposed upgrades (Figures 4-1 and A-8 through A-16) at the existing port include:

- A fifty-meter extension of the rock causeway including reinforced concrete stairlandings on both sides

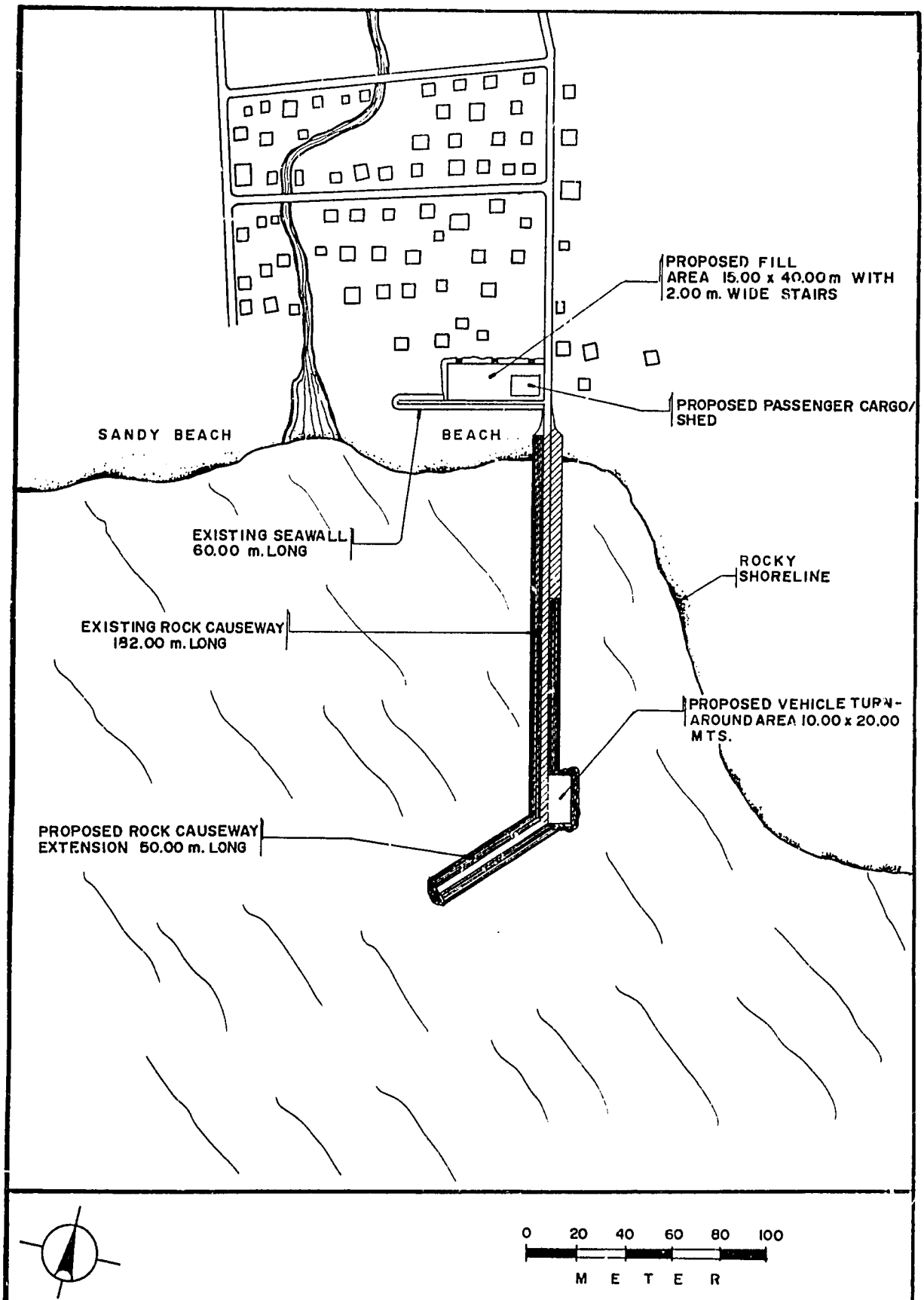
- A vehicle turn-around area near the offshore end of the causeway

- A landfill area on shore

- A port building

2. DESIGN AND CONSTRUCTION

The proposed causeway extension is a rockmound structure. The proposed causeway would be constructed in three layers consisting of core, underlayer and armour rocks.



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

PLAN - PROPOSED CARAMOAN PORT FACILITIES

FIGURE 4-1

V.
COST ESTIMATES

V. COST ESTIMATES

A. COST OF PROPOSED PORT FACILITIES

The proposed port facilities are shown in Figures A-8 through A-16. The construction cost of the causeway extension, port building and landing area is estimated at P. 8,536,000.

B. UNIT RATES

The construction costs were determined by applying unit rates to the quantities. Unit rates are presented in Exhibit 10. This list of unit rates was developed from available data of current contracts for construction of ports at various locations in the country. In general, unit rates for port construction vary from port to port depending on the remoteness of the port. Applied unit rates are based on 1990 costs.

C. REMOTENESS FACTOR

An evaluation was made by comparing awarded contract unit prices for port subprojects at various locations throughout the Philippines. Subprojects on smaller, remote islands far from urban centers (Manila, Cebu, or Davao) or at sites accessible only by water were typically more expensive to construct than similar subprojects readily accessible by road. Therefore, a remoteness factor has been included in the cost estimate to help quantify the additional, above-normal mobilization and procurement costs required when constructing a port improvement at a remote location. This factor has been derived for each port subproject using the appropriate cost data available from other, similar port construction contracts.

Caramoan Port is not accessible by roadway from Manila or anywhere else on Luzon. Therefore, all materials and equipment must be shipped to the site, probably from Bagacay, a river port. After due consideration regarding this condition, the remoteness factor for Caramoan has been assumed at 1.10.

D. CONTINGENCIES AND OTHER COSTS

A contingency factor of 10% has been taken into account for all port improvement construction. However, adverse construction conditions or unforseen obstacles are more likely for in-water construction than land-based construction. Typically, this extra uncertainly or contingency is reflected in higher unit rates for in-water construction instead of a separate, higher contingency factor. The unit rates presented in Exhibit 10 are derived in keeping with this method.

The following additional costs are tabulated in the manner shown in the Cost Estimate Summary (Table 5-1).

- Contractor's Site-Related Costs:

- Mobilization and demobilization		2%
- Surveying		1%
- Engineer's building at site		1%
- Office supplies, watchman, janitor		1%
- Site supervision		4%
	Total	9%

- Contractor's Overhead and Profit: (based on DPWH Standards)

- Contractor's Overhead		10%
- Contractor's Profit		9%
	Total	19%

E. ECONOMIC AND FINANCIAL COST ESTIMATE

The economic and financial analyses of this subproject have been made based on the data shown in Table 5-1. The economic cost of construction components typically varies between 70% and 90% of the financial cost. The economic and financial costs of the proposed facilities of Caramoan are tabulated in the estimate.

F. CONSTRUCTION PERIOD

The estimated construction time required for the proposed port improvement is between twelve and fourteen months, provided that the required equipment is on site or can be readily mobilized from Manila or other urban centers.

TABLE 5-1 - COST ESTIMATE SUMMARY
THE PORT OF CARAMOAN
(Sheet 1 of 1)

ITEM	DESCRIPTION	UNIT	UNIT COST (Pesos)	QUANTITY	COST COMPONENTS [1000 Pesos (% of Financial Cost.)] FOREIGN	LOCAL	TAXES	ECONOMIC COST (1000 P)	FINANCIAL COST (1000 P)
	I. CAUSEWAY AND VEHICLE TURNAROUND AREA								
22	Crushed Aggregate Base Course	CU.M.	240	86	11 (52%)	5 (22%)	5 (26%)	16	21
33	Portland Cement Concrete Pavement	SQ.M.	400	390	78 (50%)	48 (31%)	30 (19%)	126	156
50	Reinforcing Steel	KG	21	45,800	433 (45%)	423 (44%)	106 (11%)	856	962
64	Structural Concrete, Class A (over water)	CU.M.	3,300	305	352 (35%)	503 (50%)	151 (15%)	855	1,006
68	Core Rock for Causeway or Breakwater	CU.M.	260	563	73 (50%)	44 (30%)	29 (20%)	117	146
69	Underlayer Rock	CU.M.	450	863	194 (50%)	117 (30%)	78 (20%)	311	389
71	Armor Rock, Large (larger than 1 ton)	CU.M.	690	2,676	923 (50%)	554 (30%)	369 (20%)	1,477	1,846
	TOTAL				2,064 (46%)	1,894 (37%)	768 (17%)	3,758	4,526
	II. PASSENGER AND CARGO PLATFORM AND SHED								
9	Compacted Fill, Select Material, Borrow	CU.M.	70	1,755	58 (47%)	34 (28%)	31 (25%)	92	123
22	Crushed Aggregate Base Course	CU.M.	240	117	15 (52%)	6 (22%)	7 (26%)	21	28
33	Portland Cement Concrete Pavement	SQ.M.	400	660	132 (50%)	82 (31%)	50 (19%)	214	264
50	Reinforcing Steel	KG	21	1,700	16 (45%)	16 (44%)	4 (11%)	32	36
64	Structural Concrete, Class A (over water)	CU.M.	3,300	11	13 (35%)	18 (50%)	5 (15%)	31	36
81	Open Building	S.M.	3,070	100	126 (41%)	135 (44%)	46 (15%)	261	307
82	Comfort Rooms, incl. Walls (no foundation, no roof)	S.M.	1,500	24	15 (41%)	16 (44%)	5 (15%)	31	36
108	Grouted Riprap	CU.M.	1,000	83	17 (21%)	56 (67%)	10 (12%)	73	83
	TOTAL				392 (43%)	363 (40%)	158 (17%)	755	913

SUBTOTAL	4,513	5,439
Remoteness Factor : 1.10	451	544
SUBTOTAL	4,964	5,983
Contingencies (10%)	496	598
SUBTOTAL	5,461	6,581
Site Costs (9%)	491	592
SUBTOTAL	5,952	7,173
Overhead & Profit (19%)	1,131	1,363
TOTAL COST	7,083	8,536

VI.
ECONOMIC EVALUATION

VI. ECONOMIC EVALUATION

A. INTRODUCTION

Feeder port subprojects have to meet certain economic criteria to prove that the necessary investments will be beneficial to the community. All RIF port subprojects are subject to the following evaluation:

- an economic evaluation with a cut-off of 15% economic internal rate of return (EIRR)

The **economic evaluation** of feeder port subprojects is performed by using a Port Evaluation Model (Table 6-1). This spreadsheet model permits the easy economic evaluation of improvement proposals and alternatives for the proposed port subprojects. These alternatives can include the additional provision or extension of breakwaters, causeways, piers, seawalls and port buildings.

The main inputs to the model, drawing on the data discussed earlier, are:

- Traffic forecasts (Chapter III)
- Static port vessel capacities (Exhibit 11)
- Optimum vessel capacities (Exhibit 11)
- Representative vessel standby and operating costs (Exhibit 11)
- Value of passenger time (Exhibit 6)
- Construction costs for each alternative (Chapter V)

The benefits quantified can include vessel operating cost savings, time cost savings and maintenance cost savings as well as reduced handling, spoilage and development benefits. The economic evaluation of this subproject has been carried out with the following assumptions:

- The subproject life is assumed to be twenty years.
- For discounting purposes, annual values are assumed to be incurred at the end of each year.
- The opportunity cost of capital is set at 15%.

The benefits not quantified are:

- The expected new revenue opportunity for vessel, passenger, cargo and fish landing fees presented by the proposed new facilities (Chapter VII)

- Social benefits and some indirect development benefits

B. SUBPROJECT BENEFITS

The proposed construction consisting of causeway extension with stairlandings, a port building and a landing platform entails the improvement and expansion of an existing facility. Consequently, social benefits will not be as pronounced as might otherwise be the case.

There are two ports within th Municipality of Caramoan. The proposed subproject port in Barangay Guijalo is the more important except with respect to marginal (inner-coastal) fish landings which appear to be about equally divided between the two ports.

The principal requirement for extending to a deep-water berth and moorage and to improve other facilities supports the growing role of Caramoan Port at Guijalo as a regional redistribution center. Currently, the west side of the present causeway is not accessible to vessels larger than small-motor bancas at low tide due to shallow water alongside and rocks strewn about the berthing area. This problem is not as apparent on the east side, but fully-loaded vessels still cannot berth at low tide and have to resort to "lightage" services to ferry passengers and cargos ashore.

Consequently, the principal sources of assured benefits from the proposed construction will be from vessel and passenger port time savings and from reduced fish and consumable handling and spoilage costs.

Direct economic benefits for the 1992 base year have been estimated as follows:

1. VESSEL TURN-AROUND SAVINGS

Commercial vessel turn-around savings reflect the reduced time to approach the berth and the reduced time in port due to the provision of stairlandings on the improved and repaired causeway.

Commercial vessels are defined as vessels of three DWT and greater registered with the government.

The following data and assumptions were used to estimate the 1992 benefits due to vessel turn-around savings:

- 21.7 commercial vessels per day (Table 3-1)
- One-half of vessel arrivals and departures are during periods of low tide and will realize full benefit from the enlarged causeway and stairlandings.
- 300 active sailing days per year for commercial vessels
- One hour per day saved by commercial vessels
- P. 104 per hour standby costs for large bancas considered representative of bancas launches now in service to and from Caramoan (Exhibit 11)
- 4.27% per year increase in banca passenger travel demand in Camarines Sur (Exhibit 6)

Using these data and assumptions, the 1992 benefit due to vessel turn-around savings would be P. 338,500. This is projected by multiplying the 1992 benefit by the factor 1.0427.

2. PASSENGER TIME SAVINGS

Passenger time savings reflect the savings due to the reduced time taken for vessels to approach the berth and the accelerated discharge and embarkation of passengers made possible through the addition of stairlandings to the rehabilitated causeway.

The following data and assumptions were used to estimate the 1992 benefits due to passenger time savings:

- 321,818 passengers in 1992 (Table 3-1)
- One-half of passenger arrivals and departures are during periods of low tide and will realize full benefit from the enlarged causeway and stairlandings
- P. 2.584/hour as the value of passenger in 1990 time projected to increase with per capita income growth of 5.00% per year (Exhibits 5 and 8)
- 1/2 hour saved per trip including vessel berth approach time savings
- 4.27% as the projected annual traffic demand increase for travel by medium banca (Table 3-1 and Exhibit 6)

Using these data and assumptions, the 1992 benefit due to savings in passenger time would be P. 229,200. This is

projected by multiplying the 1992 benefit by the factors 1.0500 and 1.0427.

3. HANDLING COST SAVINGS

Handling cost savings at the proposed new facility resulting from the addition of stairlandings adjacent to the port building are estimated at P. 5 per ton handled and from the alleviation of congestion evident at all present facilities.

Fish volumes are not projected to increase over the forecast period (Table 3-1).

Base cargo volumes for rice, bagged and bottled cargos consist generally of inelastic demand commodities and are projected to increase directly with population projections for Camarines Sur of 1.77% per year (Table 3-1 and Exhibit 4).

Other cargos are projected to increase with populations, per capita income growth and an income demand elasticity of 0.5 for a net annual growth of 4.27% per year.

The following data and assumptions were used to estimate the 1992 benefits due to handling cost savings:

- 660 tons of marginal and commercial fish per year not projected to increase over the forecast period
- 8,534 tons of base cargos increasing with population by 1.77% per year
- 2,216 tons of other cargo volumes increasing by 4.27% per year
- Savings estimated at P. 5 per ton handled

Using these data and assumptions, the 1992 benefit due to handling cost savings would be P. 57,100. This is projected by multiplying the 1992 base cargo benefit by factor 1.0177 and the 1992 other cargo benefit by 1.0427.

4. REDUCED SPOILAGE SAVINGS

There are important reduced spoilage savings due to the provision of a new port building at Caramoan.

However, there are already some facilities available and consequently the benefit is calculated at one-half of the industry standard of 2% spoilage for fish and 1% spoilage for consumables.

The following data and assumptions were used to calculate the 1992 benefits due to reduced spoilage:

- One-half of 2% of 660 tons of fish per year at P. 20,000 per ton not increasing

- One-half of 1% of 1,948 tons of consumables per year at P. 40,000 per ton increasing at 4.27% per year (Exhibit 6)

Using these data and assumptions, the 1992 benefit due to spoilage savings would be P. 521,600. The is projected by multiplying the 1992 benefit due to spoilage savings by the factor 1.0427.

5. DEVELOPMENT BENEFITS

Development benefits are considered as those derived from economic development generated by the proposed port improvement or construction.

The generated activities are related to the type of the proposed investment and may occur in the port's hinterland or in the origin or destination of the port's users (passengers and cargo). The additional development may originate in extending agricultural frontiers by cultivating areas that were not cultivated before, by improving agricultural technology, by attracting new tourists to the area, by increasing fish catch, by initiating or increasing mineral exploitation, etc.

These benefits are added to the direct savings resulting from the existing activities in the port, measured by savings in future port rehabilitation and maintenance, port operation, transport cost, passenger travel time, elimination of spoilage, etc.

In order to attribute development benefits to a specific port investment, one must be sure that the existing port condition and the facilities are the principal constraints for that development.

The following four threshold criteria are considered essential to determine if further analysis of possible development benefits is required:

- Investment Type

The proposed investment is classified as:

  - Construction of a new port
  - Increasing the number of months of service during the year or upgrading the port to an all-weather port
  - Significantly increasing the port's capacity in terms of space or vessel type

- Complimentary Investment

In order to generate the new activities, an additional substantial complimentary investment is not required.

o Transport System

The transport system will fall into one of the following categories:

- The port is the only outlet for passenger or cargo movements from and to its hinterland
- There is no alternative all-weather transport system, cheaper than the proposed port, which serves its hinterland
- There is an effective port capacity constraint

o Development Potential

An unexploited potential is identified in the port's hinterland (sea or land).

The Port of Caramoan is currently used as a transfer point for goods being transported either between Legazpi/Tabaco or Naga/Pili and points on the Caramoan Peninsula or Catanduanes Island. This is only marginally attributed to the road from the port area to Lagonoy which at present is not accessible to motor vehicles.

The Caramoan Port hinterland is hilly and mountainous. The agricultural activities on a limited scale are rice, vegetable, rootcrops, corn and fruit trees with coconut production being the most extensive crop. Exportable crops are transported by boats to one of Sabang, Sagnay (Nato) or Tabaco where well developed roads connect these ports to market outlets and distribution centers in Naga, Pili and Legazpi.

The Lagonoy Gulf is rich in fish. The port extension together with the provision of a port building will most likely help the local fishermen. But it is the Consultant's opinion that the possibility of generating additional fish catch going to the Naga City market is related to the road improvement from Caramoan to Lagonoy, which requires a substantial complimentary investment to that proposed for the port.

There are several mineral deposits under current and active evaluation by foreign interests in the region. Given an improved peace and order situation on the Caramoan Peninsula, the upgraded facilities at Caramoan should enhance their early development. A closer study of this proposed development may be necessary to determine the benefits that can be attributed to the port subproject.

C. SUBPROJECT COSTS

1. CONSTRUCTION COSTS

Subproject costs are developed and described in detail in Chapter V.

2. MAINTENANCE COSTS

Maintenance costs are projected to commence at 2% of original investment costs and to increase thereafter at 8.5% per year until the asset is replaced.

D. ECONOMIC EVALUATION

Table 6-1 presents the results of the economic evaluation undertaken.

The improvement recommended is for the repair and extension of the present causeway and the addition of stairlandings to the causeway, the construction of a new port building and a landing platform.

Benefits are calculated as described previously. The results of the analysis for the base case are:

- Net Present Value (15%) P. 603,000
- Benefit Cost Ratio 1.09
- EIRR (%) 16.16%

E. SENSITIVITY EVALUATION

The proposed program was found (Table 6-1) to be economically feasible with an EIRR in excess of 15%. However, each of the following sensitiviy scenarios undertaken has an EIRR of less than 15%:

Costs:	+15%	+0%	+15%
Benefits:	-0%	-15%	-15%
Net Present Value (1%)	(684.3)	(774.7)	(2,062.0)
Benefit/Cost Ratio	0.89	0.89	0.75
EIRR (%)	13.81%	13.44%	11.24%

F. RECOMMEN[illegible]

Since the [illegible] provement for the Port of Caramoan has a base EIRR [illegible] which is above the minimum 15% requirement, t[illegible] recommends constructing the proposed upgrades as out[illegible] apter IV.

TABLE 6-1

ECONOMIC ANALYSIS (1000 Pesos)

PORT: Caramoan LOCATION: Guijalo, Camarines Sur

YEAR	VESSEL SAVINGS (1)	PASSENGER TIME SAVINGS (2)	HANDLING SAVINGS (3)	SPOILAGE SAVINGS (4)	NET MAINTENANCE COST (5)	PROJECT COSTS (6)	NET BENEFIT STREAM (7)
1991	0.0	0.0	0.0	0.0	0.0	7,083.0	(7,083.0)
1992	338.5	229.2	57.1	321.6	141.7	0.0	804.7
1993	370.6	250.9	57.5	329.7	153.7	0.0	855.1
1994	405.8	274.7	58.8	338.1	166.8	0.0	910.7
1995	444.3	300.8	60.1	346.9	180.9	0.0	971.1
1996	486.4	329.3	61.4	356.1	196.3	0.0	1,036.9
1997	532.5	360.5	62.7	365.7	213.0	0.0	1,108.5
1998	583.0	394.7	64.1	375.7	231.1	0.0	1,186.4
1999	638.3	432.2	65.6	386.1	250.8	0.0	1,271.3
2000	698.8	473.2	67.0	396.9	272.1	0.0	1,363.9
2001	765.1	518.0	68.5	408.2	295.2	0.0	1,464.7
2002	837.7	567.2	70.1	420.0	320.3	0.0	1,574.7
2003	917.1	621.0	71.7	432.3	347.5	0.0	1,694.6
2004	1,004.1	679.8	73.4	445.1	377.1	0.0	1,825.4
2005	1,099.3	744.3	75.1	458.5	409.1	0.0	1,968.1
2006	1,203.6	814.9	76.8	472.5	443.9	0.0	2,123.8
2007	1,317.7	892.2	78.6	487.0	481.6	0.0	2,293.9
2008	1,442.7	976.8	80.4	502.2	522.5	0.0	2,479.5
2009	1,579.5	1,069.4	82.4	518.0	567.0	0.0	2,682.3
2010	1,729.3	1,170.8	84.3	534.4	615.2	0.0	2,903.7
2011	1,893.3	1,281.9	86.3	551.6	667.4	0.0	3,145.7
TOTAL	18,287.4	12,381.9	1,401.8	8,446.7	6,853.1	7,083.0	26,581.8

TOTAL BENEFITS: 40,518 COSTS: 13,936

RESULTS:

Net Present Value (15%)	603.0	(1000 Pesos)
Benefit Cost Ratio	1.09	
EIRR (%)	16.16%	

SENSITIVITY ANALYSIS:

	Costs:	+15%	+0%	+15%
	Benefits:	+0%	-15%	-15%
Net Present Value (15%)		(684.3)	(774.7)	(2,062.0)
Benefit Cost Ratio		0.92	0.89	0.75
EIRR (%)		13.81%	13.44%	11.24%

VII.
FINANCIAL ANALYSIS

VII. FINANCIAL ANALYSIS

A. INTRODUCTION

The terms of reference require the study to determine if the proposed project could be sustained by the responsible municipality from revenues generated by the port as a whole. This analysis assumes that the municipality is prepared to assess wharfage, layover, cargo, passenger and concession fees as is currently undertaken at Caramoan (Guijalo) on the Lagonoy Gulf. Further, it has been assumed that the municipality is prepared to increase such fees proportionate to the projected growth in per capita income until the port becomes self-sustaining.

Although Caramoan assesses such fees, it should be noted, however, that the assessment and collection of port fees by municipalities is the exception rather than the rule throughout the Philippines.

In any case, it has been assumed that a depreciation fund will be set aside just as soon as revenues exceed maintenance costs or at the tenth year, whichever is the later. In the case of Caramoan, this is not likely to occur before the end of the tenth year, after which time funds equal to 5% of the original costs are to be deposited. The effective depreciation period is therefore thirty years.

The Financial Analysis for the proposed facility is presented in Tables 7-1 at the end of this chapter.

B. REVENUES

Vessel wharfage revenues (Table 7-1 Column 1) have been projected by multiplying the number of commercial inter-island and local vessels larger than thr[illegible] DWT by a wharfage fee of P. 20 per day for inter-island and [illegible] banca-type vessels.

Vessels have been project[illegible] call on the proposed new facility the equivalent of 300 [illegible] r year.

Cargos and passengers car[illegible] inter-island and local bancas and launches are proje[illegible] increase in excess of population increases which wi[illegible] e partly compensated by inter-island vessels slowly evolving to larger capacities over the forecast period. Consequently, vessel arrivals and departures are projected to increase with the projected population growth of 1.77% per year (Table 3-1 and Exhibit 4).

Fee schedules are projected to increase with the projected increase in per capita incomes for Camarines Sur at 5.00% per year (Exhibit 5).

Vessel layover revenues (Column 2) have been determined in an identical manner for the balance of sixty-five port days per year.

Cargo fees (Column 3) are assumed applicable to the projected base cargo landings of 8,534 tons and other cargo landings of 2,216 tons (Table 3-1).

Base cargos are projected to increase with population at 1.77% per year (Exhibit 4). Other cargos are projected to increase at 4.27% per year (Exhibit 6).

Cargo fee schedules are projected to increase from a base level of P. 20 per ton handled directly with the projected increase in per capita incomes for Camarines Sur at 5.00% per year (Exhibit 5).

Stevedore, or **arrastre fees** (Column 4) are generally assessed at a rate of P. 20 per ton of cargo or commercial fish handled. Fees are not assessed for non-commercial fish landings. Only about 10% of the fees are normally allocated to a municipality by the arrastre firms.

Fees are projected to increase with the projected increase in per capita incomes at 5.00% per year (Exhibit 5).

Passenger fees (Column 5) should be the easiest to collect at a base assessment of P. 0.50 per passenger.

Passenger volumes are projected to increase at the same rate projected for banca travel demand in Camarines Sur at 4.27% per year (Exhibit 6).

Base passenger fee levels are projected to increase in proportion to the projected increase in per capita income of 5.00% per year. Fifty percent of the passenger fees collected are generally retained by longshore unions or port employee benevolent funds as a kind of service commission (Exhibit 5).

Transit fee (Column 6) opportunities, other than those for surplus fish exports, are not apparent at this time for Caramoan Port since their imposition would likely divert transit cargos now passing through Caramoan to other routings.

Concession fee (Column 7) opportunities at the proposed new port building should be substantial but limited by the available lease space of about fifty square meters. Potential annual revenues for such space has been estimated at P. 600 per square meter per year increasing with the projected increase in per capita income for Camarines Sur at 5.00% per year (Exhibit 5).

C. OPERATING EXPENSES

Maintenance (Column 8) is estimated at 2% of the initial investment costs for the first year. Maintenance costs are assumed to increase at 8.5% per year over the life of the asset.

Wages (Column 9) are estimated for six employees in year one at the proposed facility.

Employees are projected to increase at the same rate as base cargos and populations at 1.77% (Exhibit 4).

Wages are projected to increase from P. 6,000 per employee per year in 1990 at 5.00% per year, which is the same rate projected for per capita income in Camarines Sur (Exhibit 5).

Total Expenses (Column 10) are those expenses before any provision for asset replacement.

Total revenues (Column 11) are those prospective revenues already described. **Net revenues** (Column 12) are prospective revenues less prospective operating costs before depreciation.

The **net recovery factor** (Column 13) is the percentage of costs before depreciation recovered from the proposed service fee assessments. Over the forecast period of twenty years, this factor is 172.4% of costs.

Depreciation fund contributions (Column 14) are assessed in this appraisal as 5% of the original improvement costs commencing after the initial ten years.

The **adjusted net cost recovery factor** (Column 15) reflects the application of the depreciation fund contribution charge. Overall, the port is projected to be able to recover 118.8% of the costs over the forecast period.

D. CONCLUSION

It is the consultant's judgement that the proposed subproject for Caramoan Port at Guijalo Barangay could be maintained by the Municipality of Caramoan without undue supplement from general revenues provided the municipality continues to assess the suggested port fees and charges in the manner projected in this analysis.

TABLE 7-1

FINANCIAL ANALYSIS (1000 Pesos)

PORT: Caramoan LOCATION: Guijalo, Camarines Sur

	REVENUES							OPERATING EXPENSES		SUMMARY RESULTS				DEPRECIATION	
	Vessel Whrfge. (1)	Vessel Layover (2)	Cargo Fees (3)	Arrastre Fees (4)	Psgr. Fees (5)	Transit Fees (6)	Cncssion Fees (7)	Mntnce. (8)	Wages (9)	Total Expenses (10)	Total Revenues (11)	Net Revenues (12)	Cost Rcvry Fctr (13)	Deprec. (14)	Adj. Cost Rcvry Fctr (15)
1992	130.2	26.0	215.0	21.5	80.5	n/a	30.0	185.2	36.0	221.2	503.2	282.0	227.5%	0.0	227.5%
1993	139.1	28.5	219.9	22.0	88.1	n/a	31.5	201.0	38.5	239.4	529.1	289.7	221.0%	0.0	221.0%
1994	148.7	31.2	225.0	22.5	96.4	n/a	33.1	218.1	41.1	259.2	556.9	297.7	214.9%	0.0	214.9%
1995	158.9	34.2	230.1	23.0	105.6	n/a	34.7	236.6	43.9	280.5	586.5	306.0	209.1%	0.0	209.1%
1996	169.8	37.4	235.5	23.5	115.6	n/a	36.5	256.7	46.9	303.6	618.3	314.6	203.6%	0.0	203.6%
1997	181.4	41.0	241.0	24.1	126.6	n/a	38.3	278.5	50.2	328.7	652.3	323.6	198.4%	0.0	198.4%
1998	193.8	44.8	246.6	24.7	138.6	n/a	40.2	302.2	53.6	355.8	688.7	332.9	193.6%	0.0	193.6%
1999	207.1	49.1	252.4	25.2	151.7	n/a	42.2	327.9	57.3	385.2	727.8	342.6	189.0%	0.0	189.0%
2000	221.4	53.8	258.3	25.8	166.1	n/a	44.3	355.8	61.2	417.0	769.7	352.7	184.6%	0.0	184.6%
2001	236.5	58.9	264.4	26.4	181.8	n/a	46.5	386.0	65.4	451.4	814.7	363.3	180.5%	426.8	92.8%
2002	252.8	64.4	270.7	27.1	199.1	n/a	48.9	418.8	69.9	488.7	863.0	374.3	176.6%	426.8	94.3%
2003	270.1	70.5	277.2	27.7	218.0	n/a	51.3	454.4	74.7	529.1	914.9	385.8	172.9%	426.8	95.7%
2004	288.6	77.2	283.9	28.4	238.6	n/a	53.9	493.0	79.8	572.8	970.6	397.8	169.4%	426.8	97.1%
2005	308.4	84.6	290.7	29.1	261.3	n/a	56.6	534.9	85.3	620.2	1,030.6	410.4	166.2%	426.8	98.4%
2006	329.6	92.6	297.8	29.8	286.0	n/a	59.4	580.4	91.1	671.5	1,095.2	423.6	163.1%	426.8	99.7%
2007	352.2	101.4	305.0	30.5	313.2	n/a	62.4	629.7	97.4	727.1	1,164.6	437.5	160.2%	426.8	100.9%
2008	376.3	111.0	312.5	31.3	342.9	n/a	65.5	683.3	104.1	787.3	1,239.4	452.1	157.4%	426.8	102.1%
2009	402.1	121.5	320.2	32.0	375.4	n/a	68.8	741.3	111.2	852.5	1,320.0	467.5	154.8%	426.8	103.2%
2010	429.7	133.0	328.1	32.8	411.0	n/a	72.2	804.4	118.8	923.2	1,406.9	483.7	152.4%	426.8	104.2%
2011	459.2	145.6	336.3	33.6	450.0	n/a	75.8	872.7	127.0	999.7	1,500.5	500.8	150.1%	426.8	105.2%
Total	5,255.9	1,406.7	5,410.8	541.1	4,346.3	0.0	992.0	8,960.9	1,453.2	10,414.2	17,952.7	7,538.5	172.4%	4,694.8	118.8%

VIII.
SOCIAL SOUNDNESS ANALYSIS

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VIII. SOCIAL SOUNDNESS ANALYSIS

Social soundness analyses evaluate the effect of construction projects from the perspective of the intended beneficiaries, local residents and institutions in the zone of influence. This analysis focused on effects on income, population movements and cultural minorities. In brief, anticipated social benefits are positive.

Caramoan is an active fishing, trading and passenger port used primarily by fishermen, small, relatively low-income merchants and local residents. Upgrading the facilities will enhance their transactions, resulting in both increased incomes and eased social interactions.

Merchants using Caramoan Port generally deal in small quantities of various retail items such as sugar, salt, tobacco, vegetables, and consumables of all kinds. The port is sometimes used by farmers exporting crops such as rice and vegetables. Caramoan is also a fishing port. The Lagonoy Gulf is the principle source of fish for the area.

Passengers and cargos coming from Catanduanes currently utilizes Tabaco Port in Albay. With the port subproject in Caramoan, the route from Catanduanes shall be shortened in terms of time and distances for seawater transport. The Municipality of Garchitorena south of Caramoan will also be served and linked to Caramoan. Passengers from the Ports of Sabang and Sagnay on the Caramoan Peninsula will also be served.

Improving of Caramoan Port will not result in any significant population migration.

There are no vulnerable cultural minorities in the area that might be adversely affected by the proposed construction.

In conclusion, since the proposed construction is the improvement of an existing port, social benefits will not be as pronounced as they would be for a new port, but all anticipated social impacts are positive. They will serve primarily middle- and lower-class residents of the area rather than any privileged group. Thus, the project is socially sound.

For further analysis, refer to the Social Soundness Overview included in Appendix D.

IX.
ENERGY ANALYSIS

IX. ENERGY ANALYSIS

Energy savings derived from these proposed port improvements can be primarily attributed to the economies of consumption and the economies of scale. The economies of consumption result from a faster turn-around time at the improved port. Less time spent at the port allows more time for transit while maintaining the same transportation schedule. Transit at reduced speeds results in more efficient fuel consumption and realized energy savings.

The economies of scale evolve from the use of larger vessels made possible through port improvements. Approximately twice the amount of cargo or passengers can be shipped in a larger vessel at only a 50% increase in energy consumption.

A secondary but important source of energy savings results from the reduced wastage of other perishables, such as ice, when they can be protected in sheds and/or bodegas.

Other probable savings are not significant in the context of single municipal ports.

Representative vessel types were selected on the basis of general applicability to the current and future requirements of all municipal ports surveyed. Exhibit 9 displays vessel types, roles and costs and describes fuel consumption factors per unit of work undertaken. Vessel types are described in Table 9-1. Figure 9-1 shows the average fuel consumption in liters/hour for each vessel type.

TABLE 9-1

REPRESENTATIVE VESSELS

TYPE OF VESSELS	DESCRIPTION	PRINCIPAL ACTIVITY
Small Paddle Banca	without engines and not usually in excess of 3/4 DWT	subsistence fishing, some passenger and cargo handling as lighterage service
Small Motor Banca	16 HP Briggs and Stratton engines and not usually in excess of 1.5 DWT	fishing, (40 - 60%) transporting passengers (20 - 40%) and cargo (10 - 20%)
Medium Motor Banca	85 HP Fuso 4DR5 diesel engines and of an average displacement of 4 DWT	transporting fish, usually in support of much larger trawlers (40 - 60%) fishing (20 - 40%) and transporting cargo (10 - 20%)
Large Motor Banca	two 85 HP engines or single 165 HP Isuzu engine and of an average displacement of 9 DWT	transporting cargo (40 - 60%), fish (20 - 40%) and passenger (10 - 20%)
Medium Launch	two 85 HP engines or a single 165 HP Isuzu engine and of an average displacement of 10 DWT	transporting passengers (80 - 90%) and cargo (10 - 20%)
Large Launch	two engines totalling about 250 HP and of an average displacement of 20 DWT	transporting passengers (80 - 90%) and cargo (10 - 20%)
Small Trawler	two engines totalling about 250 HP and of an average displacement of 20 DWT	fishing (60 - 80%) and transporting fish (20 - 40%)
Large Trawler	two engines totalling about 300 HP and of an average displacement of 40 DWT	fishing (60 - 80%) and transporting fish (20 - 40%)

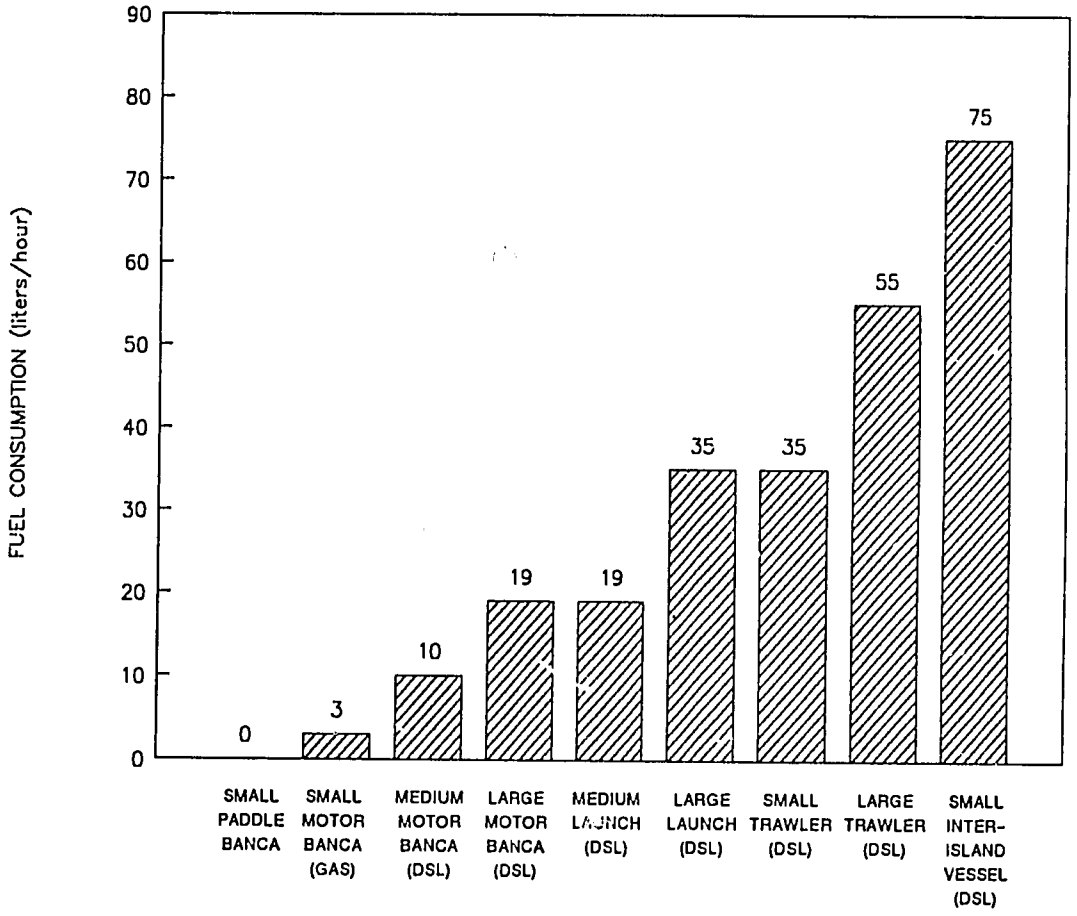
TABLE 9-1
(CONTINUED)

REPRESENTATIVE VESSELS

TYPE OF VESSELS	DESCRIPTION	PRINCIPAL ACTIVITY
Small Inter Island Vessel	two engines totalling about 400 HP and of an average displacement of 80 DWT	transporting passengers (40 - 60%), cargo (20 - 40%) and produce (10 - 20%)
Medium Inter Island Vessel	two engines totalling about 800 HP and of an average displacement of 1,000 DWT	transporting passengers (40% - 60%), cargo (20% - 40%) and produce (10% - 20%)
Large Inter Island Vessel	two engines totalling about 2400 HP and of an average displacement of 2,000 DWT	transporting passengers (40% - 60%), cargo (20% - 40%) and produce (10% - 20%)

FIGURE 9-1

ASSUMED FUEL CONSUMPTION



(GAS) = Gasoline engine

(DSL) = Diesel engine

X.
ENVIRONMENTAL ASSESSMENT

X. ENVIRONMENTAL ASSESSMENT

A. SUBPROJECT DESCRIPTION

Improvements proposed for the Port of Caramoan are described in detail in Chapter IV of this report. Construction involves the repair and extension of the existing causeway facility, including the provision of a vehicle turn-around area, and shoreline reclamation for a passenger and cargo shed (Figure 4-1). No other construction or dredging activities are proposed for the coastal or offshore environments.

B. EXISTING ENVIRONMENT

1. PHYSICAL ENVIRONMENT

The Caramoan Port site is located in Barangay Guijalo, approximately five kilometers south of the town of Caramoan, in the Province of Camarines Sur (Figure 1-1). The existing facility, which consists of a 182-meter rock causeway with a sixty meter long attached seawall, is on the south coast of the Caramoan Peninsula, which forms the northern border of the Lagonoy Gulf (Figure 1-2).

The Caramoan Peninsula, particularly the eastern portion encompassing the port site, is extremely rugged and is dominated by shear rock pinnacles and mountainous terrain. No major rivers are present near the port area. Two intermittent creeks pass through Barrio Guijalo to empty on the reef flat west of the existing causeway. No sediment accretion or serious shoaling is apparent in the port vicinity.

The shoreline in proximity of the present port facility is composed of white sandy beaches separated by steep rocky headlands (Plate 1-1). The local marine environment consists of a wide, shallow reef flat which extends approximately ten to fifteen meters beyond the causeway terminus to the reef front and sandy foreslope (Figure 10-1). The ledge-like reef front is highly irregular in alignment and is characterized by deep spur and groove formations, which include caves and overhangs. The sandy foreslope begins at an average depth of five meters and contains numerous coralline patch reefs. Several prominent patch reefs reach to within one meter of depth approximately forty meters southwest of the existing causeway terminus, presenting a serious navigational hazard to shipping access.

2. NATURAL RESOURCES

Open canopy forest remains on the rugged, extreme slopes of the eastern Caramoan Peninsula, approximately five kilometers from the subproject site (Figure 10-2). Coconut plantations dominate the surrounding port area, the lower inland and coastal

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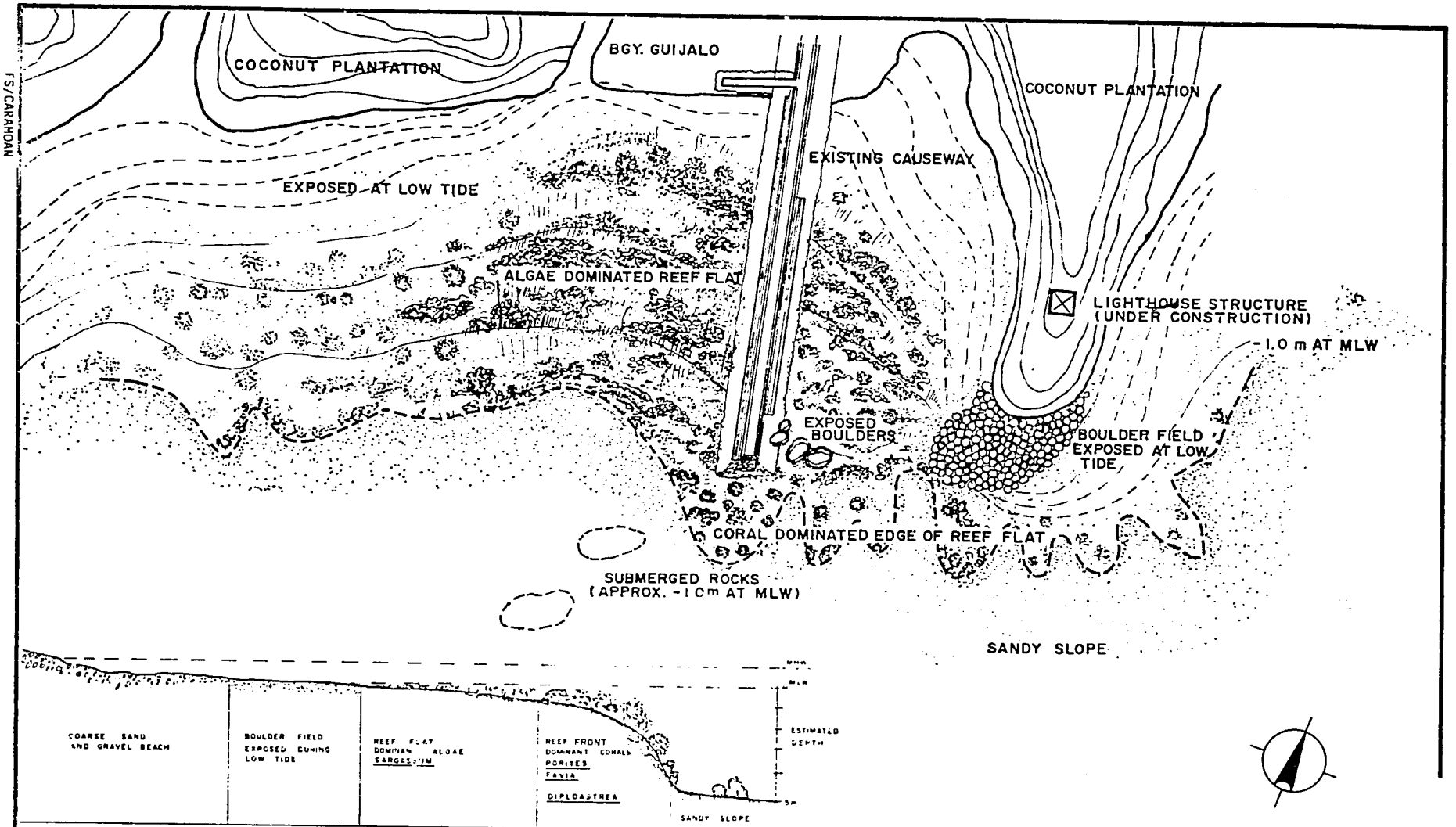

SCHEMATIC CROSS-SECTION OF CARAMOAN REEF FORMATION

APPROX. SCALE: 1:1000

RURAL INFRASTRUCTURE FUND PROJECT

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ZONATION OF THE CARAMOAN PORT REEF FORMATION

FIGURE 10

FS/CARAMOAN

slopes, while rice and mixed crops are found in the lowlands adjacent to the Manapot River. A minor creek-fed area east of the of the subproject site and Lipata Cove (Figure 1-1) includes several hectares of mixed estuarine communities of nipa palm and secondary growth mangroves.

The reef flat of the Caramoan Port site is extensive and includes two dominant ecological communities delineated by the presence of the macro-algae **Sargassum** and the transition to hard corals composed predominantly of the genera **Porites, Diploastrea, Pavona, Heliopora, Acropora** and **Pocillopora** (Figure 10-2). The **Sargassum** zone extends from approximately the low tide mark to the one to two meter isobath, below which depth hard corals dominate the narrow band of the reef front and the dispersed patch reefs of the sandy foreslope. Maximum coral cover within the reef front was visually estimated at thirty to forty percent. With the exception of massive growth form genera of corals (e.g. **Porites, Diploastrea**), most corals in the vicinity of the subproject site are of relatively small colony size, averaging ten to thirty centimeters in diameter. Observed fish life in the surveyed area was abundant and diverse.

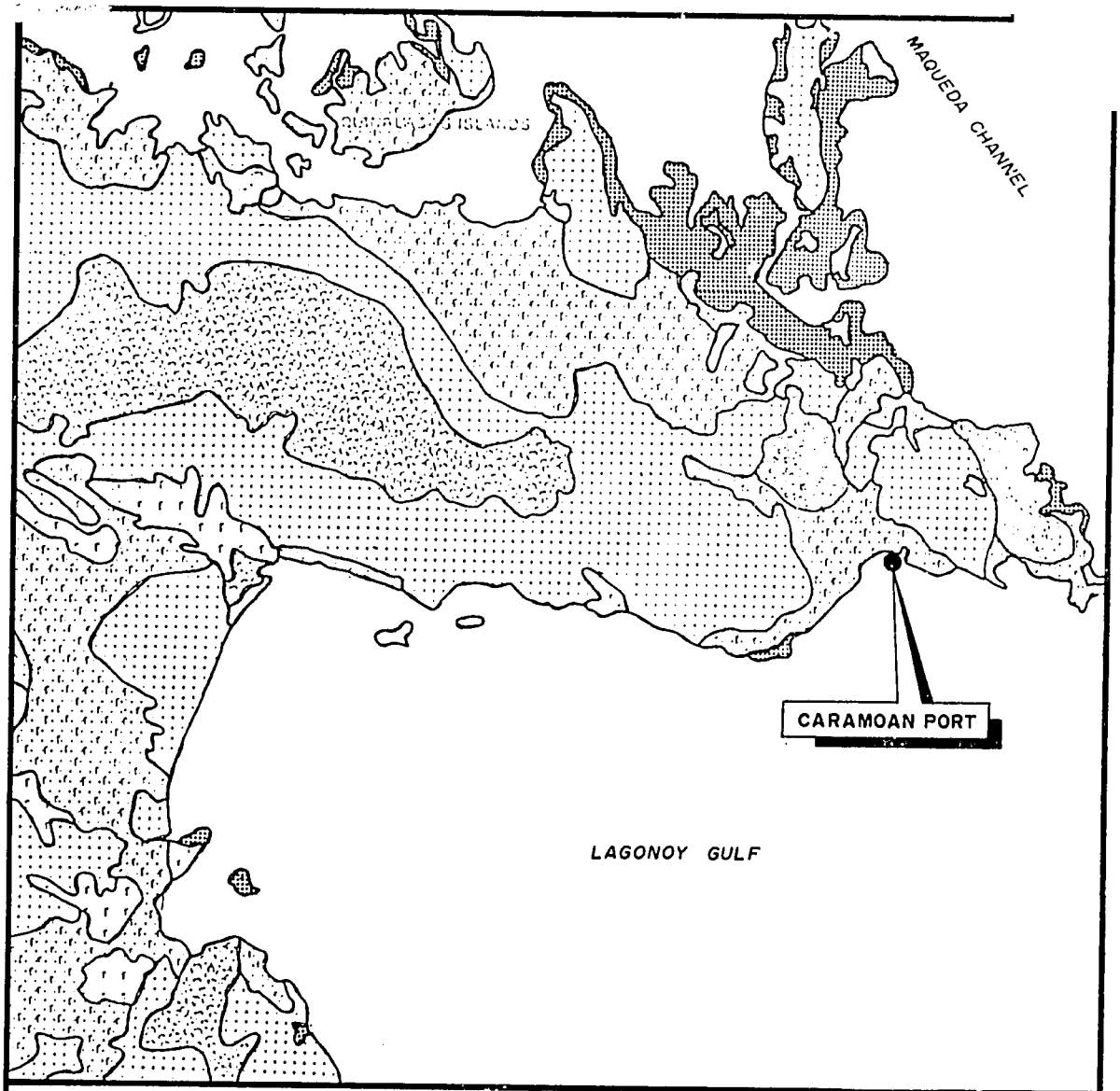
The Caramoan National Park, established in 1938 by Proclamation 291, is located approximately ten kilometers from the port site, on the north coast of the peninsula (Figure 10-3). The designated area of 347 hectares includes caves, panoramic hills and superb shoreline. The park area has been encroached upon by human settlements and agricultural plantings due to the long-term lack of protection.

3. CULTURAL AND SOCIO-ECONOMIC RESOURCES

a. Human Settlements and Livelihood

The Caramoan subproject site is an active port facility with an established community linked by a cross-peninsular road to the town proper and associated barangays of Caramoan (Figure 1-1). The adjacent barrio of Guijalo occupies a low-lying coastal valley that is flooded annually when high tides coincide with storm waves originating from the south. The existing sixty meter long seawall was constructed to partially alleviate this problem.

A primary means of livelihood in the Guijalo community is deep-sea fishing, which involves an estimated thirty motorized pumpboats using wide mesh nets to catch sailfish, blue marlin and yellow fin tuna. The principal fishing grounds are reportedly ten kilometers offshore and most fishing operations are conducted during the calmer months from February to September. Most of the prime fish catch is shipped to Manila via Sabang Port and is dependent on prior delivery of block ice through the Lagonoy Gulf shipping network (Figure 2-1). The deep sea fisheries include the use of floating fish shelters (payaos) which are anchored in waters nearly 1000 meters deep. Coastal fisheries include the collection and marketing of milkfish (bangus) fry during the months of March to July.



LEGEND :

- DIPTEROCARP FOREST, CLOSED CANOPY
- DIPTEROCARP FOREST, OPEN CANOPY
- CULTIVATED AREA MIXED W/ BRUSH & GRASS
- GRASSLAND, GRASS COVERING
- COCONUT PLANTATIONS
- CROPLAND MIXED W/ COCONUT PLANTATION
- LAKE
- FISHPONDS DERIVED FROM MANGROVE
- MANGROVES
- CORAL REEFS

5 0 5 10 Km.
SCALE 1:250,000

CARAMOAN PORT

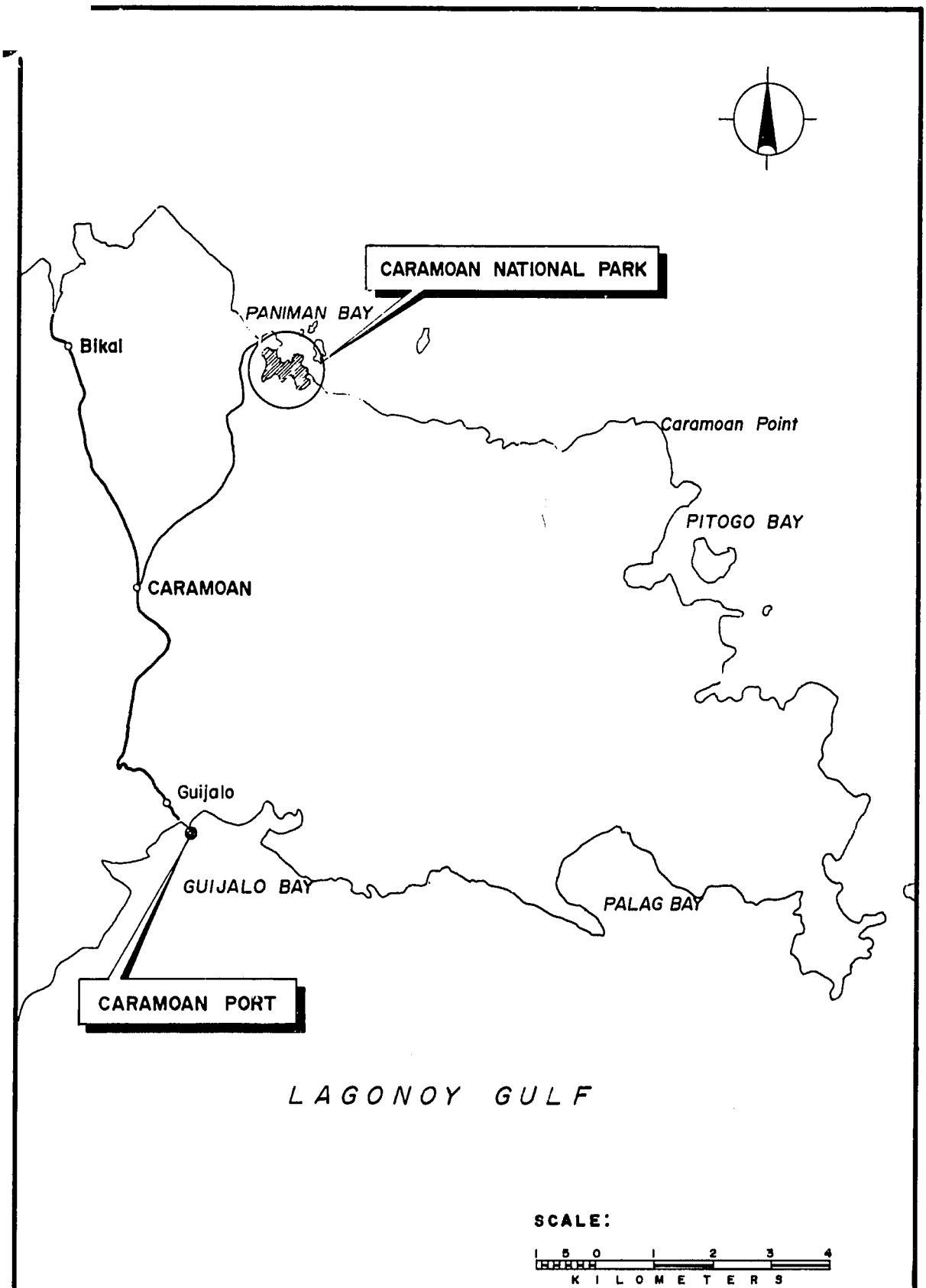
SOURCE : PCOS 2816
National Mapping and Resource Information Authority, 1987

RURAL INFRASTRUCTURE FUND PROJECT — AID PROJECT NO 492-0420

LAND COVER MAP

FIGURE 10-2

FS/CARAMOAN



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492 – 0420

LOCATION MAP – CARAMOAN NATIONAL PARK

FIGURE 10-3

A detailed economic overview of the proposed subproject is presented in Chapter II.

b. Transportation

A description of the transportation network serving the Caramoan area is provided in Chapter II. In general, the Caramoan Peninsula is economically handicapped due to the absence of an interconnecting road system to the Bicol Region, resulting in a total dependence on sea transportation. Contrary to the road infrastructure map (Figure A-2), the indicated coastal roads leading from the Municipalities of Lagonoy and Tinambal to the Caramoan Port area do not exist, though a northern coastal road will reportedly be under construction in 1992.

Due to the southerly exposure of the subproject site and the distance to the nearest connecting ports of the Lagonoy Gulf network, sea transportation is difficult during strong periods of the southwest monsoon (Habagat; June to September). Further shipping difficulties are encountered during low tides, when most boats must anchor offshore of the existing Caramoan causeway facility due to the prevailing shallow access. Passengers and cargos are ferried to and from shore during low tide using smaller, shallow draft outrigger boats (bancas) in a time-consuming and hazardous procedure.

c. Archaeological and Historical Sites

Based on available references and interviews with officials of the National Museum and local residents, no significant archaeological or cultural resources are known to be present in the immediate subproject vicinity. The history of the Municipality of Caramoan dating to 1687 and archaeological finds elsewhere in the Bicol Region increase the possibility that additional archaeological resources may be located in the general area. During the field surveys, previous excavations of apparent burial sites were observed within the extensive Pitogo Cave, about ten kilometers northeast of the port site. The Archaeological Division of the National Museum has no record of these unofficial Pitogo Cave excavations.

C. IMPACT ASSESSMENT

1. PHYSICAL ENVIRONMENT

Construction activities involve the limited extension of an existing, active port facility. Field observations indicate that significant coastal currents and littoral drift patterns are not prevalent at the subproject site and will not be negatively impacted by the designed causeway addition. Sediment and sand accretion or erosion is not apparent near the existing port facility. The proposed, angled causeway extension may create conditions for limited sand accretion opposite the

existing seawall by partially deflecting wave action from the southwestern quadrant.

Causeway fill and armour rocks will be locally sourced inland and will not include coral rock or marine materials. During the field surveys, concerns were expressed by local residents and community officials regarding the negative impact on coastal erosion if the large shoreline rocks found west of the site are utilized for armour purposes. Adequate rock sources are available along the road to Caramoan. Limited terrestrial impact will occur from the local procurement of sand, gravel and rock.

2. NATURAL RESOURCES

Improvement of the Caramoan Port by the extension of the existing causeway into deeper water is predicted to have insignificant impact on the local marine environment. Past port construction activities at the Caramoan site has not resulted in the discernable alteration of the dominant reef communities (**Sargassum** algae and hard corals, Figure 10-1). The relatively small coral colony size observed for the surveyed reef area is typical of wave-stressed, typhoon affected shallow reef environments. The actual construction of the causeway extension and vehicle turn-around area will displace an estimated 1,000 square meters of existing reef area while creating new substrate for subsequent reef colonization. The extension of the causeway into deeper water should reduce the incidental damage to the local reef caused by the anchoring of larger boats offshore during low tides. The direct impact of the Caramoan subproject on the rich biodiversity of the eastern Caramoan Peninsula, including the Caramoan National Park site, is expected to be minimal as this is a minor upgrade of an active port facility.

The improved utility and capacity of the completed port facility may contribute to secondary environmental impacts related to infrastructure and economic development. For example, the level of exploitation of the traditional deep-sea fisheries is limited, under existing conditions, to the availability of block ice and market accessibility. Higher levels of fisheries exploitation may prove to be unsustainable in the absence of resource management measures. A long standing proposal to initiate mining of extensive marble resources in the vicinity of the Caramoan National Park has not been implemented to date due to the existing transportation constraints (Exhibit 2).

Secondary impacts resulting from improvement of the transportation network and potential economic development could be mitigated through implementation of existing GOP laws and regulations (e.g. Proclamation 291, Caramoan National Park) and through community-based educational programs emphasizing sustainable development and resource management.

3. CULTURAL AND SOCIO-ECONOMIC RESOURCES

a. Human Settlements and Livelihood

The described port subproject will not directly displace or relocate any existing structures, inhabitants or livelihood activities. Annual flooding of the Guijalo barrio due to the coincidence of southerly storm waves with high tides should be reduced by the angular alignment of the proposed causeway extension.

The improved causeway will permit the docking of large vessels at low tide and may indirectly displace the limited livelihood presently gained by providing water taxi (lighterage) services to and from vessels anchored offshore. The socio-economic benefits attributed to the completed Caramoan Port are described in detail in Chapter VIII and Appendix D.

b. Transportation

The eastern Caramoan Peninsula is dependent on sea transportation for market and services access. The extension of the causeway at Barangay Guijalo will reduce the existing low tide limitation of the port facility while providing a greater degree of storm shelter for vessels and shoreline settlements. The provision of a vehicle turn-around area will compensate for the narrow, one-way capacity of the causeway width.

c. Archaeological and Historical Sites

The immediate vicinity where the port improvement activities are proposed has been subjected to disturbances in the past and, based on interviews and available references, is not known to include archaeological sites, historical monuments or culturally significant features. Field observation of the unauthorized excavations in Pitogo Cave suggest that archaeological resources may exist in outlying areas including the numerous other caves of the eastern Caramoan Peninsula.

Based on Philippine law, the contractor will be required to halt construction if any archaeological properties are encountered in order to allow the National Museum to investigate discoveries and put into effect chance find procedures. DPWH should coordinate with the archaeological authorities to implement international standards of rescue and recovery of finds as appropriate.

D. ALTERNATIVE CONSTRUCTION ACTION

1. NO ACTION ALTERNATIVE

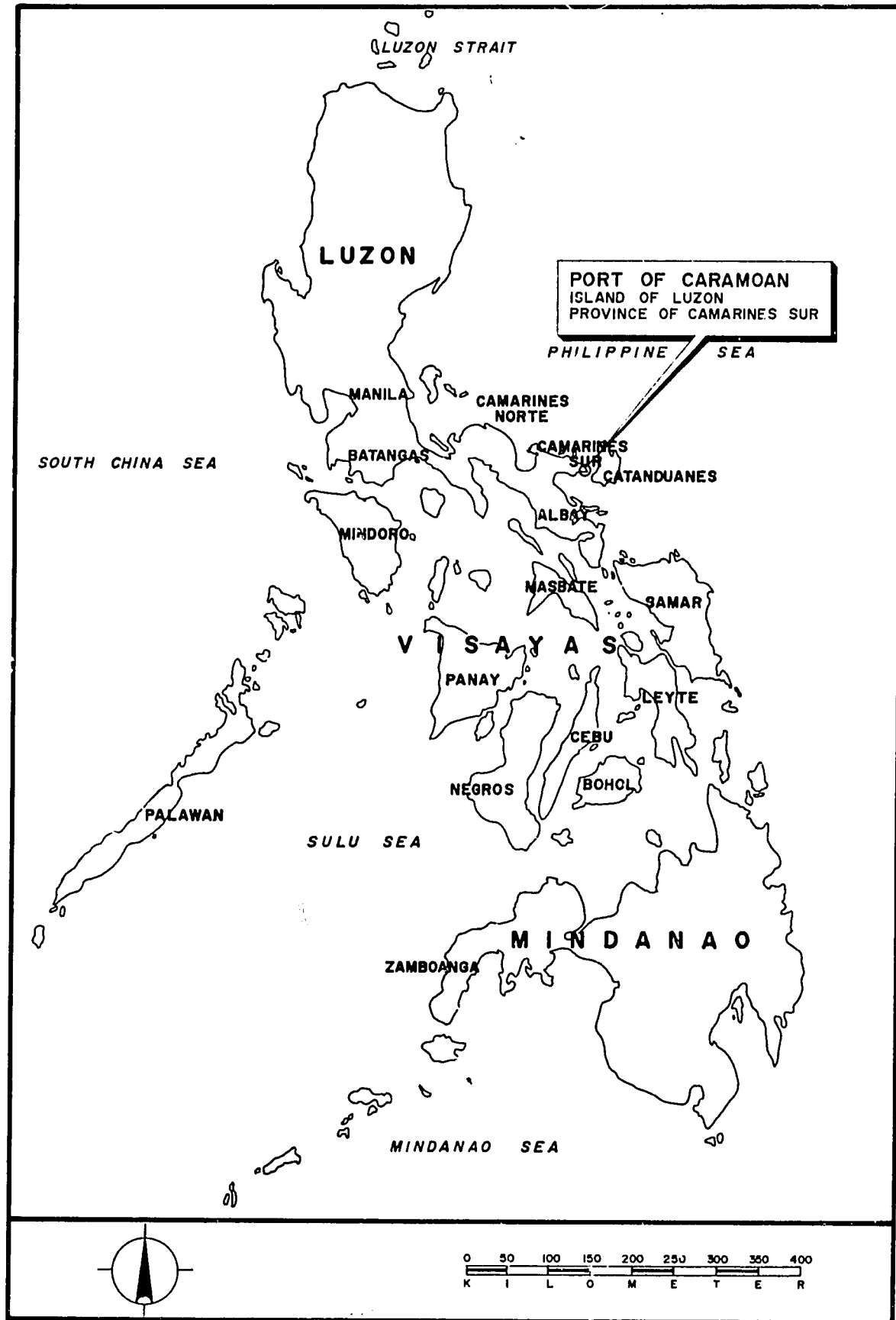
The no action alternative would not improve the quality and utility of the existing Caramoan Port facilities or correct the prevailing port deficiencies. Consequently, the no action alternative is considered unacceptable.

2. ALTERNATIVE CONSTRUCTION ACTION

Several different alignments of the proposed causeway extension were considered. Construction of the causeway extension along a southwesterly orientation provides deep-water access while accommodating underwater features and reducing the likelihood of coastal flooding.

An partially completed lighthouse structure is located on the headland immediately east of the Caramoan causeway (Figure 10-1, Plate 1-1). Completion of this navigational aid could be incorporated into the proposed subproject and would facilitate local transportation.

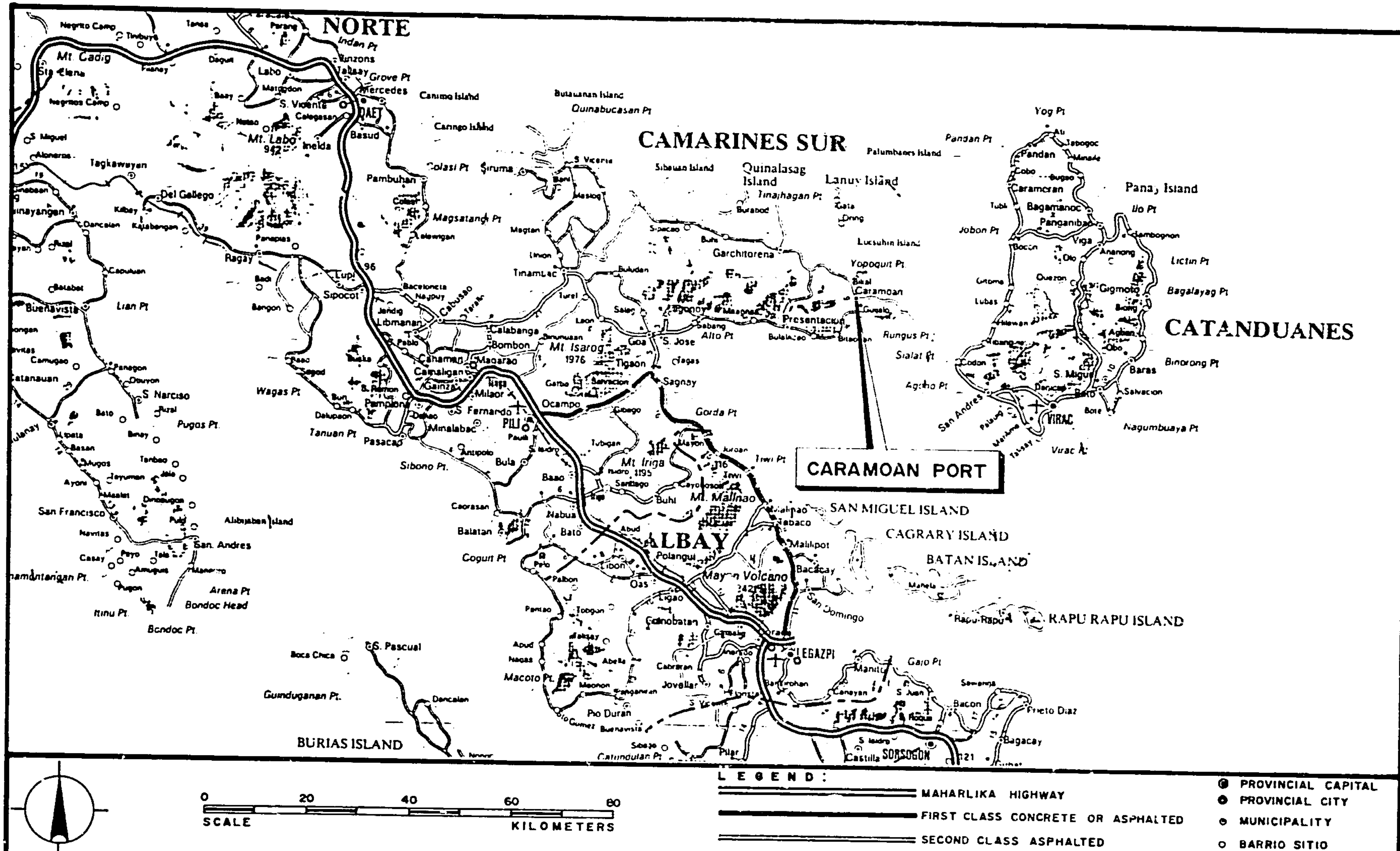
APPENDIX A
FIGURES



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

K E Y M A P

FIGURE A-1



0 20 40 60 80
SCALE KILOMETERS

LEGEND:

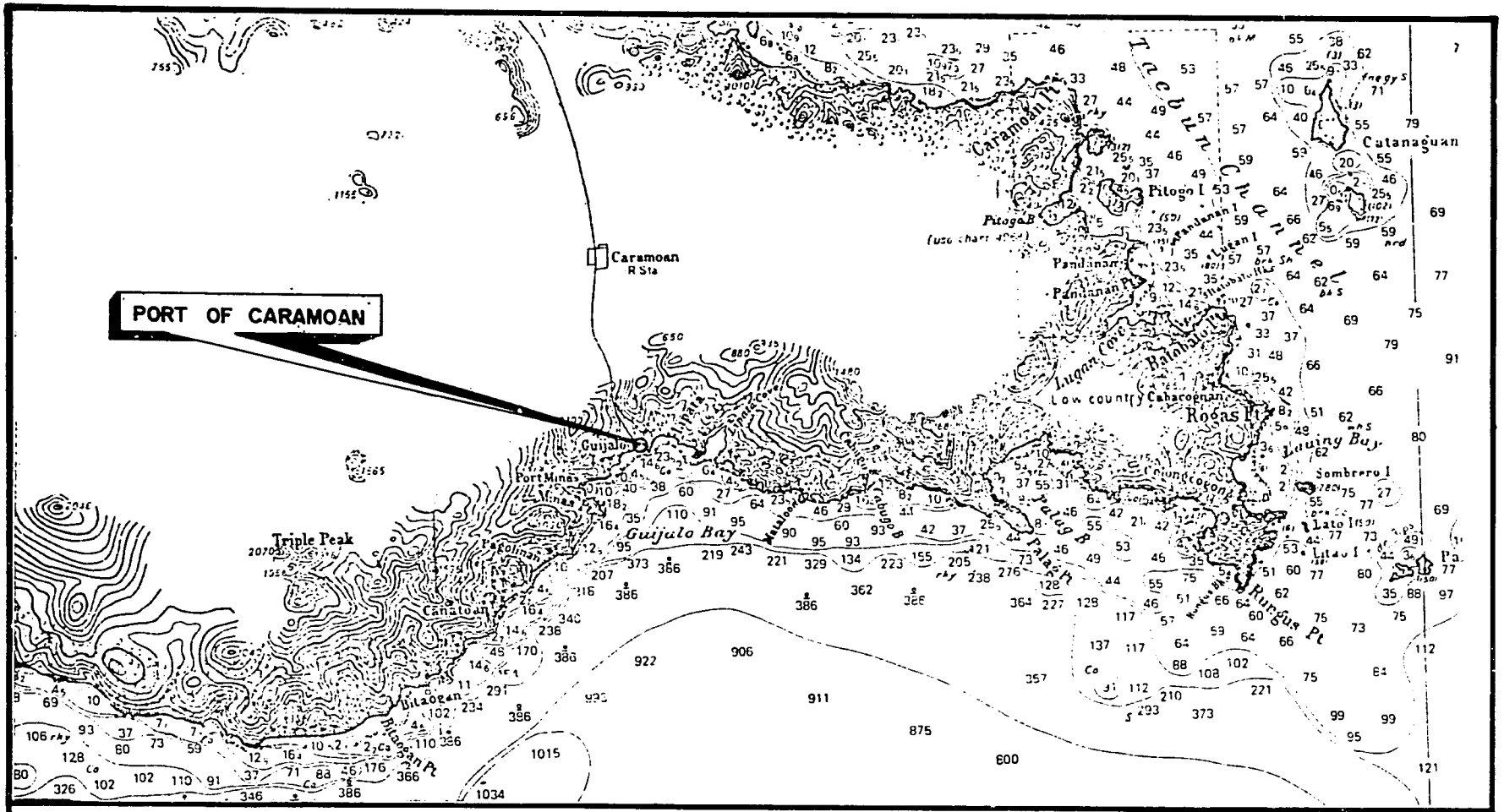
- MAHARLIKA HIGHWAY
- FIRST CLASS CONCRETE OR ASPHALTED
- SECOND CLASS ASPHALTED
- THIRD CLASS FAIR
- PROVINCIAL CAPITAL
- PROVINCIAL CITY
- MUNICIPALITY
- BARRIO SITIO
- DOMESTIC AIRPORT

RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 – 0420

ROAD INFRASTRUCTURE MAP

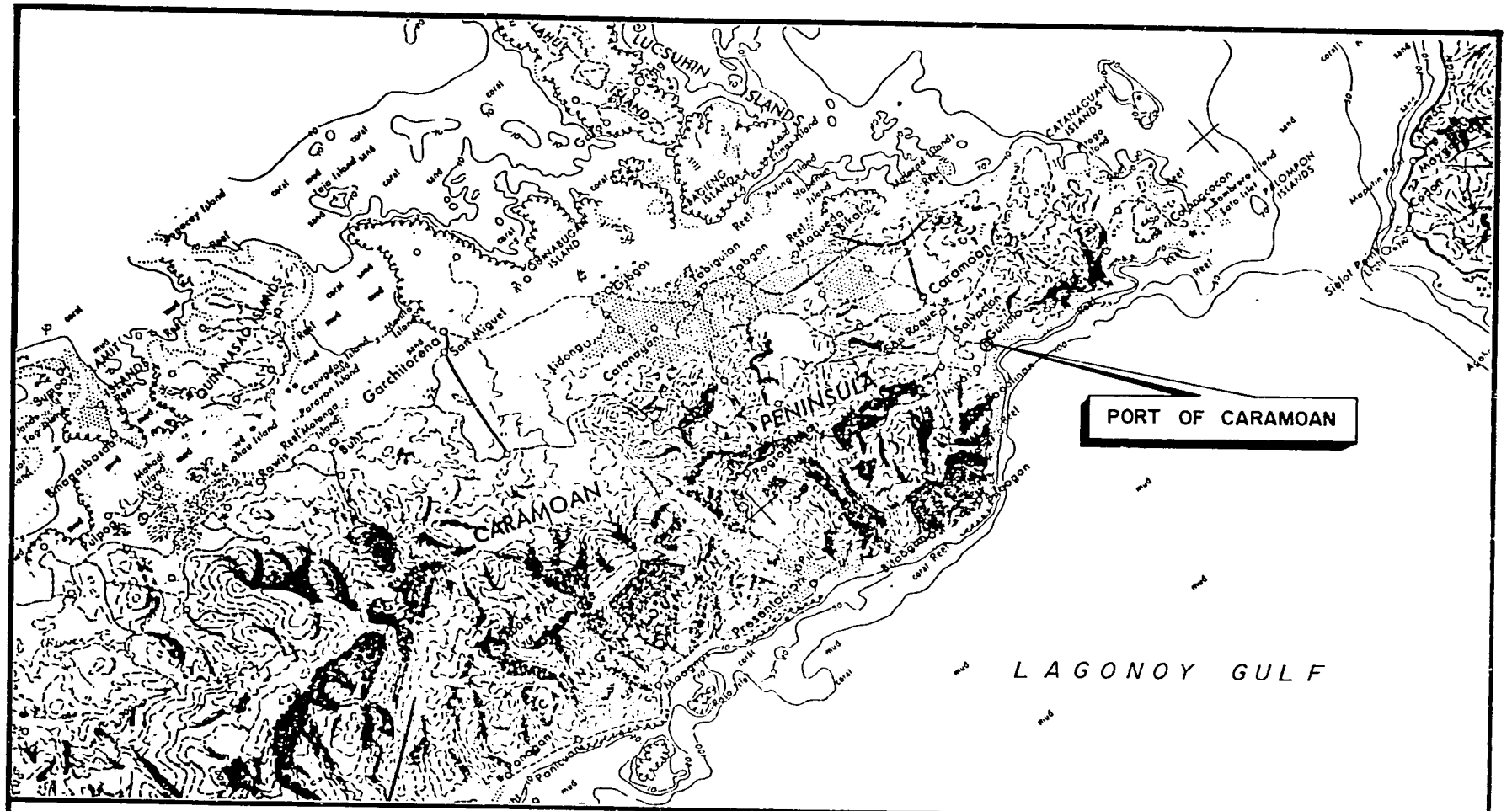
FIGURE A-2



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492 - 0420

AREA HYDROGRAPHIC MAP

FIGURE A - 3

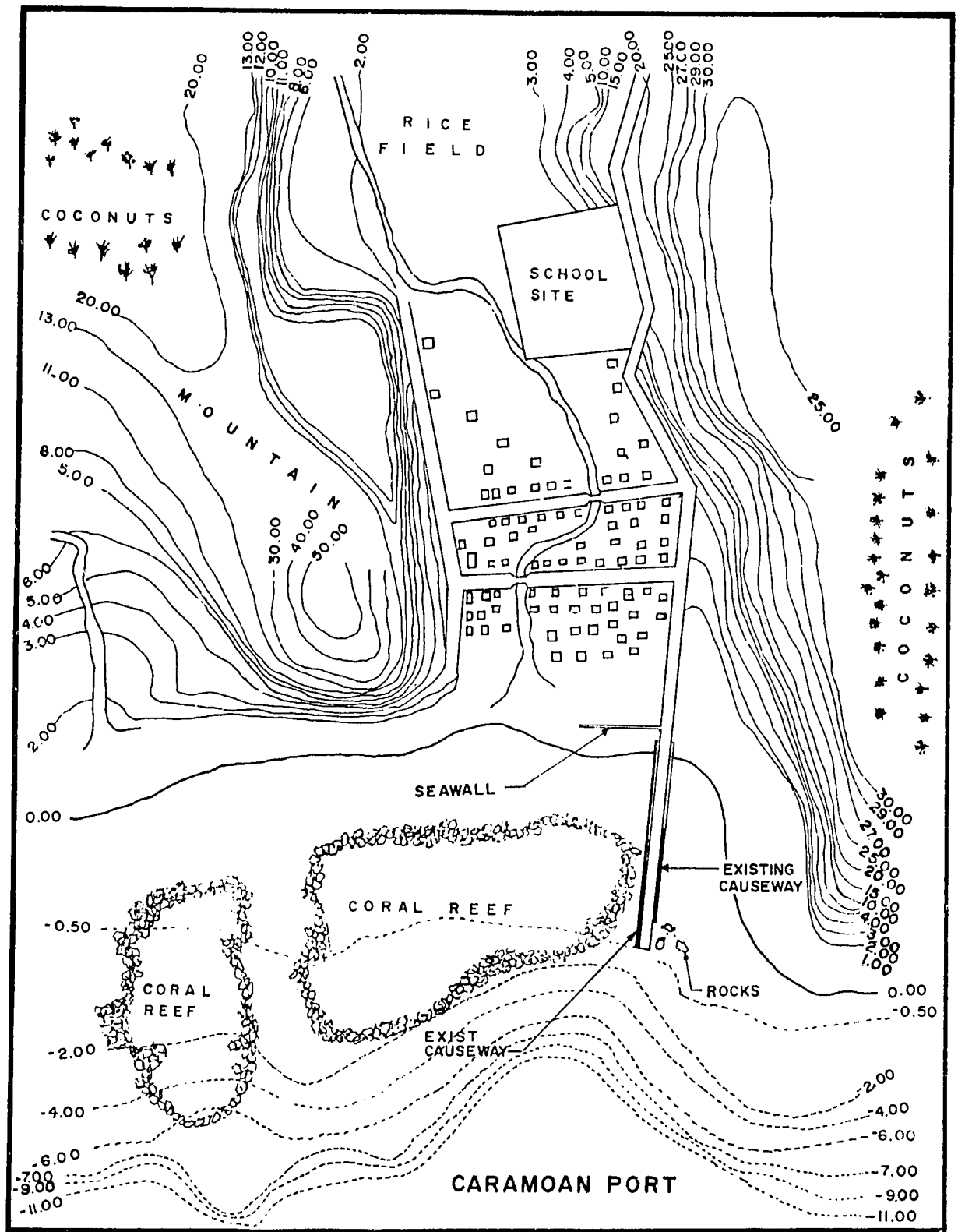


RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 - 0420

AREA TOPOGRAPHIC MAP

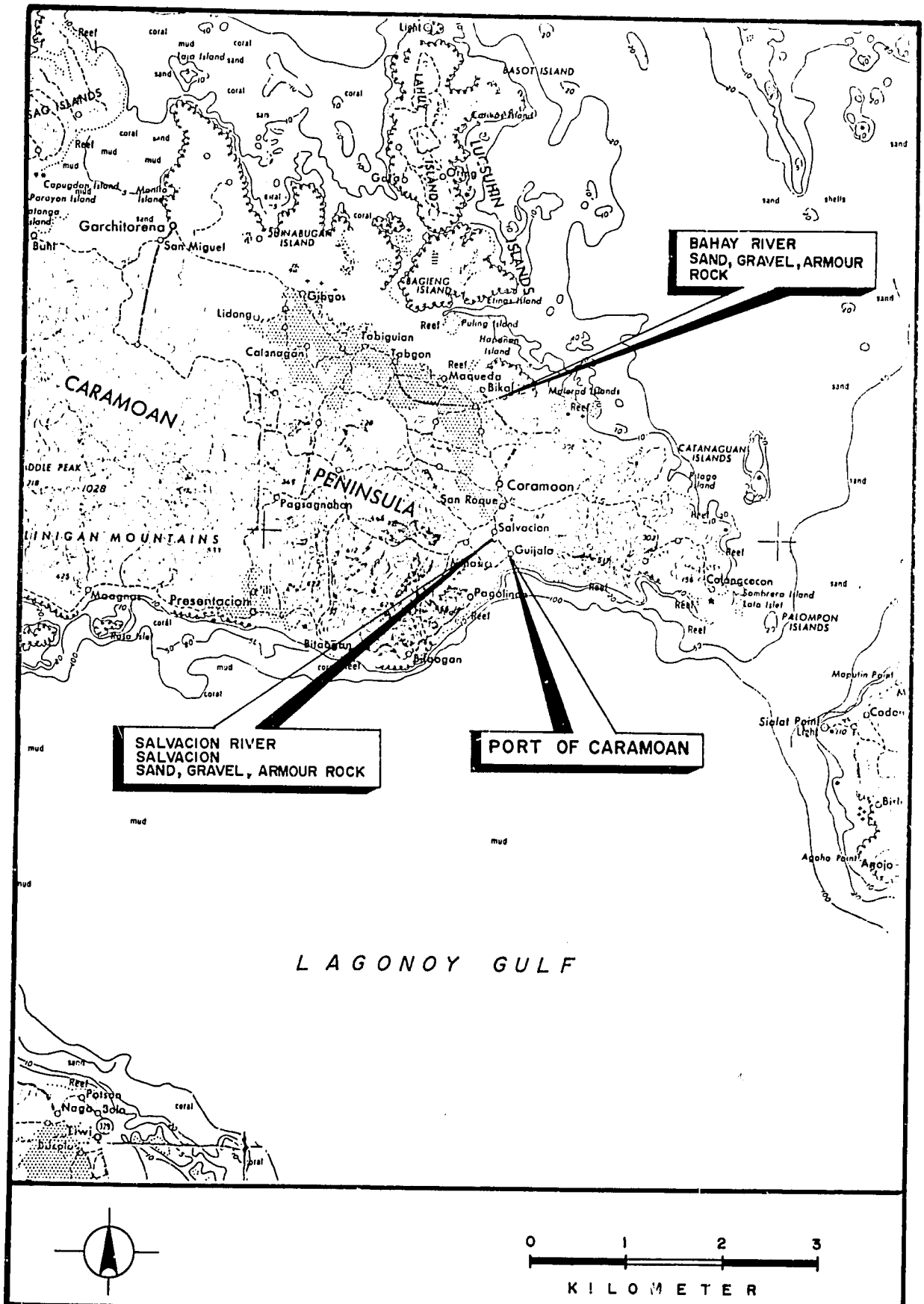
FIGURE A-4



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

TOPOGRAPHIC & HYDROGRAPHIC SURVEY

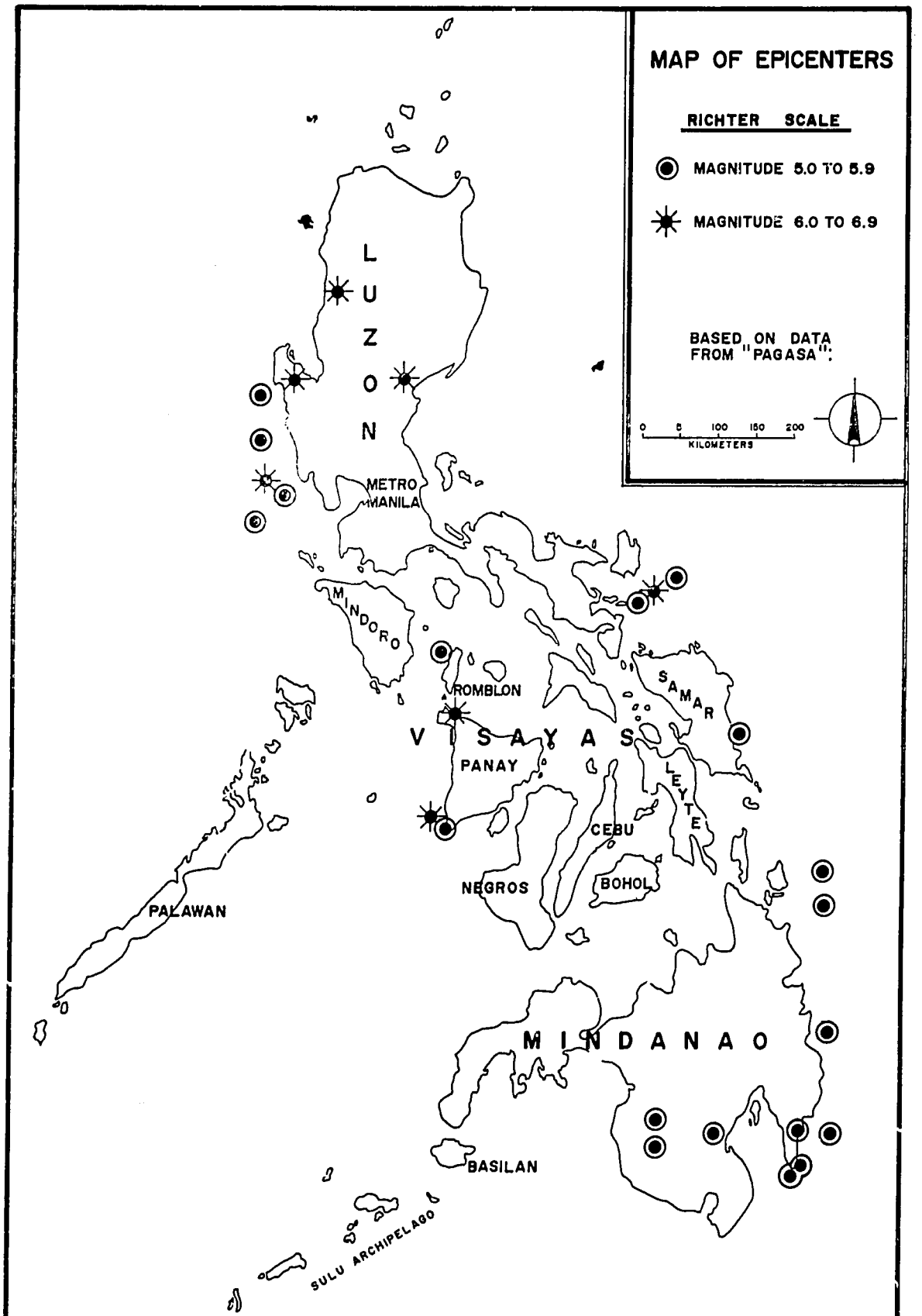
FIGURE A-5



RURAL INFRASTRUCTURE FUND PROJECT — AID PROJECT NO. 492-0420

LOCATION OF CONSTRUCTION MATERIALS

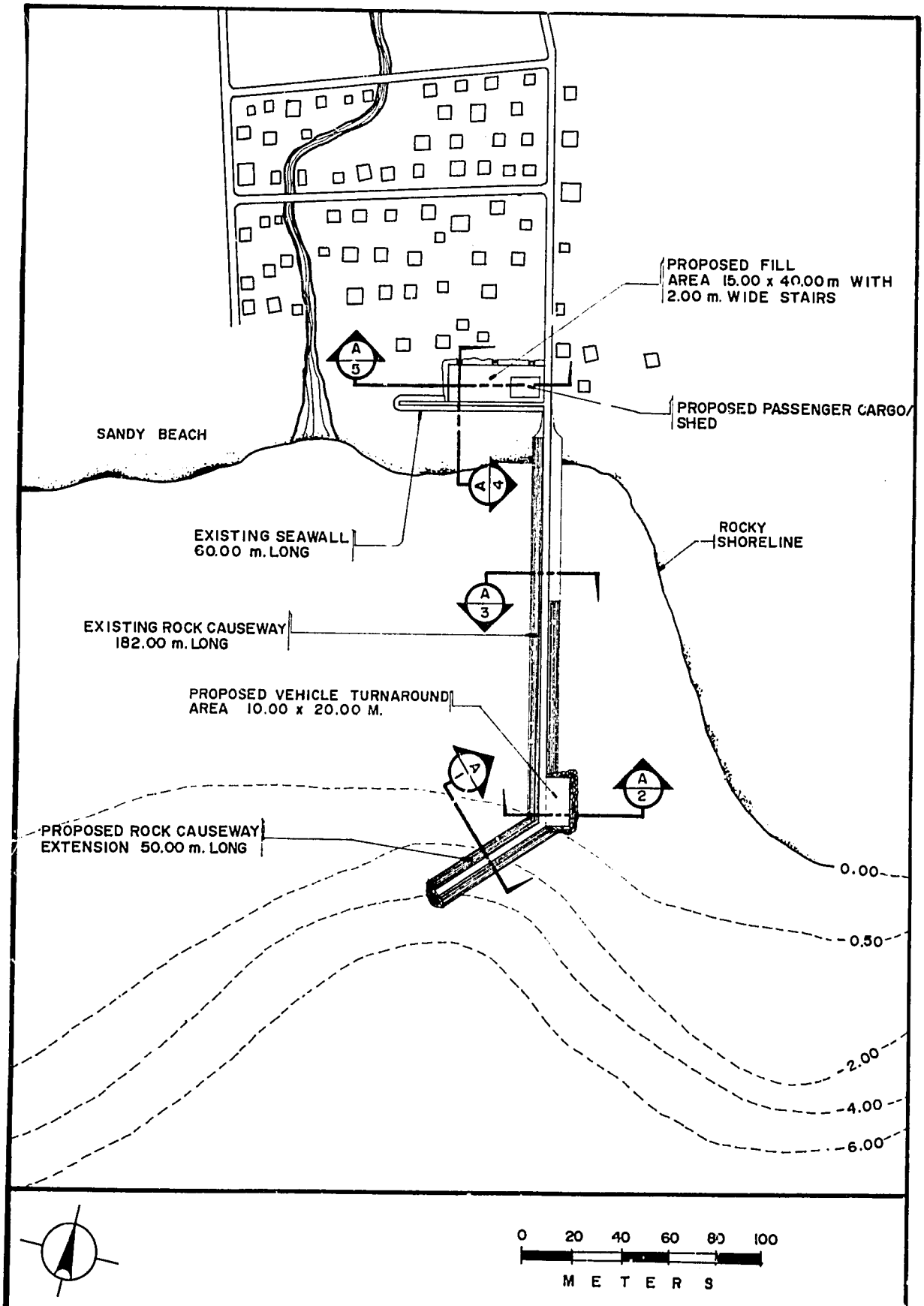
FIGURE A-6



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT 492 - 0420

SIGNIFICANT PHILIPPINE EARTHQUAKES : 1960 - 1965

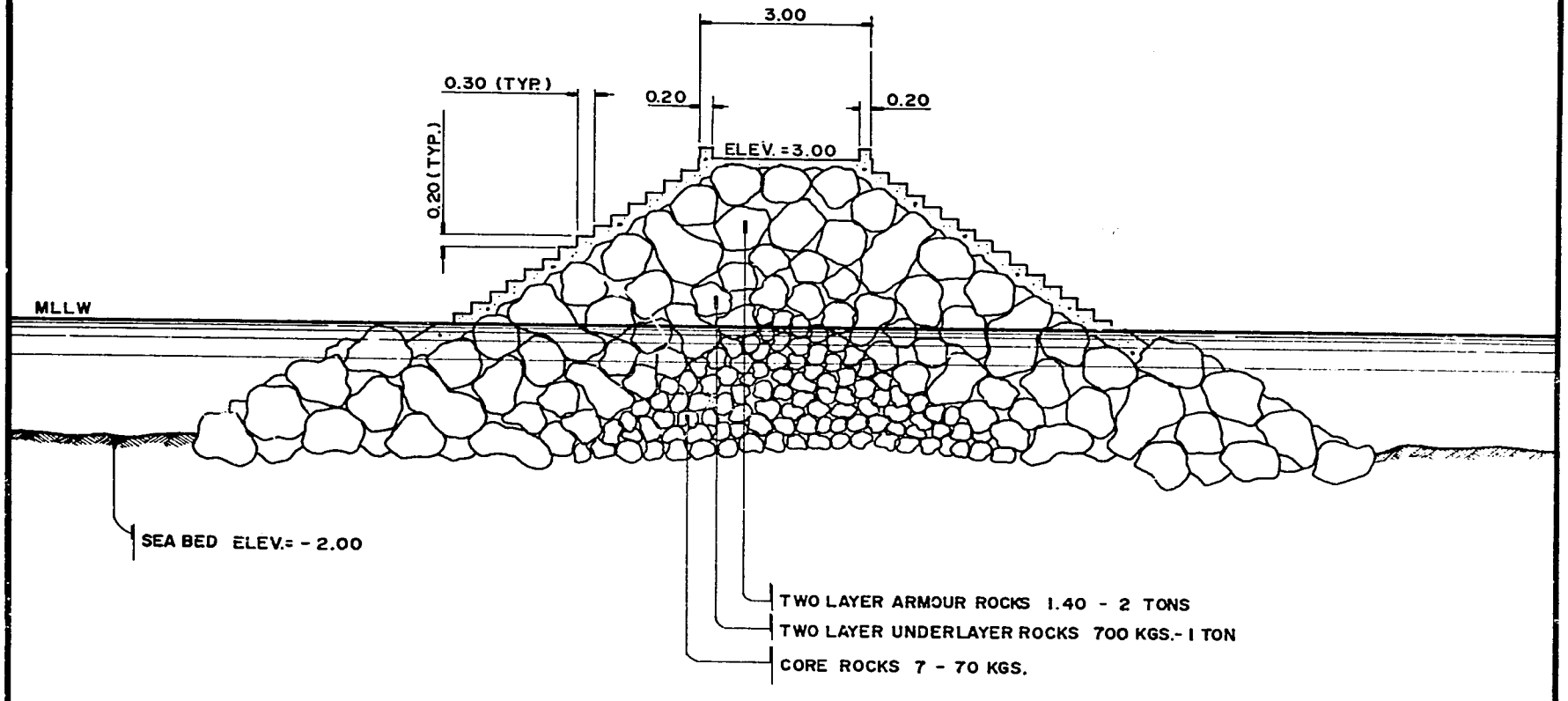
FIGURE A - 7



RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

PLAN - PROPOSED CARAMOAN PORT FACILITIES

FIGURE A-8



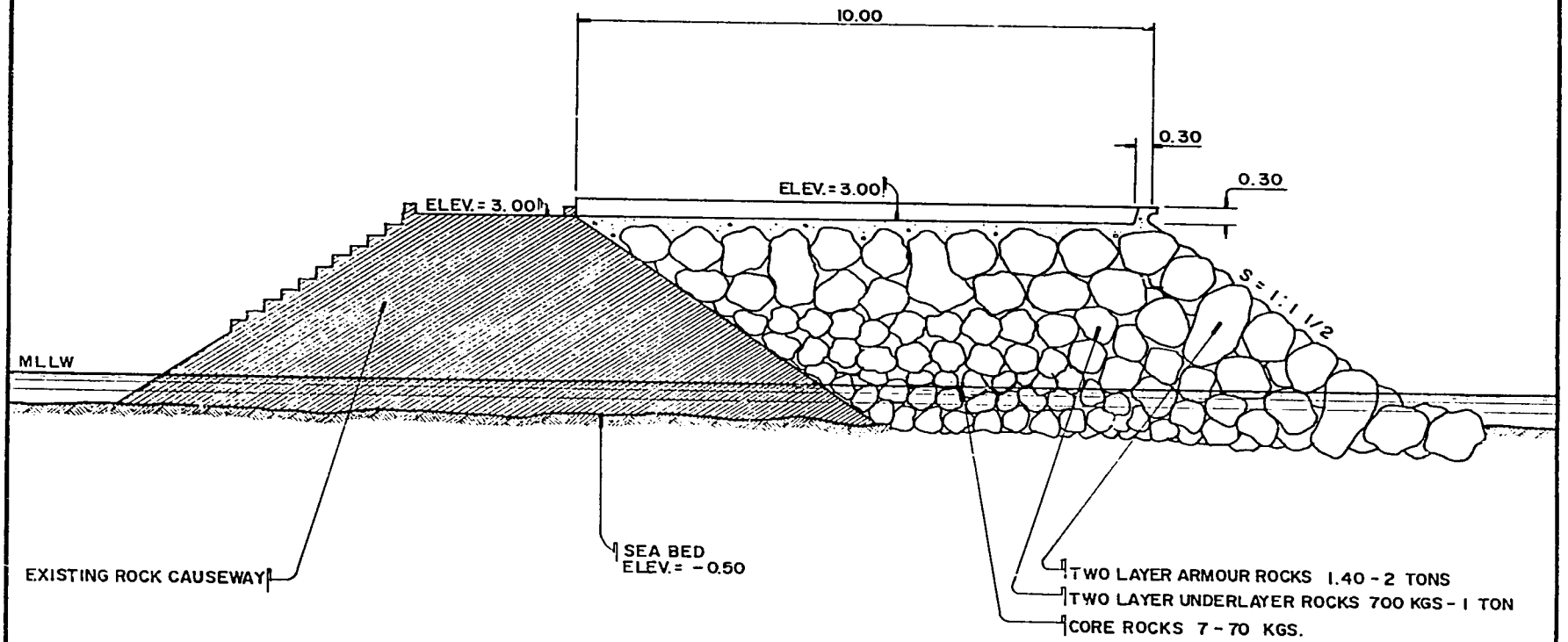
SECTION A/1

SCALE: 1:100

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492 - 0420

CARAMOAN PORT – PROPOSED ROCK CAUSEWAY EXTENSION

FIGURE A - 9



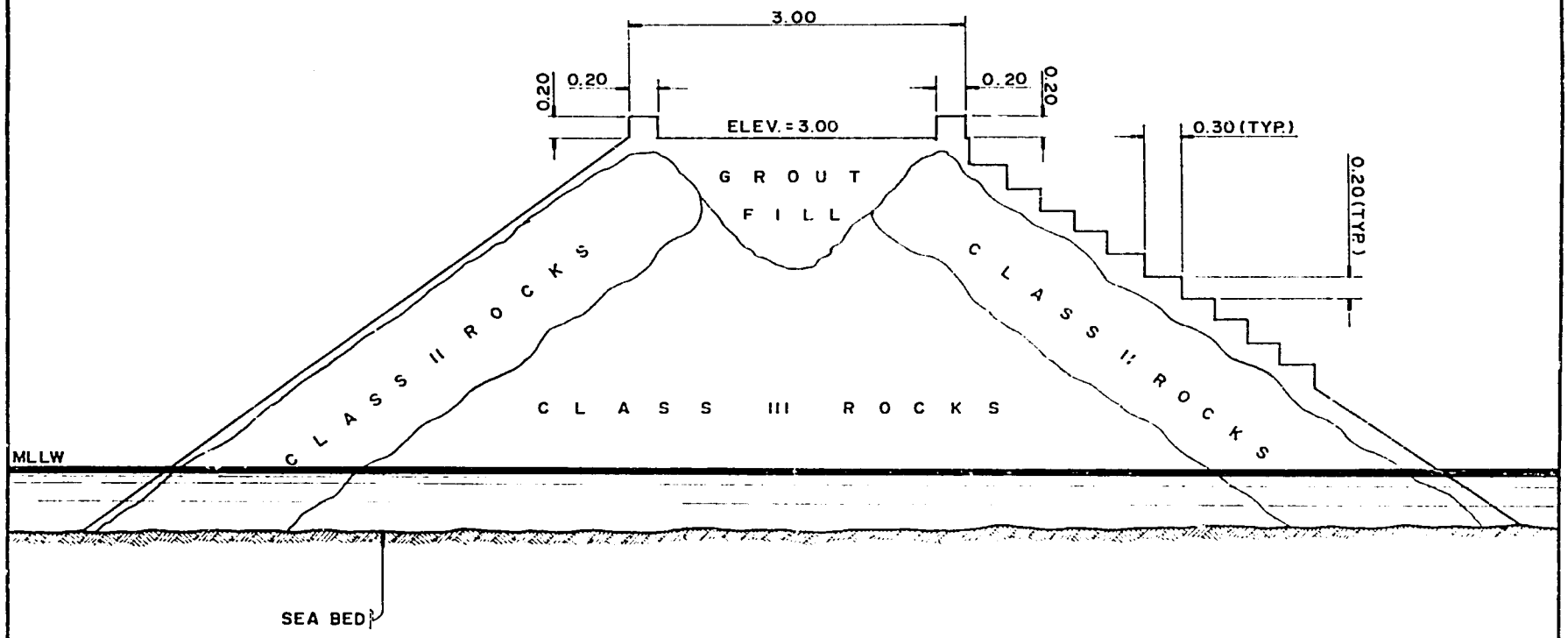
SECTION A/2

SCALE: 1:100

RURAL INFRASTRUCTURE FUND PROJECT — AID PROJECT NO. 492 - 0420

CARAMOAN PORT - PROPOSED VEHICLE MANEUVERING AREA

FIGURE A - 10



SECTION A/3

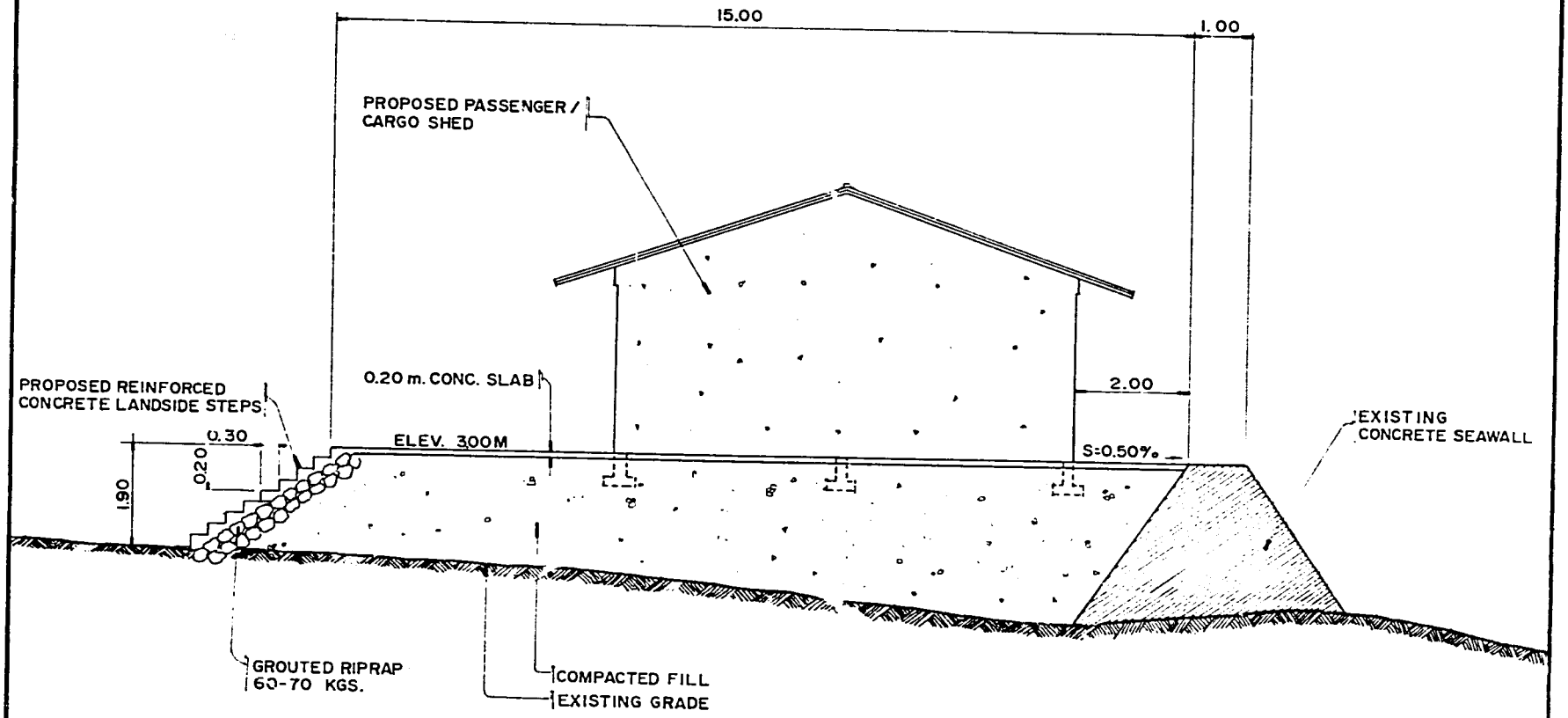
SCALE: 1:50

RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 - 0420

CARAMOAN PORT - EXISTING ROCK CAUSEWAY

FIGURE A - 11



SECTION (A/4)

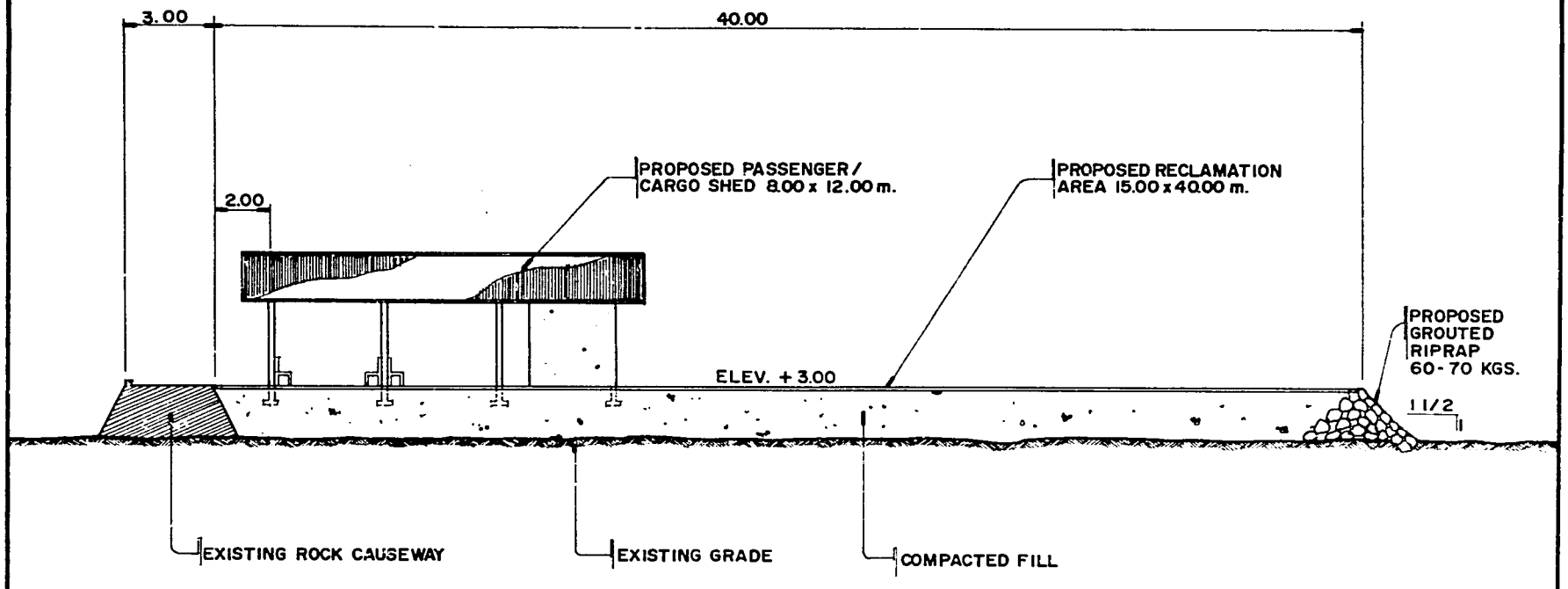
SCALE: 1:100

RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 - 0420

CARAMOAN PORT - PROPOSED RECLAMATION AREA

FIGURE A - 12



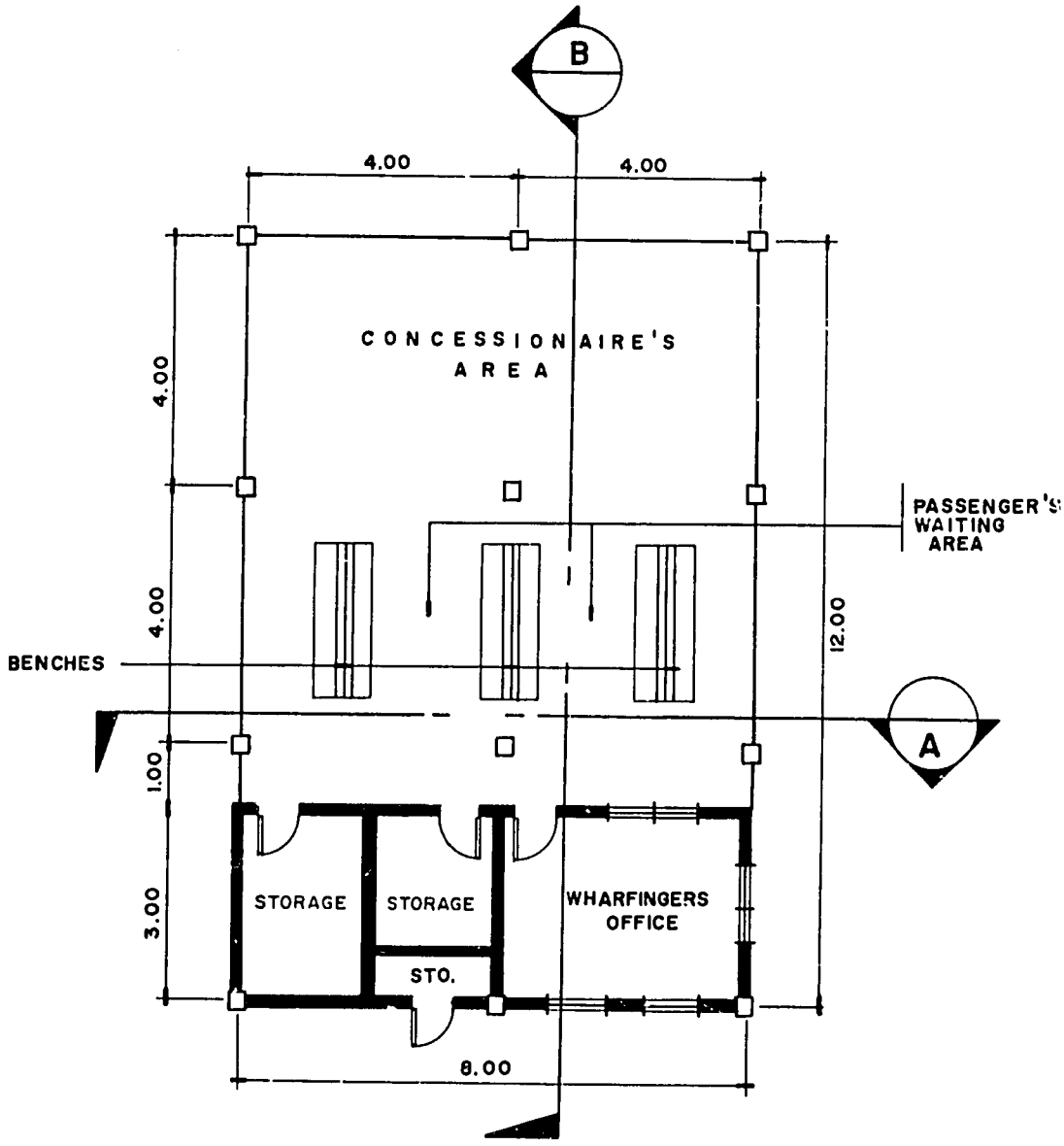
SECTION A/5

SCALE: 1:200

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492 - 0420

CARAMOAN PORT - PROPOSED RECLAMATION AREA

FIGURE A - 13

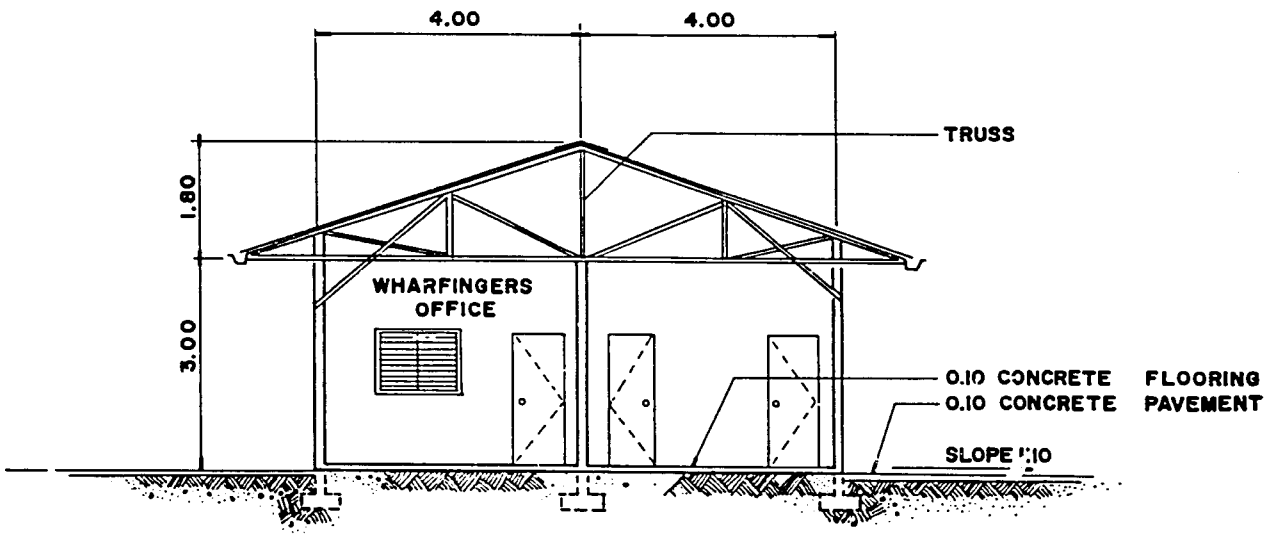


SCALE 1 : 100

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420

PROPOSED PORT BUILDING

FIGURE A- 14



SECTION A

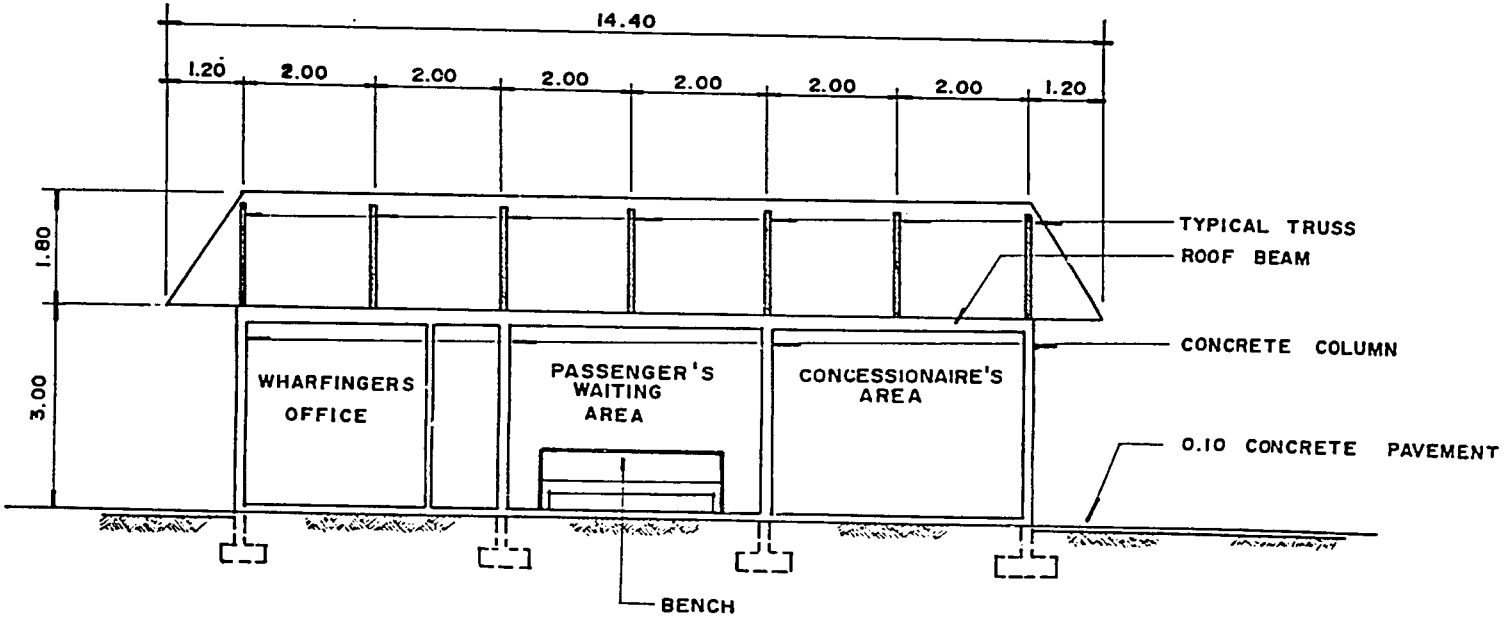
SCALE 1 : 100

RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 - 0420

PROPOSED PORT BUILDING

FIGURE A - 15



SECTION B

SCALE 1 : 100

RURAL INFRASTRUCTURE FUND PROJECT

AID PROJECT NO. 492 - 0420

PROPOSED PORT BUILDING

FIGURE A - 16

APPENDIX B
EXHIBITS

EXHIBIT I
PORT SHIPPING STATISTICS

PORT : CARAMOAN, GUINALO
PROVINCE : CAMARINES SUR
ISLAND : LUZON
REGION : V

DATE : MAY 10, 1990
REPORTED BY: EPC/JML

CARGO: (If one sheet is insufficient, use second sheet attached)

COMMODITY	INBOUND/ OUTBOUND (Check one) In	Out	TONS PER YEAR	TYPE OF VESSEL	TONS PER VESSEL	PESOS VALUES per/kg	ORIGIN or DESTINATION	TARIFF or FARE
FISH/MARINE PRODUCTS	✓		660					
VEGETABLES	✓		272				SAGNAY SABANG	
RICE	✓		1,054				SAGNAY SABANG	
FUEL	✓		802				SAGNAY SABANG TABALO	
CEMENT	✓		239				SAGNAY SABANG	
COPRA		✓	100				TABALO	
BOTTLED CARGO	✓	✓	OUT - 1,910 IN - 3,620	- SAGNAY,	SABANG, TABALO		OUT - SAGNAY, SABANG PRESENTACION, CABLAB, TABALO	
CORN		✓	25				TABALO	
ICE	✓		600				SAGNAY SABANG	
SUGAR	✓		1,200				SAGNAY SABANG	
ANIMAL FEED								
LUMBER								
MEAT								
SALT	✓		261				SAGNAY SABANG	

PASSENGERS PER DAY		VESSELS/ WEEK	DAY	PASSENGERS PER YEAR	TYPE OF YEAR	PASSENGERS PER VESSEL	FARE	DEST.
500	IN		6	148,000	300 DAYS A YEAR	75 - 100	₱25 MIN.	SAGNAY (14.6%), SABANG (46.6%), PRESENTACION (18.1%), CAB-CAB (10.3%), TABALO (9.4%) OTHERS (4.0%)
500	OUT		6	148.000	300 DAYS A YEAR	75 - 100		

VESSELS:

TYPE OF VESSEL	NO. OF VESSELS BOATS PER WEEK or DAY	MAX. TONNAGE	AVE. LENGTH (m)	MAX. DRAFT (m)	ORIGIN OF VESSEL	TRAVEL TIME	DISTANCE (km)	FUEL CONSP PER HOUR
MEDIUM BANCA	6 PER DAY	6	18 M. MIN.	1.5	SABANG			10 LIT/HR.
MEDIUM BANCA	1 PER DAY	6	18 M. MIN.	1.5	CABCAB, CATANDUANES			10 LIT/HR.
MEDIUM BANCA	ONE (SELDOM)	6	18M. MIN.	1.5	TABALO			10 LIT/HR.

EXHIBIT 2

SOCIO - ECONOMIC DATA

MUNICIPALITY OF : CARAMOAN DATE : MAY 18, 1990

REPORTED BY: EPL / JML

ANNUAL PRODUCTION

NAME OF PRODUCTS	YEAR (1988)		YEAR	
Agriculture				
rice		cavans/year		cavans/year
copras / COCONUT	14,999 M.T.	sacks/year		sacks/year
corn	360 M.T.	cavans/year		cavans/year
ROOT CROPS & VEGETABLES	575 M.T.	kilos/year		kilos/year
ABACA	302 M.T.			
Fishing				
fish marine catch		M.T./year		M.T./year
fish cultures		M.T./year		M.T./year
shell fish		M.T./year		M.T./year
Cattle & Poultry Raising				
cow / CATTLE	1,729	heads/year		heads/year
carabao	1,598	heads/year		heads/year
hogs / SWINE	3,092	heads/year		heads/year
goat	460	heads/year		heads/year
chickens	7,905	heads/year		heads/year
Local Products				

LAND TRAFFIC DATA (1990)

FROM: _____ TO: _____

VEHICLE			PASSENGER/DAY		CARGO (KILOS/DAY)	
TYPE	NO.	NO. OF TRIPS	INCOMING	OUTGOING	INCOMING	OUTGOING
			N/A			

EXHIBIT 2
(CONTINUED)

SOCIO - ECONOMIC DATA

MUNICIPALITY OF : CARAMOAN DATE : MAY 10, 1990

REPORTED BY: EPC / JMC

LOCATION OF PORT SITE	DISTANCE TO NEAREST ROAD/TOWN/ BARRIO	AREA OF INFLUENCE	HINTERLAND TOPOGRAPHY
a. BRGY. GUIJALO b. c.	3 KM. FROM THE TOWN CENTER		THE TERRAIN WILL BE MUCH SLOPE. THE LAND CONSIST OF MOUNTAINOUS HILLS.

DEMOGRAPHY: PRESENT POPULATION BARRIO: CARAMOAN MUNICIPALITY POPULATION: 37,610

PROVINCE:

COMMUNICATION	RADIO	TELEPHONE	TELEX	FAX	TELEGRAM	OTHERS
Available? (Yes or No)	YES				YES	

List other development projects in agriculture, fishing, health, etc. within 20 km of Port.

UNEXPLOITED POTENTIAL EXIST NEAR THE PORT'S HINTERLAND. THIS CONSIST OF GOLD, COPPER, MARBLE AND WHITE CEMENT DEPOSIT OF UNDETERMINED QUANTITY IN CAHOY ISLAND. AND THE SPORTS FISHING OF THE BLUE MARLIN, A SPECIE WHICH CAN BE FOUND IN THE LAGONOY GULF.

What is the purpose of the port projects? What will be the role of the port?

THE PURPOSE IS TO IMPROVE THE CALLS FOR THE DREDGING OF THE ONE SHALLOW SIDE OF THE BERTHING AREA AND REPAIR OF DAMAGED CAUSEWAY. THE ROLE OF THE PORT WILL BE THE ONLY OUTLET FOR PASSENGER OR CARGO OF THE MUNICIPALITY, DESPITE THE LIKELY COMPLETION OF THE LAGONOY TO CARAMOAN HIGHWAY IN 1991 OR 1992.

If the port is built or improved, from where will traffic be diverted?

DIVERSION WILL BE MUCH THE SAME AS THE CURRENT SITUATION OF THE PORT.

NAMES OF LOCAL OFFICIALS:

CURSIÑITO PADUA - MUNICIPAL MAYOR
ZAPERO OBIAS - VICE MAYOR
SB MEMBERS : MAXIMO BRIES
SANTOS BASIÑO
CESAR DIANELA
GREGORIO RECTO - MUNICIPAL TREASURER
ATANACIO RAMIRES JR. - MUNICIPAL SECRETARY

MARCELO SANCHO JR. - MPDC
FRANCISCO P. ALTEZ - MAO

EXHIBIT 3

NAME OF PORT: GUIJALO PORT					PORT OPERATION INVENTORY							ISLAND: LUZON		PROVINCE: CAMARINES SUR		
TYPE OF VESSELS	NO. OF VESSELS	VESSEL STATISTICS			CONSUMPTION				ENGINE TYPE	ORIGIN	DESTINATION	CARGOES / TON			AVERAGE NO OF PASS / YEAR	
		MAX TONNAGE	LENGHT	DRAFT	LITERS / HR	HRS. / TRIP	NO. OF TRIP/BOAT	DIST./TRIP				COMMODITY	INCOMING	OUTGOING	IN	OUT
MEDIUM BANCA	6	8 TONS MIN.	13.0 MIN	1.0	10			20 KPH	120 HP	CARAMOAN	SABANG	(SEE PORTS SHIPPING STATISTICS)				
MEDIUM BANCA	1	8 TONS MIN.	13.0 MIN	1.0	10			20 KPH	120 HP	CARAMOAN	CAB-CAB CATAN DUANES					
MEDIUM BANCA	1	8 TONS MIN.	13.0 MIN	1.0	10			20 KPH	120 HP	CARAMOAN	TABALO					

EXHIBIT 4

POPULATION BY PROVINCE

Socio-Economic Data by Province for Use in Forecasting Travel Demand.

This file contains, for each province, the base year (1990) and forecasted (for years 2000 and 2010) population and income per capita.

This spreadsheet uses these variables to calculate average annual traffic growth rates by province for the normal growth of passenger traffic.

Population by Province, Base Year (1990) and Forecasts for Years 2000 and 2010.

		POPULATION			AVERAGE ANNUAL GROWTH RATE	
REGION	PROVINCE	1990	2000	2010	1990 to 2000	2000 to 2011
I	Abra	190,634	223,919	252,506	1.62%	1.62%
I	Benguet	477,706	617,374	696,193	2.60%	2.60%
I	Ilocos Norte	455,395	517,582	583,661	1.29%	1.29%
I	Ilocos Sur	526,273	614,474	692,923	1.56%	1.56%
I	La Union	562,603	677,880	764,424	1.88%	1.88%
I	Mountain Province	126,455	151,647	171,007	1.83%	1.83%
I	Pangasinan	1,952,845	2,270,109	2,559,930	1.52%	1.52%
II	Batanes	14,748	17,510	19,746	1.73%	1.73%
II	Cagayan	891,370	1,077,806	1,215,408	1.92%	1.92%
II	Ifugao	138,827	167,787	189,208	1.91%	1.91%
II	Isabela	1,117,117	1,380,361	1,556,589	2.14%	2.14%
II	Kalinga Apayao	242,970	305,946	345,005	2.33%	2.33%
II	Nueva Vizcaya	322,034	410,811	463,259	2.46%	2.46%
II	Quirino	117,629	157,745	177,884	2.98%	2.98%
III	Bataan	479,034	659,363	743,543	3.25%	3.25%
III	Bulacan	1,395,274	1,695,899	1,912,411	1.97%	1.97%
III	Nueva Ecija	1,354,853	1,641,089	1,850,604	1.94%	1.94%
III	Pampanga	1,483,572	1,808,985	2,039,935	2.00%	2.00%
III	Tarlac	860,292	1,031,338	1,163,007	1.83%	1.83%
III	Zambales	568,593	692,201	780,573	1.99%	1.99%
IV-A	Aurora	138,273	172,004	193,963	2.21%	2.21%
IV-A	Batangas	1,466,451	1,767,352	1,992,987	1.88%	1.88%
IV-A	Cavite	1,076,137	1,399,737	1,578,439	2.66%	2.66%
IV-A	Laguna	1,260,610	1,551,619	1,749,711	2.10%	2.10%
IV-A	Marinduque	218,707	264,552	298,327	1.92%	1.92%
IV-A	Rizal	782,340	1,020,032	1,150,258	2.69%	2.69%
IV-B	Occidental Mindoro	315,536	419,919	473,529	2.90%	2.90%
IV-B	Oriental Mindoro	606,444	782,611	882,526	2.58%	2.58%
IV-B	Palawan	511,706	664,917	749,806	2.65%	2.65%
IV-B	Quezon	1,491,434	1,864,838	2,102,919	2.26%	2.26%
IV-B	Romblon	236,994	280,440	316,243	1.70%	1.70%
V	Albay	1,017,294	1,236,032	1,393,835	1.97%	1.97%
V	Camarines Norte	397,583	496,280	559,639	2.24%	2.24%
V	Camarines Sur	1,360,206	1,620,670	1,827,578	1.77%	1.77%
V	Catanduanes	225,575	282,818	318,925	2.29%	2.29%
V	Masbate	745,100	917,834	1,035,012	2.11%	2.11%
V	Sorsogon	642,377	801,182	903,467	2.23%	2.23%

EXHIBIT 4

(CONTINUED)

REGION	PROVINCE	POPULATION 1990	POPULATION 2000	POPULATION 2010	AVERAGE ANNUAL GROWTH RATE 1990 to 2000	AVERAGE ANNUAL GROWTH RATE 2000 to 2011
VI	Aklan	402,849	481,163	542,593	1.79%	1.79%
VI	Antique	434,893	525,447	592,530	1.91%	1.91%
VI	Capiz	627,494	766,587	864,455	2.02%	2.02%
VI	Iloilo	1,787,316	2,129,918	2,401,841	1.77%	1.77%
VI	Negros Occidental	2,419,758	2,896,811	3,266,642	1.82%	1.82%
VII	Bohol	893,359	967,868	1,091,434	0.80%	0.80%
VII	Cebu	2,655,417	3,229,110	3,641,365	1.98%	1.98%
VII	Negros Oriental	986,764	1,152,772	1,299,945	1.57%	1.57%
VII	Siguijor	80,498	90,847	102,445	1.22%	1.22%
VIII	Leyte	1,542,354	1,783,671	2,011,390	1.46%	1.46%
VIII	Southern Leyte	356,458	419,255	472,781	1.64%	1.64%
VIII	Eastern Samar	405,427	505,846	570,426	2.24%	2.24%
VIII	Northern Samar	465,235	567,231	639,648	2.00%	2.00%
VIII	Samar	590,960	696,994	785,978	1.66%	1.66%
IX-A	Basilan	252,894	304,018	342,832	1.86%	1.86%
IX-A	Sulu	437,994	504,300	568,683	1.42%	1.42%
IX-A	Tawi-Tawi	250,984	304,187	343,022	1.94%	1.94%
IX-B	Zamboanga del Norte	741,645	902,260	1,017,450	1.98%	1.98%
IX-B	Zamboanga del Sur	1,511,286	1,859,045	2,096,386	2.09%	2.09%
X	Agusan del Norte	452,794	542,951	612,269	1.83%	1.83%
X	Agusan del Sur	369,390	487,739	550,008	2.82%	2.82%
X	Bukidnon	826,513	1,033,392	1,165,324	2.26%	2.26%
X	Camiguin	67,356	78,157	88,135	1.50%	1.50%
X	Misamis Occidental	469,098	548,476	618,499	1.58%	1.58%
X	Misamis Oriental	947,529	1,238,810	1,396,966	2.72%	2.72%
X	Sorigao del Norte	482,934	610,398	688,326	2.37%	2.37%
XI	Davao	959,373	1,209,064	1,363,423	2.34%	2.34%
XI	Davao del Sur	1,465,011	1,808,583	2,039,481	2.13%	2.13%
XI	Davao Oriental	422,778	507,920	572,766	1.85%	1.85%
XI	South Cotabato	989,440	1,217,472	1,372,904	2.10%	2.10%
XI	Surigao del Sur	497,094	620,771	700,024	2.25%	2.25%
XII	Lanao del Norte	570,714	692,697	781,132	1.96%	1.96%
XII	Lanao del Sur	525,437	655,021	738,646	2.23%	2.23%
XII	Maguindanao	684,360	842,815	950,415	2.10%	2.10%
XII	North Cotabato	738,625	925,411	1,043,557	2.28%	2.28%
XII	Sultan Kudarat	423,122	559,363	630,776	2.83%	2.83%
Total		53,508,155	65,329,031	73,671,484	2.02%	2.02%

Source: NEDA

EXHIBIT 5

PER CAPITA INCOME GROWTH RATES

REGION	PROVINCE	AVERAGE ANNUAL GROWTH RATE 1990 to 2000	AVERAGE ANNUAL GROWTH RATE 2000 to 2011
I	Abra	5.25%	5.75%
I	Benguet	5.25%	5.75%
I	Ilocos Norte	5.25%	5.75%
I	Ilocos Sur	5.25%	5.75%
I	La Union	5.25%	5.75%
I	Mountain Province	5.25%	5.75%
I	Pangasinan	5.25%	5.75%
II	Batanes	5.15%	5.65%
II	Cagayan	5.15%	5.65%
II	Ifugao	5.15%	5.65%
II	Isabela	5.15%	5.65%
II	Kalinga Apayao	5.15%	5.65%
II	Nueva Vizcaya	5.15%	5.65%
II	Quirino	5.15%	5.65%
III	Bataan	4.90%	5.35%
III	Bulacan	4.90%	5.35%
III	Nueva Ecija	4.90%	5.35%
III	Pampanga	4.90%	5.35%
III	Tarlac	4.90%	5.35%
III	Zambales	4.90%	5.35%
IV-A	Aurora	4.50%	5.05%
IV-A	Batangas	4.50%	5.05%
IV-A	Cavite	4.50%	5.05%
IV-A	Laguna	4.50%	5.05%
IV-A	Marirduque	4.50%	5.05%
IV-A	Rizal	4.50%	5.05%
IV-B	Occidental Mindoro	4.50%	5.05%
IV-B	Oriental Mindoro	4.50%	5.05%
IV-B	Palawan	4.50%	5.05%
IV-B	Quezon	4.50%	5.05%
IV-B	Romblon	4.50%	5.05%
V	Albay	5.00%	5.00%
V	Camarines Norte	5.00%	5.00%
V	Camarines Sur	5.00%	5.00%
V	Catanduanes	5.00%	5.00%
V	Masbate	5.00%	5.00%
V	Sorsogon	5.00%	5.00%
VI	Aklan	5.05%	5.35%
VI	Antique	5.05%	5.35%
VI	Capiz	5.05%	5.35%
VI	Iloilo	5.05%	5.35%
VI	Negros Occidental	5.05%	5.35%
VII	Bohol	5.00%	5.35%
VII	Cebu	5.00%	5.35%
VII	Negros Oriental	5.00%	5.35%
VII	Siguijor	5.00%	5.35%
VIII	Leyte	5.65%	5.95%
VIII	Southern Leyte	5.65%	5.95%
VIII	Eastern Samar	5.65%	5.95%
VIII	Northern Samar	5.65%	5.95%
VIII	Samar	5.65%	5.95%
IX-A	Basilan	5.25%	5.65%
IX-A	Sulu	5.25%	5.65%
IX-A	Tawi-Tawi	5.25%	5.65%
IX-B	Zamboanga del Norte	5.25%	5.65%
IX-B	Zamboanga del Sur	5.25%	5.65%
X	Agusan del Norte	4.90%	5.35%
X	Agusan del Sur	4.90%	5.35%
X	Bukidnon	4.90%	5.35%
X	Camiguin	4.90%	5.35%
X	Misamis Occidental	4.90%	5.35%
X	Misamis Oriental	4.90%	5.35%
X	Sorigao del Norte	4.90%	5.35%
XI	Davao	4.60%	5.20%
XI	Davao del Sur	4.60%	5.20%
XI	Davao Oriental	4.60%	5.20%
XI	South Cotabato	4.60%	5.20%
XI	Surigao del Sur	4.60%	5.20%
XII	Lanao del Norte	4.70%	5.15%
XII	Lanao del sur	4.70%	5.15%
XII	Maguindanao	4.70%	5.15%
XII	North Cotabato	4.70%	5.15%
XII	Sultan Kudarat	4.70%	5.15%

Source: Family Income & Expenditures Survey 1985 (FBS), NEDA

EXHIBIT 6

GROWTH RATE FOR PASSENGER TRAVEL DEMAND, BY PROVINCE

$f = P + I * E$ where:

f is annual growth rate for passenger travel demand
P is annual growth rate of population in province
I is annual growth rate of income per capita in province
E is elasticity of passenger travel demand to change in income per capita:

private vehicle	1.40
jeepney (banca)	0.50
bus (inter-island)	0.80

		AVERAGE ANNUAL GROWTH RATE					
		1990 to 2000			2000 to 2011		
REGION	PROVINCE	CAR	JEEPNEY (BANCA)	BUS (I-I)	CAR	JEEPNEY (BANCA)	BUS (I-I)
I	Abra	8.97%	4.25%	5.82%	9.67%	4.50%	6.22%
I	Benguet	9.95%	5.22%	6.80%	10.65%	5.47%	7.20%
I	Ilocos Norte	8.64%	3.91%	5.49%	9.34%	4.16%	5.89%
I	Ilocos Sur	8.91%	4.19%	5.76%	9.61%	4.44%	6.16%
I	La Union	9.23%	4.51%	6.08%	9.93%	4.76%	6.48%
I	Mountain Province	9.18%	4.46%	6.03%	9.88%	4.71%	6.43%
I	Pangasinan	8.87%	4.14%	5.72%	9.57%	4.39%	6.12%
II	Batanes	8.94%	4.31%	5.85%	9.64%	4.56%	6.25%
II	Cagayan	9.13%	4.49%	6.04%	9.83%	4.74%	6.44%
II	Ifugao	9.12%	4.49%	6.03%	9.82%	4.74%	6.43%
II	Isabela	9.35%	4.71%	6.26%	10.05%	4.96%	6.66%
II	Kalinga Apayao	9.54%	4.91%	6.45%	10.24%	5.16%	6.85%
II	Nueva Vizcaya	9.67%	5.04%	6.58%	10.37%	5.29%	6.98%
II	Quirino	10.19%	5.55%	7.10%	10.89%	5.80%	7.50%
III	Bataan	10.11%	5.70%	7.17%	10.74%	5.92%	7.53%
III	Bulacan	8.83%	4.42%	5.89%	9.46%	4.65%	6.25%
III	Nueva Ecija	8.80%	4.39%	5.86%	9.43%	4.61%	6.22%
III	Pampanga	8.86%	4.45%	5.92%	9.49%	4.68%	6.28%
III	Tarlac	8.69%	4.28%	5.75%	9.32%	4.50%	6.11%
III	Zambales	8.85%	4.44%	5.91%	9.48%	4.66%	6.27%
IV-A	Aurora	8.51%	4.46%	5.81%	9.28%	4.73%	6.25%
IV-A	Batangas	8.18%	4.13%	5.48%	8.95%	4.41%	5.92%
IV-A	Cavite	8.96%	4.91%	6.26%	9.73%	5.19%	6.70%
IV-A	Laguna	8.40%	4.35%	5.70%	9.17%	4.63%	6.14%
IV-A	Marinduque	8.22%	4.17%	5.52%	8.99%	4.45%	5.96%
IV-A	Rizal	8.99%	4.94%	6.29%	9.76%	5.21%	6.73%
IV-B	Occidental Mindoro	9.20%	5.15%	6.50%	9.97%	5.42%	6.94%
IV-B	Oriental Mindoro	8.88%	4.83%	6.18%	9.65%	5.11%	6.62%
IV-B	Palawan	8.95%	4.90%	6.25%	9.72%	5.18%	6.69%
IV-B	Quezon	8.56%	4.51%	5.86%	9.33%	4.78%	6.30%
IV-B	Romblon	8.00%	3.95%	5.30%	8.77%	4.22%	5.74%
V	Albay	8.97%	4.47%	5.97%	8.97%	4.47%	5.97%
V	Camarines Norte	9.24%	4.74%	6.24%	9.24%	4.74%	6.24%
V	Camarines Sur	8.77%	4.27%	5.77%	8.77%	4.27%	5.77%
V	Catanduanes	9.29%	4.79%	6.29%	9.29%	4.79%	6.29%
V	Masbate	9.11%	4.61%	6.11%	9.11%	4.61%	6.11%
V	Sorsogon	9.23%	4.73%	6.23%	9.23%	4.73%	6.23%

C(1)

EXHIBIT 6

(CONTINUED)

		AVERAGE ANNUAL GROWTH RATE					
		1990 to 2000			2000 to 2011		
REGION	PROVINCE	CAR	JEEPNEY (BANCA)	BUS (I-I)	CAR	JEEPNEY (BANCA)	BUS (I-I)
VI	Aklan	8.86%	4.32%	5.83%	9.20%	4.47%	6.07%
VI	Antique	8.98%	4.43%	5.95%	9.40%	4.58%	6.19%
VI	Capiz	9.09%	4.55%	6.06%	9.51%	4.70%	6.30%
VI	Iloilo	8.84%	4.29%	5.81%	9.26%	4.44%	6.05%
VI	Negros Occidental	8.89%	4.34%	5.86%	9.31%	4.49%	6.10%
VII	Bohol	7.80%	3.30%	4.80%	8.29%	3.48%	5.08%
VII	Cebu	8.98%	4.48%	5.98%	9.47%	4.65%	6.26%
VII	Negros Oriental	8.57%	4.07%	5.57%	9.06%	4.24%	5.85%
VII	Siguijor	8.22%	3.72%	5.22%	8.71%	3.89%	5.50%
VIII	Leyte	9.37%	4.29%	5.98%	9.79%	4.44%	6.22%
VIII	Southern Leyte	9.55%	4.46%	6.16%	9.97%	4.61%	6.40%
VIII	Eastern Samar	10.15%	5.06%	6.76%	10.57%	5.21%	7.00%
VIII	Northern Samar	9.91%	4.83%	6.52%	10.33%	4.98%	6.76%
VIII	Samar	9.57%	4.49%	6.18%	9.99%	4.64%	6.42%
IX-A	Basilan	9.21%	4.48%	6.06%	9.77%	4.68%	6.38%
IX-A	Sulu	8.77%	4.04%	5.62%	9.33%	4.24%	5.94%
IX-A	Tawi-Tawi	9.29%	4.57%	6.14%	9.85%	4.77%	6.46%
IX-B	Zamboanga del Norte	9.33%	4.60%	6.18%	9.89%	4.80%	6.50%
IX-B	Zamboanga del Sur	9.44%	4.72%	6.29%	10.00%	4.92%	6.61%
X	Agusan del Norte	8.69%	4.28%	5.75%	9.32%	4.51%	6.11%
X	Agusan del Sur	9.68%	5.27%	6.74%	10.31%	5.49%	7.10%
X	Bukidnon	9.12%	4.71%	6.18%	9.75%	4.93%	6.54%
X	Camiguin	8.36%	3.95%	5.42%	8.99%	4.17%	5.78%
X	Misamis Occidental	8.44%	4.03%	5.50%	9.07%	4.25%	5.86%
X	Misamis Oriental	9.58%	5.17%	6.64%	10.21%	5.39%	7.00%
X	Sorigao del Norte	9.23%	4.82%	6.29%	9.86%	5.04%	6.65%
XI	Davao	8.78%	4.64%	6.02%	9.62%	4.94%	6.50%
XI	Davao del Sur	8.57%	4.43%	5.81%	9.41%	4.73%	6.29%
XI	Davao Oriental	8.29%	4.15%	5.53%	9.13%	4.45%	6.01%
XI	South Cotabato	8.54%	4.40%	5.78%	9.38%	4.70%	6.26%
XI	Surigao del Sur	8.69%	4.55%	5.93%	9.53%	4.85%	6.41%
XII	Lanao del Norte	8.54%	4.31%	5.72%	9.17%	4.53%	6.08%
XII	Lanao del Sur	8.81%	4.58%	5.99%	9.44%	4.80%	6.35%
XII	Maguindanao	8.68%	4.45%	5.86%	9.31%	4.68%	6.22%
XII	North Cotabato	8.86%	4.63%	6.04%	9.49%	4.86%	6.40%
XII	Sultan Kudarat	9.41%	5.18%	6.59%	10.04%	5.41%	6.95%

Source: Consultant's calculations from (5 & 8)

EXHIBIT 7

GROSS REGIONAL DOMESTIC PRODUCT (GRDP)

REGION	PROVINCE	AVERAGE ANNUAL GROWTH RATE 1990 to 2000	AVERAGE ANNUAL GROWTH RATE 2000 to 2011
I	Abra	6.80%	6.80%
I	Benguet	6.80%	6.80%
I	Ilocos Norte	6.80%	6.80%
I	Ilocos Sur	6.80%	6.80%
I	La Union	6.80%	6.80%
I	Mountain Province	6.80%	6.80%
I	Pangasinan	6.80%	6.80%
II	Batanes	7.25%	7.05%
II	Cagayan	7.25%	7.05%
II	Ifugao	7.25%	7.05%
II	Isabela	7.25%	7.05%
II	Kalinga Apayao	7.25%	7.05%
II	Nueva Vizcaya	7.25%	7.05%
II	Quirino	7.25%	7.05%
III	Bataan	6.80%	6.80%
III	Bulacan	6.80%	6.80%
III	Nueva Ecija	6.80%	6.80%
III	Pampanga	6.80%	6.80%
III	Tarlac	6.80%	6.80%
III	Zambales	6.80%	6.80%
IV-A	Aurora	6.80%	6.80%
IV-A	Batangas	6.80%	6.80%
IV-A	Cavite	6.80%	6.80%
IV-A	Laguna	6.80%	6.80%
IV-A	Marinduque	6.80%	6.80%
IV-A	Rizal	6.80%	6.80%
IV-B	Occidental Mindoro	6.80%	6.80%
IV-B	Oriental Mindoro	6.80%	6.80%
IV-B	Palawan	6.80%	6.80%
IV-B	Quezon	6.80%	6.80%
IV-B	Romblon	6.80%	6.80%
V	Albay	6.80%	6.80%
V	Camarines Norte	6.80%	6.80%
V	Camarines Sur	6.80%	6.80%
V	Catanduanes	6.80%	6.80%
V	Masbate	6.80%	6.80%
V	Sorsogon	6.80%	6.80%
VI	Aklan	6.40%	6.20%
VI	Antique	6.40%	6.20%
VI	Capiz	6.40%	6.20%
VI	Iloilo	6.40%	6.20%
VI	Negros Occidental	6.40%	6.20%
VII	Bohol	6.85%	6.60%
VII	Cebu	6.85%	6.60%
VII	Negros Oriental	6.85%	6.60%
VII	Siguijor	6.85%	6.60%
VIII	Leyte	6.80%	6.80%
VIII	Southern Leyte	6.80%	6.80%
VIII	Eastern Samar	6.80%	6.80%
VIII	Northern Samar	6.80%	6.80%
VIII	Samar	6.80%	6.80%
IX-A	Basilan	6.80%	6.80%
IX-A	Sulu	6.80%	6.80%
IX-A	Tawi-Tawi	6.80%	6.80%
IX-B	Zamboanga del Norte	6.80%	6.80%
IX-B	Zamboanga del Sur	6.80%	6.80%
X	Agusan del Norte	6.80%	6.80%
X	Agusan del Sur	6.80%	6.80%
X	Bukidnon	6.80%	6.80%
X	Camiguin	6.80%	6.80%
X	Misamis Occidental	6.80%	6.80%
X	Misamis Oriental	6.80%	6.80%
X	Surigao del Norte	6.80%	6.80%
XI	Davao	6.85%	7.00%
XI	Davao del Sur	6.85%	7.00%
XI	Davao Oriental	6.85%	7.00%
XI	South Cotabato	6.85%	7.00%
XI	Surigao del Sur	6.85%	7.00%
XII	Lanao del Norte	6.80%	6.70%
XII	Lanao del Sur	6.80%	6.70%
XII	Maguindanao	6.80%	6.70%
XII	North Cotabato	6.80%	6.70%
XII	Sultan Kudarat	6.80%	6.70%

Source: NEDA

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EXHIBIT 8

VALUE OF PASSENGER TIME BY REGION

REGION	INCOME		POPULATION (IN THOUSANDS)		PROPORTION OF ADULTS (A)	UNADJUSTED PASSENGER TIME (V*)	ADJUSTED PASSENGER TIME (V)
	1988 INCOME	FEBRUARY 1988 INCOME (Y)	1988	FEBRUARY 1990			
I	2.086 x 10^10	2.656 x 10^10	4,099	4,236	0.593	2.843	2.001
II	1.435 x 10^10	1.847 x 10^10	2,689	2,806	0.570	3.954	2.784
III	4.778 x 10^10	6.144 x 10^10	5,816	6,065	0.580	6.014	4.234
IV	5.454 x 10^10	7.052 x 10^10	7,623	7,992	0.579	5.219	3.674
V	1.969 x 10^10	2.524 x 10^10	4,158	4,323	0.542	3.670	2.584
VI	2.909 x 10^10	3.721 x 10^10	5,387	5,588	0.578	3.945	2.777
VII	2.270 x 10^10	2.917 x 10^10	4,411	4,599	0.594	3.657	2.574
VIII	1.499 x 10^10	1.907 x 10^10	3,216	3,317	0.557	3.534	2.488
IX	1.727 x 10^10	2.211 x 10^10	3,033	3,150	0.546	4.402	3.100
X	2.089 x 10^10	2.695 x 10^10	3,408	3,567	0.560	4.620	3.252
XI	2.707 x 10^10	3.489 x 10^10	4,096	4,275	0.557	5.012	3.528
XII	1.706 x 10^10	2.197 x 10^10	2,778	2,902	0.534	4.856	3.420

Source:

NSCB, "1989 Philippine Statistical Yearbook", Manila, October 1989
1988 Income - Table 2.4, pp. 2-12 - pp. 2-13
February 1990 Population - Table 1.7, pp. 1-48 - pp. 1-59
1988 Population - Table 1.7, pp. 1-48 - pp. 1-59
Proportion of Adults in Population - Table 1.4, pp. 1-20 - pp. 1-42

EXHIBIT 9

LAGONOY GULF LOGISTICS NETWORK
CARAMOAN (Guijalo) PORT
(1000 Tons)

FROM/ TO	SAGNAY (NATO)	SABANG	PRESEN- TACION	CARA- MOAN	CABCAB	TABACO	OTHERS	TOTAL
NATO								
%/passengers	50	0	6	7	5	5	16	9
passengers	51	1	5	20	10	5	10	102
fish, etc.	75							75
rice	140	140						280
fuel	42	42						84
consumables	95	95						189
bag cargo	207	207						413
bottle cargo	537	280		257				1,073
others	1,032	32					1,000	2,063
SABANG								
%/passengers	1	50	35	27	12	5	24	27
passengers	1	152	29	80	22	5	15	304
fish, etc.		540	90					630
rice	6	6						12
fuel	6	6						12
consumables	12	12						25
bag cargo	4	954	950					1,909
bottle cargo	3	1,031		1,028				2,062
others	2	272	270					543
PRESENTACION								
%/passengers	5	10	50	2	0	1	2	7
passengers	5	29	41	5	0	1	1	82
fish, etc.			360					360
rice	30	382	412					825
fuel	29	115	144					288
consumables	61	258	319					637
bag cargo	22	563	585					1,170
bottle cargo	15	764	844	65				1,687
others	7	86	93					186
CARAMOAN								
%/passengers	20	47	6	50	16	9	5	26
passengers	20	80	5	148	30	10	3	296
fish, etc.				660				660
rice	122	932		1,054				2,108
fuel	118	280		802		404		1,603
consumables	243	629		872				1,744
bag cargo	86	1,375		1,461				2,922
bottle cargo	59	1,864		3,823	1,900			7,646
others	29	210		239				478

EXHIBIT 9
(CONTINUED)

FROM/ TO	SAGNAY (NATO)	SABANG	PRESEN-TACION	CARA-MOAN	CABCAB	TABACO	OTHERS	TOTAL
CABCAB								
%/passengers	10	7	0	10	50	28	0	16
passengers	10	22	0	30	92	30	0	184
fish, etc.								0
rice	141	290			431			862
fuel	59	87			146			292
consumables	122	196			318			635
bag cargo	43	428			461			932
bottle cargo	29	580		386	995			1,990
others	15	65			80			160
TABACO								
%/passengers	5	2	1	3	16	50	3	9
passengers	5	5	1	10	30	53	2	106
fish, etc.								0
rice	30	66				96		193
fuel	29	20				49		98
consumables	61	45				106		211
bag cargo	22	97	360			479		958
bottle cargo	15	132		129		276		552
others	7	15	70	125		217		434
OTHERS								
%/passengers	10	5	1	1	0	2	50	6
passengers	10	15	1	3	0	2	31	62
fish, etc.								0
rice	61	198					259	518
fuel	59	59					118	236
consumables	122	134					256	511
bag cargo	43	292					335	670
bottle cargo	29	396		38			425	888
others	15	45					60	119
TOTAL:								
passengers	102	304	82	296	184	106	62	1,136
%	9	27	7	26	16	9	6	100
fish	75	540	450	660	0	0	0	1,725
%	4	31	26	38	n/a	n/a	n/a	100
rice	530	2,014	412	1,054	431	96	259	4,797
fuel	342	608	144	802	146	453	118	2,613
consumables	715	1,368	319	872	318	106	256	3,953
bag	427	3,916	1,895	1,461	461	479	335	8,974
bottle	687	5,047	844	5,725	995	2,176	425	15,898
others	1,107	723	433	364	80	217	1,060	3,984
TOTAL CARGO	3,806	13,677	4,047	10,278	2,433	3,527	2,453	40,219
Percent	10	34	10	26	6	9	6	100

EXHIBIT 10 - SUMMARY OF UNIT RATES

(Sheet 1 of 3)

SUMMARY OF UNIT RATES RURAL INFRASTRUCTURE FUND PROJECT			FINANCIAL COST		FOREIGN COMPONENT DIRECT		FOREIGN COMPONENT INDIRECT		FOREIGN COMPONENT TOTAL		LOCAL COMPONENT		TAXES		ECONOMIC COST	
PAY ITEM NO.	DESCRIPTION	UNIT	UNIT COST (Pesos)	%	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)
(0 - 19)	I. EARTHWORK															
1	Clearing & Grubbing	SQ.M.	1.76	100	49	0.9			49	0.9	19	0.3	32	0.6	68	1.2
2	Tree Removal, Small	EA.														
3	Demolition of Structures & Obstructions	L.S.														
4	Unsuitable Excavation	CU.M.	40	100	46	18.4			46	18.4	23	9.2	31	12.4	69	27.6
5	Surplus Rock Excavation	CU.M.	150	100	28	42.0			28	42.0	54	81.0	18	27.0	82	123.0
6	Structure Excavation	CU.M.	50	100	47	23.5			47	23.5	22	11.0	31	15.5	69	34.5
7	Foundation Fill	CU.M.	56	100	47	26.3			47	26.3	28	15.7	25	14.0	75	42.0
8	Excavation Below Water Elevation	CU.M.	190	100	16	30.4	18	34.2	34	64.6	52	98.8	14	26.6	86	163.4
9	Compacted Fill, Select Material, Borrow	CU.M.	70	100	47	32.9			47	32.9	28	19.6	25	17.5	75	52.5
(20 - 39)	II. PAVEMENT															
20	Aggregate Subbase Course	CU.M.	140	100	48	67.2			48	67.2	27	37.8	25	35.0	75	105.0
21	Aggregate Base Course	CU.M.														
22	Crushed Aggregate Base Course	CU.M.	240	100	52	124.8			52	124.8	22	52.8	26	62.4	74	177.6
23	Soil Aggregate Shoulder	CU.M.	150	100	48	72.0			48	72.0	27	40.5	25	37.5	75	112.5
24	Gravel Surface Course	CU.M.														
25	Bituminous Prime Coat, MC-70	SQ.M.	11	100	5	0.6	50	5.5	55	6.1	25	2.8	20	2.2	80	8.8
26	Bituminous Tack Coat, CRS-2	SQ.M.	8	100	8	0.6	47	3.8	55	4.4	24	1.9	21	1.7	79	6.3
27	Single Bituminous Surface Treatment	SQ.M.	25	100	5	1.3	49	12.3	54	13.5	24	6.0	22	5.5	78	19.5
28	Double Bituminous Surface Treatment	SQ.M.	49	100	5	2.5	48	23.5	53	26.0	25	12.3	22	10.8	78	38.2
29	Bituminous Concrete Wearing Course	CU.M.	2740	100	31	849.4	21	575.4	52	1424.8	22	602.8	26	712.4	74	2027.6
30	Bituminous Concrete Binder Course	CU.M.	2600	100	31	806.0	21	546.0	52	1352.0	22	572.0	26	676.0	74	1924.0
32	Bituminous Concrete Leveling Course	MT	1130	100	31	350.3	21	237.3	52	587.6	22	248.6	26	293.8	74	836.2
33	Portland Cement Concrete Pavement	SQ.M.	400	100	18	72.0	32	128.0	50	200.0	31	124.0	19	76.0	81	324.0

EXHIBIT 10 - SUMMARY OF UNIT RATES

(Sheet 2 of 3)

SUMMARY OF UNIT RATES - RURAL INFRASTRUCTURE FUND PROJECT			FINANCIAL COST		FOREIGN COMPONENT DIRECT		FOREIGN COMPONENT INDIRECT		FOREIGN COMPONENT TOTAL		LOCAL COMPONENT		TAXES		ECONOMIC COST	
PAY ITEM NO.	DESCRIPTION	UNIT	UNIT COST (Pesos)	%	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)
(40 - 59)	III. CONCRETE STRUCTURES - ON LAND															
40	Precast Concrete Piles, Furnished (40 x 40cm)	L.M.	320	100	15	123.0	26	213.2	41	336.2	44	360.8	15	123.0	85	697.0
41	Precast Concrete Piles, Driven (40 x 40cm)	L.M.	626	100	14	87.6	32	200.3	46	288.0	38	237.9	16	100.2	84	525.8
42	Precast Concrete Piles, Furnished (45 x 45cm)	L.M.	1290	100	15	193.5	26	335.4	41	528.9	44	567.6	15	193.5	85	1096.5
43	Precast Concrete Piles, Driven (45 x 45cm)	L.M.	790	100	14	110.6	32	252.8	46	363.4	38	300.2	16	126.4	84	663.6
44	Prestressed Conc. Sheet Piles, Furn. (25 x 60cm)	L.M.	1180	100	15	177.0	26	306.8	41	483.8	44	519.2	15	177.0	85	1003.0
45	Prestressed Conc. Sheet Piles, Driven (25 x 60cm)	L.M.	590	100	14	82.6	32	188.8	46	271.4	38	224.2	16	94.4	84	495.6
46	Pile Transportation per 100 Kilometers, On Land	L.M.	250	100	30	75.0	20	50.0	50	125.0	30	75.0	20	50.0	80	200.0
47	Pile Transportation per 100 Kilometers, By Sea	L.M.	300	100	30	90.0	20	60.0	50	150.0	30	90.0	20	60.0	80	240.0
48	Test Pile, Concrete (40 x 40cm)	L.M.		100									100			
49	Test Pile, Concrete (45 x 45cm)	L.M.		100									100			
50	Reinforcing Steel	KG	21	100			45	9.5	45	9.5	44	9.2	11	2.3	89	18.7
51	Structural Concrete, Class A	CU.M.	2100	100	15	315.0	26	546.0	41	861.0	44	924.0	15	315.0	85	1785.0
52	Structural Concrete, Class B	CU.M.	2090	100	15	313.5	26	543.4	41	856.9	44	919.6	15	313.5	85	1776.5
(60 - 79)	IV. MARINE STRUCTURES OVER/IN WATER															
60	Precast Concrete Piles, Furnished (40 x 40cm)	L.M.	820	100	15	123.0	26	213.2	41	336.2	44	360.8	15	123.0	85	697.0
61	Precast Concrete Piles, Driven (40 x 40cm)	L.M.	660	100	25	165.0	20	132.0	45	297.0	40	264.0	15	99.0	85	561.0
62	Precast Concrete Piles, Furnished (45 x 45cm)	L.M.	1290	100	15	193.5	26	335.4	41	528.9	44	567.6	15	193.5	85	1096.5
63	Precast Concrete Piles, Driven (45 x 45cm)	L.M.	835	100	25	208.8	20	167.0	45	375.8	40	334.0	15	125.3	85	709.8
64	Structural Concrete, Class A (over water)	CU.M.	3300	100	15	495.0	20	660.0	35	1155.0	50	1650.0	15	495.0	85	2805.0
65	Structural Concrete, Class B (over water)	CU.M.	3280	100	15	492.0	20	656.0	35	1148.0	50	1640.0	15	492.0	85	2788.0
66	Structural Concrete, Class A (under water)	CU.M.	5300	100	15	795.0	20	1060.0	35	1855.0	50	2650.0	15	795.0	85	4505.0
67	Structural Concrete, Class B (under water)	CU.M.	5200	100	15	780.0	20	1040.0	35	1820.0	50	2600.0	15	780.0	85	4420.0
68	Core Rock for Causeway or Breakwater	CU.M.	260	100	50	130.0			50	130.0	30	78.0	20	52.0	80	208.0
69	Underlayer Rock	CU.M.	450	100	50	225.0			50	225.0	30	135.0	20	90.0	80	360.0
70	Armor Rock, Small (up to 1 ton)	CU.M.	575	100	50	287.5			50	287.5	30	172.5	20	115.0	80	460.0
71	Armor Rock, Large (larger than 1 ton)	CU.M.	690	100	50	345.0			50	345.0	30	207.0	20	138.0	80	552.0
72	Berthing Dolphins (5 Timber Piles)	EA.	30000	100	30	9000.0	20	6000.0	50	15000.0	35	10500.0	15	4500.0	85	25500.0
73	Berthing Dolphins (7 Timber Piles)	EA.	40000	100	30	12000.0	20	8000.0	50	20000.0	35	14000.0	15	6000.0	85	34000.0
74	Mooring Bollard	EA.	13000	100	40	5200.0			40	5200.0	45	5850.0	15	1950.0	85	11050.0
75	Mooring Cleat	EA.	8000	100	40	3200.0			40	3200.0	45	3600.0	15	1200.0	85	6800.0
76	Mooring Ring	EA.	450	100	40	180.0			40	180.0	45	202.5	15	67.5	85	382.5

Note: Items 40,42,44,60 and 62 are ex plant.

EXHIBIT 10 - SUMMARY OF UNIT RATES

(Sheet 3 of 3)

SUMMARY OF UNIT RATES RURAL INFRASTRUCTURE FUND PROJECT			FINANCIAL COST		FOREIGN COMPONENT DIRECT		FOREIGN COMPONENT INDIRECT		FOREIGN COMPONENT TOTAL		LOCAL COMPONENT		TAXES		ECONOMIC COST	
PAY ITEM NO.	DESCRIPTION	UNIT	UNIT COST (Pesos)	%	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)	%	UNIT COST (Pesos)
(80 - 99)	V. STANDARD PORT BUILDINGS															
80	Building w/ Comfort Room, Office	S.M.	4000	100	15	600.0	26	1040.0	41	1640.0	44	1760.0	15	600.0	85	3400.0
81	Open Building	S.M.	3070	100	15	460.5	26	798.2	41	1253.7	44	1350.8	15	460.5	85	2609.5
82	Comfort Rooms, incl. Walls (no foundation, no roof)	S.M.	1500	100	15	225.0	26	390.0	41	615.0	44	660.0	15	225.0	85	1275.0
(100 - 119)	VI. DRAINAGE/EROSION WORKS															
100	Backfill Material, Pipe Culvert	CU.M	136	100	47	63.9			47	63.9	27	36.7	26	35.4	74	100.6
101	RCPC, 61cm Diameter	L.M.	886	100	18	159.5	22	194.9	40	354.4	42	372.1	18	159.5	82	726.5
102	RCPC, 91cm Diameter	L.M.	1500	100	16	240.0	26	390.0	42	630.0	42	630.0	16	240.0	84	1260.0
103	RCPC, 107cm Diameter	L.M.	2000	100	14	280.0	28	560.0	42	840.0	42	840.0	16	320.0	84	1680.0
104	RCPC, 122cm Diameter	L.M.	3000	100	14	420.0	28	840.0	42	1260.0	42	1260.0	16	480.0	84	2520.0
105	Structural Concrete for Pipe Headwalls	CU.M.	2090	100	15	313.5	26	543.4	41	856.9	44	919.6	15	313.5	85	1776.5
106	Reinforcing Steel for Pipe Headwalls	KG	23	100			45	10.4	45	10.4	44	10.1	11	2.5	89	20.5
107	Removal, Cleaning, Replacement, Salvaged Pipe Culverts	L.M.														
108	Grouted Riprap	CU.M.	675	100	8	54.0	13	87.8	21	141.8	67	452.3	12	81.0	88	594.0
109	Concrete Slope Protection	SQ.M.	400	100	18	72.0	32	128.0	50	200.0	31	124.0	19	76.0	81	324.0
110	Gabions	CU.M.														
(120 - 129)	VII. INCIDENTAL WORKS															
120	Metal Beam Guardrail	L.M.	786	100	40	314.4			40	314.4	25	196.5	35	275.1	65	510.9
121	Warning Signs	EA.	2825	100	42	1186.5			42	1186.5	23	649.8	35	988.8	65	1836.3
122	Regulatory Signs	EA.	2825	100	42	1186.5			42	1186.5	23	649.8	35	988.8	65	1836.3
123	Informatory Signs	EA.	10800	100	44	4752.0			44	4752.0	21	2268.0	35	3780.0	65	7020.0
124	Sodding	SQ.M.	5	100	51	2.6			51	2.6	16	0.8	33	1.7	67	3.4
130	VIII. LAND ACQUISITION	KM	300000	100							90	270000	10	30000	90	270000

EXHIBIT 11

REPRESENTATIVE VESSEL COST MODEL

CLASS OF BOAT	(1) Paddle Banca	(2) Small Banca	(3) Medium Banca	(4) Large Banca	(5) Medium Launch	(6) Large Launch	(7) Small Trawler	(8) Large Trawler	(9) Small Inter-Island	(10) Medium Inter-Island	(11) Large Inter-Island
ROLE I (40-60%)	Catch Fish	Catch Fish	Trnspt Fish	Trnspt Cargo	Trnspt Psngrs	Trnspt Psngrs	Catch Fish	Catch Fish	Trnspt Psngrs	Trnspt Psngrs	Trnspt Psngrs
ROLE II (20-40%)	Catch Fish	Trnspt Psngrs	Catch Fish	Trnspt Fish	Trnspt Psngrs	Trnspt Psngrs	Trnspt Fish	Trnspt Fish	Trnspt Cargo	Trnspt Cargo	Trnspt Cargo
ROLE III (10-20%)	Catch Fish	Trnspt Cargo	Trnspt Cargo	Trnspt Psngrs	Trnspt Cargo	Trnspt Cargo	Catch Fish	Catch Fish	Trnspt Produce	Trnspt Produce	Trnspt Produce
FIXED COSTS											
DWT	0.75	1.5	4	9	10	20	20	40	80	1,000	2,000
HP	n/a	16	85	165	165	250	250	300	450	1,800	2,400
New building	10,000	25,000	100,000	200,000	220,000	440,000	1,600,000	2,800,000	1,600,000	16,000,000	30,000,000
10% Deprec.	1,000	2,500	10,000	20,000	22,000	44,000	160,000	280,000	160,000	1,600,000	3,000,000
15% Maint.	1,500	3,750	15,000	30,000	33,000	66,000	240,000	420,000	240,000	2,400,000	4,500,000
30% Other	3,000	7,500	30,000	60,000	66,000	132,000	480,000	840,000	480,000	4,800,000	9,000,000
Tot/yr;Fin	5,500	13,750	55,000	110,000	121,000	242,000	880,000	1,540,000	880,000	8,800,000	16,500,000
Tot/yr;Econ	4,675	11,688	46,750	93,500	102,850	205,700	748,000	1,309,000	748,000	7,480,000	14,025,000
CREW COSTS											
# Crewmen	2	2	4	6	10	20	20	40	80	160	200
Crew costs	20,000	40,000	120,000	180,000	310,000	615,000	625,000	1,240,000	2,450,000	4,850,000	6,050,000
FUEL COSTS											
Liters/hour	n/a	3	10	19	19	35	35	55	75	300	400
Km/hour	3	15	20	20	20	20	15	15	20	20	20
Liters/km	n/a	0	1	1	1	2	2.33	3.67	3.75	15.00	20.00
Km/day	5	15	30	45	60	60	30	40	80	80	80
%/days/year	1	1	1	1	1	1	0.6	0.7	0.9	0.9	0.9
Km/year	913	2,738	6,570	11,498	13,140	15,330	6,570	10,220	26,280	26,280	26,280
Fuel;Fin	n/a	7	5	5	5	5	4.96	4.95	4.96	4.96	4.96
Fuel;Econ	n/a	4	4	4	4	4	4.18	4.18	4.18	4.18	4.18
Fuel/yr;Fin	n/a	3,663	16,294	54,176	61,916	133,064	76,037	185,868	488,808	1,955,232	2,606,976
Fuel/yr;Econ	n/a	1,933	13,731	45,657	52,179	112,139	64,079	156,639	411,939	1,647,756	2,197,008
TOTAL COSTS											
Tot/yr;Fin	25,500	57,413	191,294	344,176	492,916	990,064	1,581,037	2,965,868	3,818,808	15,605,232	25,156.976
Tot/yr;Econ	24,675	53,620	180,481	319,157	465,029	932,839	1,437,079	2,705,639	3,609,939	13,977,756	22,272,008
Hours/yr	2,190	2,190	2,628	3,066	2,628	3,066	2,628	3,066	3,942	3,942	3,942
Cost/hr;Fin	12	26	73	112	188	323	601.61	967.34	968.75	3,958.71	6,381.78
Cost/hr;Econ	11	24	69	104	177	304	546.83	882.47	915.76	3,545.85	5,649.93

EXHIBIT 11
(CONTINUED)

CLASS OF BOAT	(1) Paddle Banca	(2) Small Banca	(3) Medium Banca	(4) Large Banca	(5) Medium Launch	(6) Large Launch	(7) Small Trawler	(8) Large Trawler	(9) Small Inter-Island	(10) Medium Inter-Island	(11) Large Inter-Island
FISHING COSTS											
% Avail/day	1	1	0	0			0.7	0.7			
Avg/catch	0	0	0	0			2	3.5			
Avg/day/yr	183	128	44	26			153	179			
Tons/year	3	5	7	8			306.60	625.97			
Cost/kgm;Fin	9	8	6	4			3.61	3.32			
Cost/kgm;Eco	9	7	5	4			3.28	3.03			
FISH TRANSPORT COSTS											
% Avail/day	0	0	0	0			0.3	0.3			
Tons/trip	0	0	2	5			15	30			
Trips/year	0	0	88	77			66	77			
Tons/year	0	0	175	345			985	2,299			
Cost/kgm;Fin	0	0	0	0			0.48	0.39			
Cost/kgm;Eco	0	0	0	0			0.44	0.35			
Cost/tkm;Fin	0	0	29	13			32.09	19.35			
Cost/tkm;Eco	0	0	27	12			29.16	17.65			
PASSENGER TRANSPORT COSTS											
% Avail/day	0	0	0	0	1	1			0.6	0.6	0.6
#/Roundtrip	0	30	60	120	150	300			800	3500	6000
Trips/year	0	37	44	51	153	179			197	197	197
Psgrs/year	0	1,095	2,628	6,132	22,995	53,655			157680	689850	1182600
Cost/psgr;Fi	0	10	15	11	15	13			14.53	13.57	12.76
Cost/psgr;Ec	0	10	14	10	14	12			13.74	12.16	11.30
Cost/pkm;Fin	0	1	0	0	1	0			0.36	0.34	0.32
Cost/pkm;Eco	0	1	0	0	0	0			0.34	0.30	0.28
CARGO TRANSPORT COSTS			CARGO TRANSPORT								
% Avail/day	0	0	0	0	0	0			0.4	0.4	0.4
Tons/day	0	1	2	5	5	10			40	400	800
Days/year	0	18	44	102	44	51			131	131	131
Tons/year	0	18	88	460	219	511			5256	52400	104800
Cost/ton;Fin	0	315	437	299	450	388			291	119	96
Cost/ton;Eco	0	294	412	278	425	365			275	107	85
Cost/tkm;Fin	0	42	29	13	15	13			7.27	2.98	2.40
Cost/tkm;Eco	0	39	27	12	14	12			6.87	2.67	2.13

SOURCE: Consultant's survey.

BASIS:
1. New building costs from field surveys.
2. Depreciation over 10 years at straight line.
3. Ordinary maintenance at 15% per year in lieu of 10% first year increasing at 8% per year.
4. Other and extrordinary costs at 15% per year for tri-annual hull rehabilations, lost and damaged nets and gear as well as excessive wear and tear due cargo and passenger overloads.

EXHIBIT 12

PORT TARIFFS AND CHARGES

Municipal ports do not, for the most part, collect dues, rates or charges for the use of ports located in their municipalities.

The following basis for determining probable revenues levels at municipal ports which might elect to assess charges is derived from current Philippine Port Authority (PPA) tariffs or from particular municipal ports who do currently assess rates or charges.

Most current PPA and municipal port charges are by vessel, crate, sack, bag, can, piece or commodity and have been converted herein to approximate per ton or kilogram equivalents for purposes of comparative evaluation.

A. **Docking and Landing Fee** (per trip)

Small-inter island vessels <100 DWT	P. 100.00
Pump boats & larger bancas >3 DWT	P. 20.00
Small motor bancas <3 DWT	n/c
Paddle and sail bancas <1 DWT	n/c

B. **Port Charges** (per day)

Small inter-island vessels <100 DWT	P. 100.00
Pump boats & larger bancas >3 DWT	P. 20.00
Small motor bancas <3 DWT	n/c
Paddle and sail bancas <1 DWT	n/c

C. **Cargos** (per ton equivalent)

Storage (2 days free, average stay 5 days)	P. 1.00
Dried fish @ P. 0.05 per box & P. 0.20 per sack	P. 5.00
Cement @ P. 0.10 per bag	P. 2.00
Other bagged cargo @ P. 0.20 sack	P. 4.00
Hogs @ P. 1.0 per head	P. 4.00
Cattle @ P. 2.0 per head	P. 4.00
Bottled cargo @ P. 0.05 per case	P. 5.00
Petroleum Products @ P. 0.05 per liter	P. 50.00
Other items not otherwise itemized by name	P. 4.00

D. **Passengers**

Passenger amenity fee (per passenger)	P. 0.50
Baggage and parcels (per package)	P. 2.00
Bagged cargos (per sack)	P. 2.00
Other cargos (per ton)	P. 50.00

SOURCES: Consultant's surveys and Philippine Port Authority

EXHIBIT 13

CLIMATOLOGICAL NORMALS - LEGASPI

STATION : LEGASPI
COORDINATES: 13'09' N 123°43' E

PERIOD OF RECORDS: 1951 - 1985

MONTH	RAIN FALL (mm)	RAINY DAYS	TEMPERATURE (deg C) MAX-IMUM	MIN-IMUM	MEAN	DRY BULB	WET BULB	DEW PT.	RH (%)	MEAN SEA LEVEL PRESSURE (mbs)	PREVAILING WIND DIREC-TION	SPEED (mps)	CLOUD (octa)	DAYS WITH TSTM	LGHT
JAN	296.9	20	28.6	22.1	25.3	25.1	23.0	22	84	1012.9	NE	4	6	1	0
FEB	195.6	17	29.1	22.2	25.6	25.4	23.1	22	82	1013.1	NE	4	6	0	0
MAR	192.6	17	29.9	22.8	26.3	26.1	23.7	23	82	1012.8	NE	4	5	0	0
APR	152.1	16	31.1	23.5	27.3	27.2	24.7	24	81	1011.6	NE	4	5	2	1
MAY	181.3	14	32.1	24.1	28.1	28.0	25.4	25	81	1009.8	NE	3	5	7	9
JUN	240.9	16	32.2	24.0	28.1	27.8	25.4	25	82	1009.1	NE	3	5	11	12
JUL	251.3	19	31.8	23.7	27.7	27.3	25.1	24	84	1008.6	SW	3	6	10	10
AUG	264.2	20	31.6	23.7	27.6	27.2	25.1	24	84	1008.2	SW	3	6	10	8
SEP	259.9	20	31.5	23.5	27.5	27.0	25.0	24	85	1008.9	W	3	6	11	11
OCT	325.5	21	31.1	23.3	27.2	26.8	24.7	24	84	1009.4	NE	3	6	9	10
NOV	483.7	22	30.1	23.1	26.6	26.4	24.4	24	85	1010.2	NE	4	6	6	5
DEC	456.0	23	29.0	22.9	25.9	25.7	23.8	23	85	1011.7	NE	4	6	2	2
ANNUAL	3300.0	225	30.7	23.2	26.9	26.7	24.5	24	83	1010.5	NE	4	6	69	68

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EXHIBIT 14

CLIMATOLOGICAL EXTREMES - LEGASPI
(AS OF 1986)

MONTH	TEMPERATURE (deg. C)				GREATEST DAILY RAINFALL (mm)		HIGHEST WIND (mps)		SEA LEVEL PRESSURE (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD/DIR	DATE	HIGH	DATE	LOW	DATE
JAN	32.7	24'12	17.0	12'79	239.0	9'04	23/N	8'72	1020.7	6'58	996.2	9'72
FEB	33.7	18'12	16.7	19'14	185.1	24'35	26/ENE	13'80	1021.0	1'62	996.2	25'70
MAR	33.9	29'50	17.0	25'13	209.2	11'71	18/NE	16'62	1020.9	12'64	1004.5	22'82
APR	36.1	29'48	16.7	4'63	193.0	6'35	21/NE	24'68	1018.2	7'65	1002.1	21'56
MAY	37.7	27'68	17.1	7'72	202.7	5'51	41/ENE	26'71	1016.0	9'57	985.8	26'71
JUN	37.6	11'63	18.9	14'71	377.9	3'23	57/S	24'72	1017.2	15'53	961.7	25'60
JUL	36.6	5'15	15.8	20'71	239.4	15'83	29/ENE	14'71	1015.5	7'53	969.2	14'83
AUG	36.9	7'39	19.4	8'71	178.3	13'63	28/SW	13'63	1015.0	11'69	990.0	24'67
SEP	36.0	1'08	19.0	13'75	215.3	2'29	29/SSW	18'79	1015.5	5'53	984.1	26'76
OCT	35.3	3'30	17.2	31'69	263.9	28'58	49/WSW	13'70	1016.4	20'79	972.0	6'60
NOV	34.4	3'13	17.9	1'69	484.6	3'67	41/N	3'67	1019.2	30'78	938.4	3'67
DEC	33.2	18'04	13.9	28'71	458.6	26'75	36/SSW	31'79	1019.8	1'78	984.8	31'59
OVERALL	37.7	5/27/ 1968	13.9	12/28/ 1971	484.6	11/3/ 1967	57/S	6/24/ 1972	1021.0	2/1/ 1962	938.4	11/3/ 1967
PERIOD OF RECORDS		1903-1918, 1947-1986		1930-1939		1902-194 1949-1986		1950-1986		1949-1986		

NOTE: DOUBLE APOSTROPHE ('') MEANS FOR YEAR 1800

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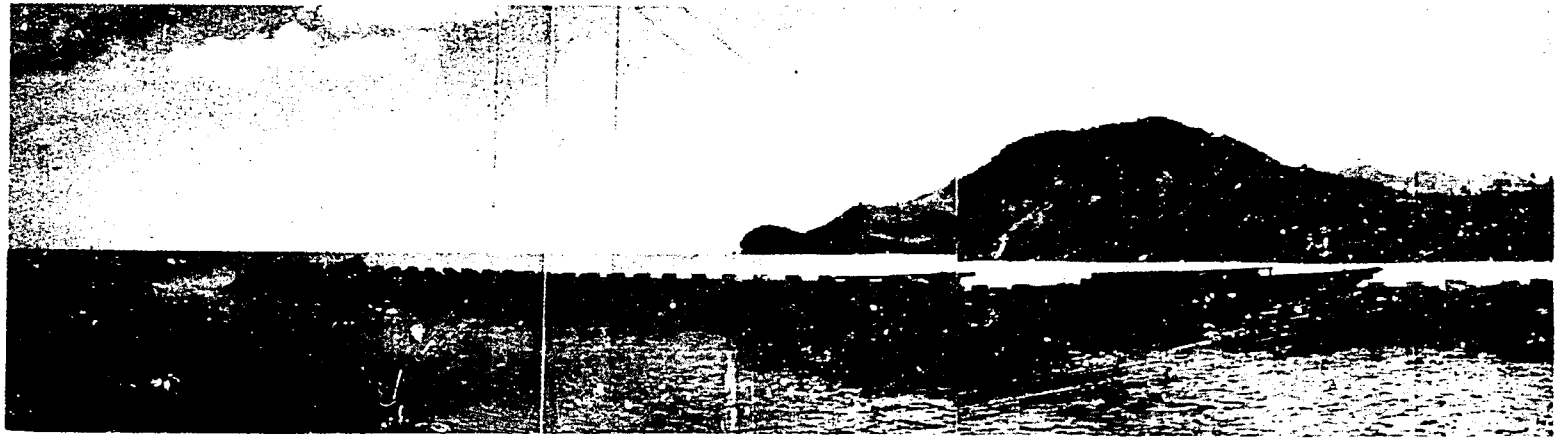
APPENDIX C
PHOTOGRAPHS



MATCH LINE

PHOTO 3: PANORAMIC VIEW OF CARAMOAN PORT

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420	
REPRESENTATIVE VIEWS OF THE SUB-PROJECT AREA	PLATE C-I

PHOTO 4: CARAMOAN PORT CAUSEWAY, LOOKING OFFSHORE; NOTE LARGE NUMBER OF BANCAS AT BERTH

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420	PLATE C-2
REPRESENTATIVE VIEWS OF THE SUB-PROJECT AREA	

PHOTO 5: END OF CAUSEWAY, NOTE MANUAL CARGO TRANSPORT

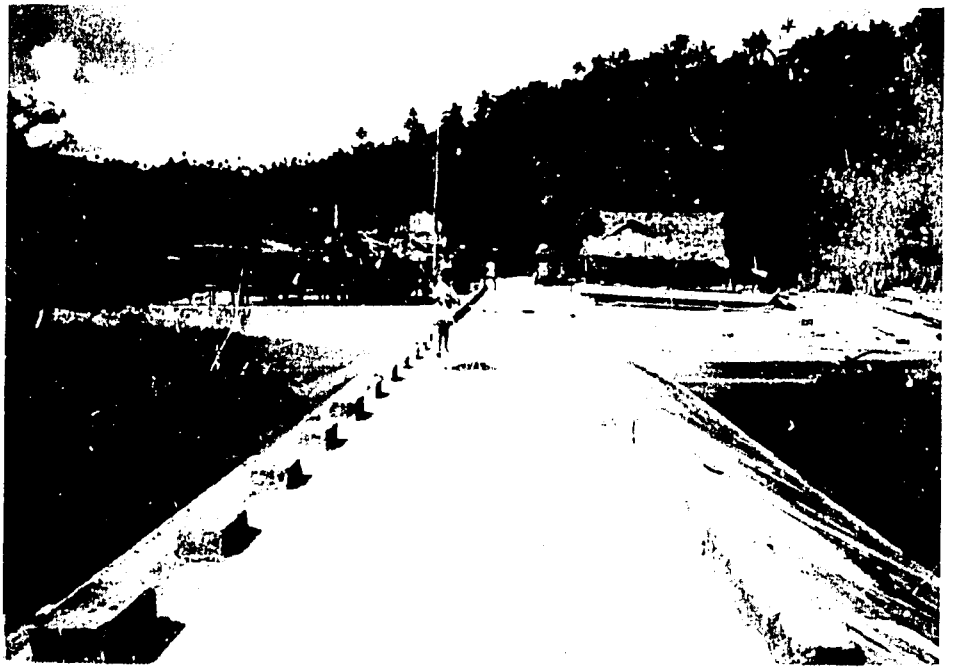


PHOTO 6: SHORESIDE OF CAUSEWAY; NOTE CONCRETE BLOCKS AT LEFT USING AS MOORING POSTS

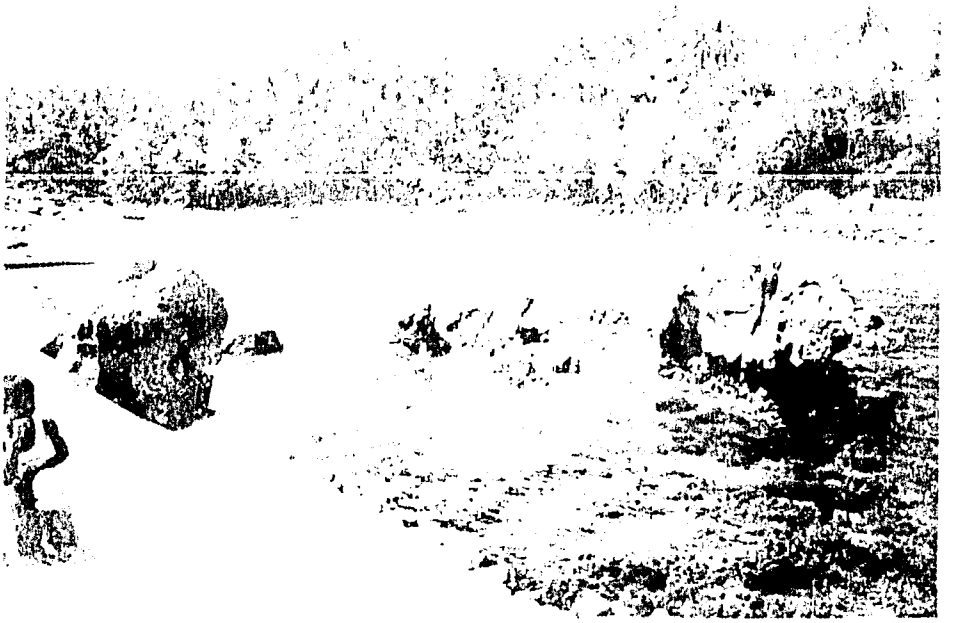


PHOTO 7: ROCK OUTCROPS NEAR END OF CAUSEWAY

PHOTO 8: DAMAGE TO CAUSEWAY EAST SIDE

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420	PLATE C-4
REPRESENTATIVE VIEWS OF THE SUB-PROJECT AREA	

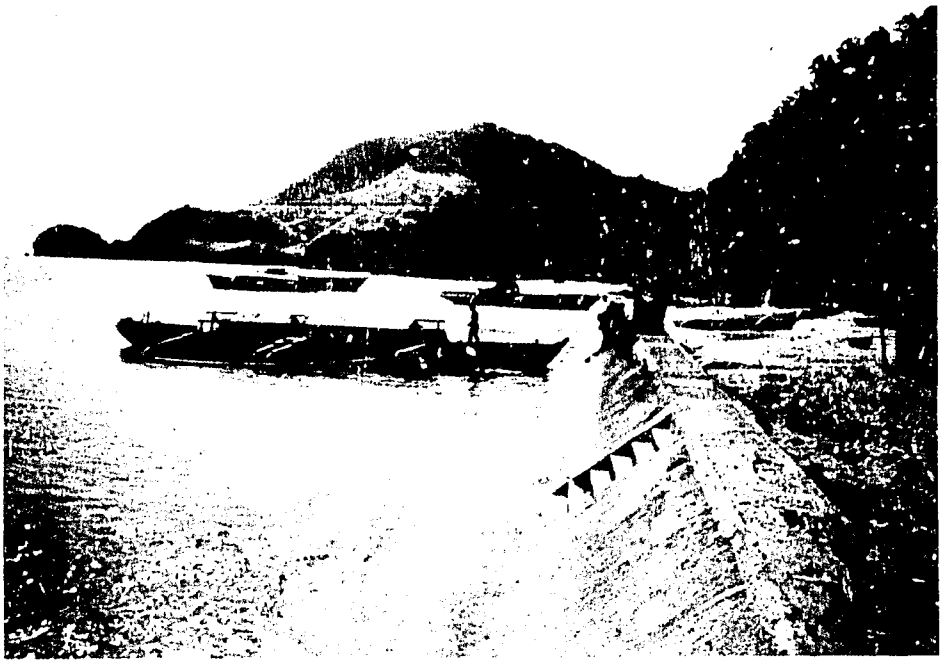


PHOTO 9: BERTHING OF PASSENGER BANCA AT SEAWALL

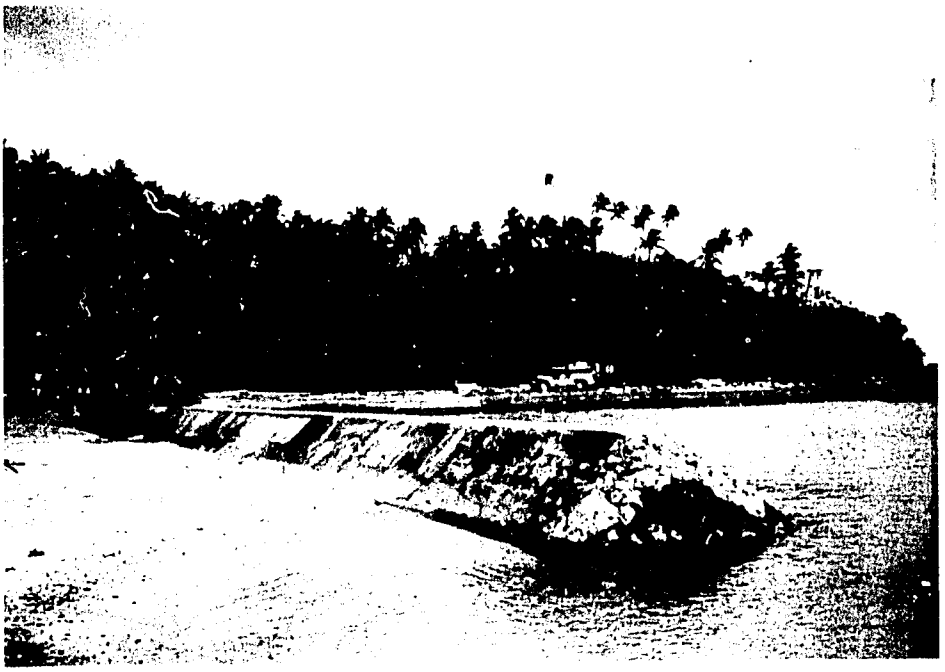


PHOTO 10: DAMAGED END OF SEAWALL

RURAL INFRASTRUCTURE FUND PROJECT AID PROJECT NO. 492-0420	PLATE C-5
REPRESENTATIVE VIEWS OF THE SUB-PROJECT AREA	

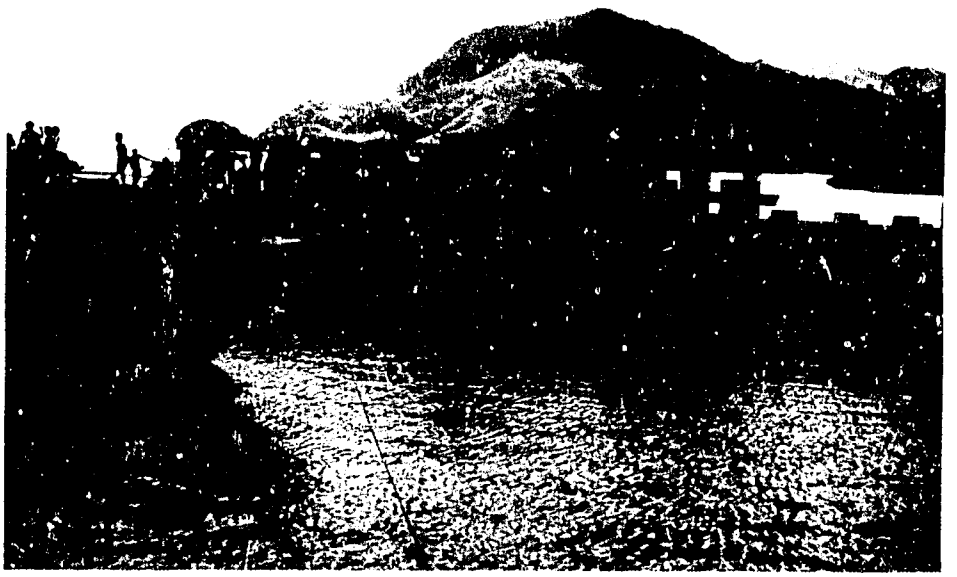


PHOTO 11: CARGO STACKED ON CAUSEWAY

APPENDIX D
SOCIAL SOUNDNESS OVERVIEW

APPENDIX D

THE SOCIAL SOUNDNESS OF PORT IMPROVEMENTS: AN OVERVIEW

A. INTRODUCTION

Social soundness analysis evaluates the effect of rural port projects from the perspective of the intended beneficiaries: users, residents and local institutions. It considers project adaptability, social participation, spread of benefits, and equity of benefit distribution. Social sensitivity in feasibility analysis can improve understanding of real needs, projection of future usage, and anticipation of negative social impacts. Social consideration in project design can help in mitigating or compensating for negative impacts and developing community capabilities for self-directed and self-sustained growth.

Social soundness analysis involves five steps:

- Identifying and describing potential port users (individuals and organizations)
- Evaluating potential benefits and/or negative social impacts for these users
- Analyzing socio-economic institutions influencing port usage
- Assessing overall social soundness
- Identifying design and implementation considerations to improve social soundness.

This report provides general social soundness analysis for Philippine port projects, common to many of the proposals. It emphasizes five important aspects of social impact:

- Influences on family income for various social groups
- Implications for population movements
- Potential effects on vulnerable cultural minorities
- Institutional effects
- Design and implementation considerations.

B. THE PHILIPPINE CONTEXT

Many social analysts have recognized the importance of the family as the basic element underlying Filipino social structure. Jocano (1971;410) notes "It is through this structural unit of society that much local authority, rights and obligation and

modes of interactions are expressed, defined, ordered and systematized."

Andres (1981;21) concludes "Structurally speaking the social system in the Philippines is the kinship system. Philippine society is markedly segmented into subgroups with which the members identify themselves to exclusion of others....The most important and highly valued segment in the Philippine society is the family and the kinship system. Obligations to the family are of the highest order. For the Filipino, the concept 'blood is thicker than water' is highly regarded. Within the network of his alliance system which consists of relatives, friends, or followers, status age-grading, generation, authority and power differentials are ranked and observed."

In the family, the father rules, but the mother governs. She is the educator, financial officer, laundry woman and cook (Agoncillo and Alfonso 1961;7). Traditionally, Filipino parents exercise almost absolute powers over their children. It is unthinkable for a Filipino to undertake something important without consulting his parents. When the parents are absent, the eldest sibling takes on the parental role. Grandparents are also consulted and their recommendations carry considerable weight. There is a deeply ingrained respect for elders (Andres 1981;22).

Ritual kinship extension through inclusion of compadre and comadre (ninong and ninang) in baptism, confirmation and wedding services is the immediate linkage between family and community. Ninong are sought from upper income social and political elites to solidify social support networks which are expected to ultimately result in concrete benefits such as granting employment and promotion, providing money in times of need, lending a vehicle, or arranging medical care.

From the family and the local community, allegiances are eventually extended as far as the region sharing a common language and religion. Regionalism generally overshadows nationalism in the Filipino value system. As Agoncillo and Alfonso (1961;9) note: "Regionalism is an extension of the closeness of family ties. Invariably, the Filipino believes that the person known to him, no matter how bad, is better than the one unknown to him."

Inherent Filipino Regionalism has been reinforced historically by Spanish "divide and rule" policies and American "democratic" values. Andres (1981;24) says: "Filipinos have the natural tendency to band together segregating themselves according to regions and home towns. Social status, sex, age and other differences seem to break their barriers at the mention of magkababayan (compatriot) and a closer interpersonal relationship, carried almost to the degree of kinship, is expected mutually of both parties at this point of time."

It is within this social context that Philippine port projects are proposed. Political leaders, loyal to their kin, barangay, and kababayan followers, naturally seek construction projects for their home communities. It is the role of feasibility studies to ensure that approved proposals also meet

rational economic and engineering criteria.

C. PHILIPPINE PORT PROJECTS

The Philippines consists of over 7,000 islands (about 700 of which are inhabited), and is dominated economically by two major cities, Manila and Cebu. Thus, ports play an extremely important role in linking small communities into the economic life of the country. In addition to inter-island traffic, ports play an important role in coastal transportation where roads are either lacking or only seasonally passable. This section summarizes lessons from social soundness analyses of previous Philippine port projects.

For coastal communities, travel by banca often fulfills the same social functions as road transport serves inland. These include moving goods to market, going shopping, visiting relatives, attending high school, and emergency dashes to hospitals or clinics. Such trips are necessary even where bancas must simply land on the beach. Improved port facilities make these journeys easier, faster and safer, and can cause travel to become feasible under previously unnavigable weather conditions.

In general, socio-economic benefits are much more dramatic where new facilities are added than where an existing port is repaired or enlarged. Most proposed RIF sub-projects involve a simple combination of repairing typhoon damage and extending existing piers. For such sub-projects, social benefits are incremental rather than striking. When passenger or marketing sheds, ice plants and cold storage, marine gas stations, or comfort rooms are added, the advantages to the user are much more impressive. Projects which include breakwaters or dredging and land reclamation can have a dramatic impact, sometimes providing year-round access to larger vessels.

Most proposed port sub-projects concern small municipal landings, primarily in rural areas, where users tend to be relatively poor. There are four major types of port users: fishermen, passengers, merchants, and companies. Fishermen may represent family or commercial enterprises. Passengers are local or inter-island. Merchants may be wholesale or retail, and companies reflect various concerns such as trading, agribusiness, and mining. Most port users are individuals from lower and middle income categories. Deep-water ocean ports, which accommodate inter-island vessels, also service large companies.

Fishermen, usually the poorest coastal residents, use the ports regularly and will benefit most. Passengers and merchants, improved port facilities can considerably speed and facilitate travel and cargo shipments. At Morong, Bataan, for example, motorized bancas come from Olongapo in 40-60 minutes, but require an additional 40 minutes to ferry passengers and their goods ashore in the shallow cove where no docking facilities exist. The transport operators and merchants benefitted are usually small operators, but cannot be considered really poor.

Socio-economic benefits from port development projects are generally reflected in:

- Better access through more regular and frequent departures
- Time savings through more rapid loading and unloading
- Added comfort through easier boarding/landing and new facilities
- Increased safety through protection of passengers and boats during inclement weather
- Reduced costs through the landing of larger craft, protection of cargo, reduced spoilage, and less ice consumption

In short, travel and transport become more convenient, faster, more comfortable, safer, and less expensive. This, in turn, can result in higher income and improved access to medical and educational facilities, especially where roads are lacking.

D. INCOME EFFECTS

Speedier travel, faster turnaround times and reduced spoilage translate into reduced transportation expenses. Given a fixed market price in Manila, this will result in lower prices for goods from the capital and higher prices for commodities exported by the port community. Both factors imply a higher effective disposable income available to community residents.

For the many small farmers in the rural port hinterlands, this can mean reduced costs for farm inputs and higher farm-gate prices for crop exports. In practice, capitalizing on this opportunity requires a road network linking the hinterland to the port and no alternative access to markets. However, most RIF sub-project ports have alternative port or road access to markets.

The most direct economic benefits accrue to fishermen, who usually represent the poorest social class. Port improvements can decrease costs, lessen spoilage, and improve marketing. A clear understanding of fishermen's needs can easily multiply such benefits. For example, an ice plant or cold storage facility will often be of greater utility than repairing a cracked market structure. Similarly, sensitivity to functional needs might be reflected in provision of a marine fueling facility where gas stations are far away.

E. POPULATION MOVEMENT

Voluntary migration effects are less likely for port development than for road projects where the value of the land

along the road increases dramatically. It would be unusual for a port to improve access to the point where it would influence a family's decision to move. Involuntary displacement, however, remains a significant concern, especially where squatters line the coast and may have to be moved for port construction.

One pair of ports has been designed with the objective of resettling squatters. A docking facility will provide access to a previously remote peninsula where small house plots have been laid out. Another will serve as a market landing, providing access to the area from which the squatters are being moved. One fisherman/ squatter noted that "resettling" usually means provision of farmland. Fishermen who wish to continue with their livelihood are provided only with a little hardware for rebuilding. In the RIF case, the new area is a peninsula and the operation should satisfy all, if properly implemented. Until now, however, the project has been planned without either consulting or informing the squatters.

F. CULTURAL MINORITIES

A special social soundness consideration is to protect tribal and cultural minorities from unfair exploitation resulting from construction projects. This is a significant consideration where roads are planned through or near ancestral tribal lands. Such considerations are less likely for port projects where less land is involved and non-existent for the large majority of the proposed projects which involve only extension of an existing port.

Historically, however, such events have occurred. In Panacan Port (Narra, Palawan), for example, the Tagbanwa formerly occupied the area where the port was constructed. They were relocated to a mountainside reservation to facilitate the development. Only about three of the original Tagbanwa residents held title to their lands. These three still hold their titles and can legally reap some of the development benefits through the increased value of their property.

Thus, the most significant step in protecting tribal minorities is ensuring them title to their lands. This is feasible in the coastal areas applicable to port projects. (Land titles are not permitted in forest reserves where many tribes live, but communal stewardship arrangements provide some protection.) Where vulnerable minorities are involved, the social soundness of development projects can be increased by including in the project provisions for assisting these people to obtain titles for their property. The Offices of Northern and Southern Communities in the President's Office are currently charged with the task of protecting tribal minorities. Outsiders wishing to purchase land from such minorities are required to obtain approval from these offices.

Appropriate consideration of minority communities's needs in port project planning could be facilitated by more pro-active consultation with them during early project planning. As with other local residents, they too often learn about development

projects when the bulldozers arrive.

G. DESIGN AND IMPLEMENTATION CONSIDERATIONS

Appropriate design considerations can be identified for individual ports by including the intended beneficiaries in the planning process. Most simply, this requires only a few interviews with representative port users. Local leaders could reap political recognition as well as economic gains by expanding the process to include public meetings. People almost always react more positively towards projects in which they are involved.

Consultation with port users can also avoid serious negative consequences. For example, the fishermen a port is intended to aid are often squatters living in huts built on stilts at the waters edge. If construction of a landing requires destruction of their houses and dislocation of their families, their net benefit will be strongly negative.

Land tenure considerations deserve special attention. Wherever private land is involved, port projects should provide assistance in obtaining titles to ensure equitable distribution of benefits.

Labor-intensive construction methods employing local labor should be considered wherever feasible. The Philippine context is characterized by extensive under-employment, and the temporary boost to the economy through provision of temporary employment opportunities can be significant.

In addition, port projects can make permanent contributions to the economy. Kiosks in newly constructed passenger sheds, for example, represent added entrepreneurial ventures. Port maintenance activities may require regular laborers. And, where municipal ports collect docking fees, local institutions will be strengthened through income generation.

Institution-strengthening efforts linked to port improvements can include support for fishermen's cooperatives. Ice plants and cold storage facilities, for example, are often a major concern of fishermen. These plants could be owned and managed through such cooperatives. Government projects could provide credit to local cooperatives, linked with appropriate management training, rather than paying for such facilities outright. DPWH could design small, inexpensive cold storage facilities appropriate for rural fishing ports, in place of the larger plants now available. Appropriate development of such interventions can be pursued effectively if fishermen are involved and consulted from the beginning.

Educational efforts can also be utilized to facilitate the development of local capacity. Municipal port personnel, for example, might benefit from management training including the collection and management of funds and port maintenance. In areas with coral reefs, workshops could be conducted for port users on appropriate practices for maintaining the integrity and

beauty of the reefs while fishing, diving or conducting normal port operations. Such seminars would be especially useful in tourist locations.

H. Conclusions

In general, the proposed port sub-projects will make transportation more convenient, faster, more comfortable, safer, and less expensive. Most port sub-projects will tend to improve real income slightly in the port communities and will not adversely affect cultural minorities or result in significant population movements.

This appendix has presented general analysis common to all port projects. Considerations specific to each case are analyzed in the main body of the report. Socio-economic characteristics of port users are summarized in Chapter II and social soundness analysis is presented in Chapter VIII.

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