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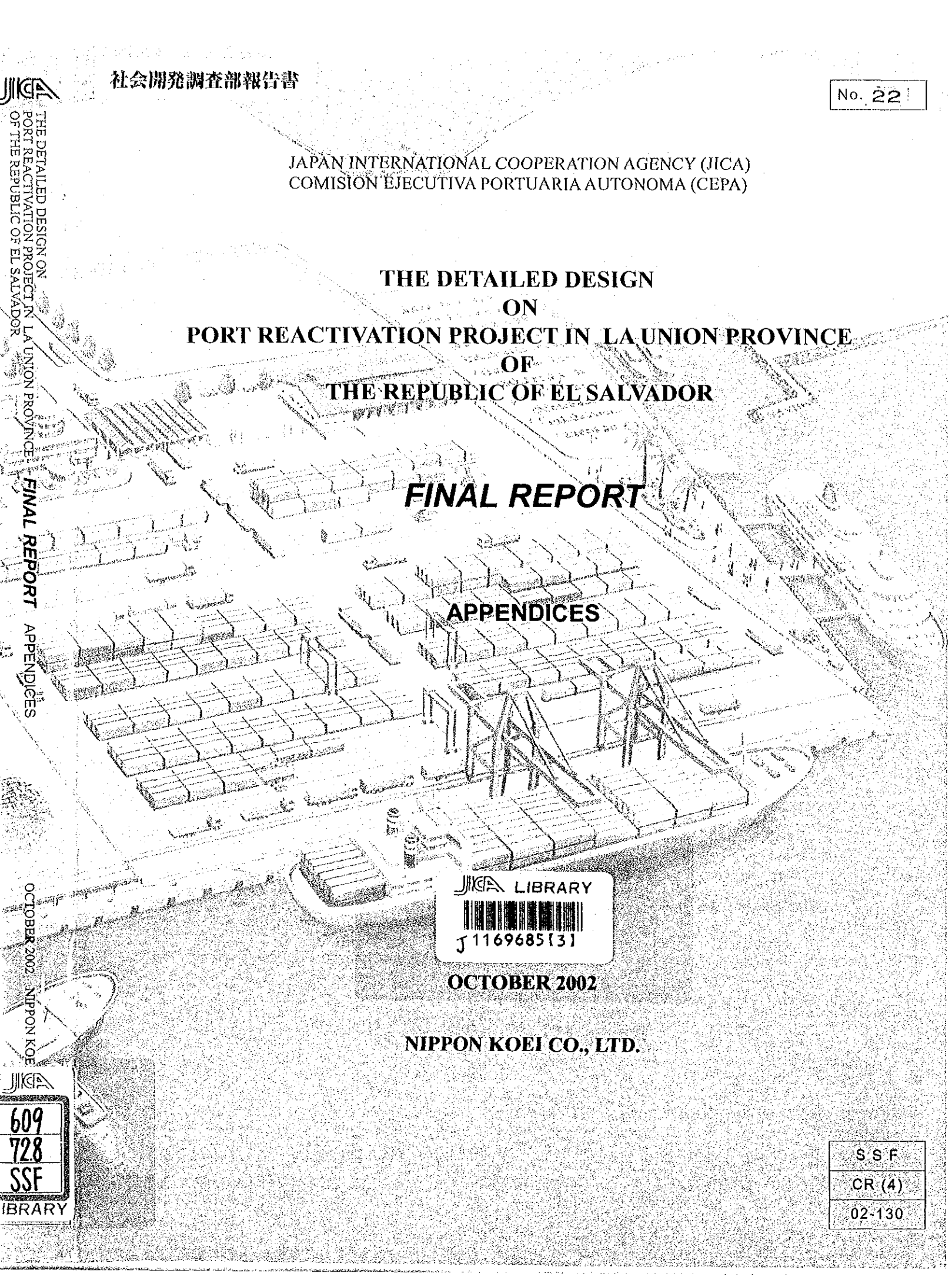
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
COMISION EJECUTIVA PORTUARIA AUTONOMA (CEPA)

THE DETAILED DESIGN ON PORT REACTIVATION PROJECT IN LA UNION PROVINCE OF THE REPUBLIC OF EL SALVADOR

FINAL REPORT

APPENDICES



OCTOBER 2002

NIPPON KOEI CO., LTD.

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ABBREVIATIONS TABLE

ABS	American Bureau of Shipping
ACI	American Concrete Institute
ADCP	Acoustic Doppler Current Profiler
AES	Power Generation and Distribution Corporation, USA
AIA	The American Institute of Architects
AIS	Automatic Identification System
AISC	American Institute of Steel Construction
AMAP	Port and Maritime Administration
AMSS	Metropolitan Area of San Salvador
ANDA	Administracion Nacional de Acueductos y Alcantarillados
ANEP	National Association of Private Enterprise
ANSI	American National Standard Institute
ANWA	American Water Works Association
ASHRAE	American Society of Heating, Refrigeration
ASHRAF	Air-Conditioning Engineers
ASIA	Asociacion Salvadorena de Ingenierous y Arquitectos
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing & Materials
AASHTO	American Association of State Highway and Transportation Officials
API	American Petroleum Industry
AWG	American Wire Gage
B/C Ratio	Benefit/Cost Ratio
BCIE	Bank of Central America for Economic Integration
BCR	Banco Cenral de Reseva
BCR	Reserve Central Bank
BOD	Biochemical Oxygen Demand
BS	British Standard
C.A.	Central America
CA-1	Pan-American Highway
CA-2	Littoral Highway
CAESS	Electrical and Illumination Company of San Salvador
CBI	Caribbean Basin Initiative
CBR/Value	California Bearing Ratio Value
CCTV System	Closed Circuit Television System
CDM	Cement Deep Mixing Method
CDL	Chart Datum Level
CEL	Comision Ejecutiva Hidroelectrica del Rio Lempa
CEPA	COMISION EJECUTIVA PORTUARIA AUTONOMA
CENDEPESCA	Centro de Desarrollo Pesquero
CFC	Conversion Factor for Consumption
CFS	Container Freight Station
CFSL	Conversion Factor for Labor
CFUL	Conversion Factor for Unskilled Labor
CH	Silty Clay
CIF	Cost, Insurance, and Freight
CITES	Convention on International Trade in Endangered Species of Wild

	Fauna and Flora
CL	Gravelly/Sandy Clay
CLESA	Santa Ana Electrical Company
CNR	Centro National de Registros
CNR	National Registry Center
CNRS	French National Research Organization Standard
CNT	Container Terminal
CNT	Containerization
CONACYT	Consejo Nacional de Ciencia y Technologia
CORSAIN	Corporacion Salvadorena de Inversiones
COD	Chemical Oxygen Demand
CPI	Consumer Price Index
CSA	Canadian Standard Association
CY	Container Yard
D/D	Detailed Design
DB	Dry Bulk
DELSUR	Electrical Distributor of the South
DL	Chart Datum Level
DOF	Degree of Freedom
DWT	Dead Weight Tonnage
DFPS	Differential Global Positioning System
E	East
ECW	Environmental Clerk or Works, provided by the Supervising Consultant to supervise Environmental ,matters
EEO	Empresa Electrica de Oriente
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management and Monitoring Plan
EMS	Environmental Management System
EMPORNAC	Santo Tomás de Castilla National Port Company
EPZ	Export Processing Zone
Epc	Environmental Permit Conditions
ESE	East South East
ETA	Estimate time of Arrival
ETD	Estimate time of Departure
F.D	Floating Dock
F/S	Feasibility Study
F/C Portion	Foreign Currency Portion
FCL	Full Container Load
FENADESAL	National Railway Company of El Salvador
FIRR	Financial Internal Rate of Return
FOB	Free on Board
FUSADES	Salvadorian Foundation for Economic and Social Development
GDP	Gross Domestic Product
GOES	Government of the Republic of El Salvador
GOJ	Government of Japan
GPS	Global Positioning System
GRT	Gross Registered Tonnage
GT	Gross Tonnage
H.W.L	Mean Springs High Water Level

$H_{1/3}$	Significant Wave Height
HWONT	High Water Level of Ordinary Neap Tide
HWOST	High Water Level of Ordinary Spring Tide
ICB	Interlocking Concrete Block
ICB	International Competitive Bidding
IEEE	The Institute of Electrical and Electronic Engineers Standard
IESNA	Illuminating Engineering Society of North America
IPI	Industrial Price Index
IUCN	International Union for the Conservation of Nature and Natural Resources
IVA	Impuesto al Valor Agregado
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standards
L.W.L	Mean Springs Low Water Level
LCL	Less than Container Load
LOA	Length Overall
L/C Portion	Local Currency Portion
LPG	Liquid Propane Gas
LWONT	Low Water Level of Ordinary Neap Tide
LWOST	Low Water Level of Ordinary Spring Tide
Lux	Illumination Unit
MARN	Ministry of Environment and Natural Resources
MCM	Mille Circular Mil
MMG	Mathematical Modeling Grouped
MOP	Ministry of Public Works
MPT	Multi-purpose Terminal
MSL	Mean Sea Level
MSPAS	Ministry of Public Health and Social Assistance
MSS	Model for Slow and Shallow Motions
MT	Metric Tonnage
Max	Maximum
Min	Minimum
N	North
NAD 27	North American Datum 1927
NCD	New Chart Datum
NK	Nippon Koei
NE	North East
NEC	National Electrical Code
NEMA	National Electrical Manufactures Association
NFPA	National Fire Protection Association
NPC	National Plumbing Codes
NPV	Net Present Valve
NSO	National Council of Science
NTU	Nephelometric Turbidity Unit (NTU)
NW	North West
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OHS	Occupational Health and Safety Plan
OM	Operations Manual

ONAN Type	Oil Natural, Air Natural
OIRSA	Regional International Organism of Agriculture and Cattle Health
OPAMS	Planning Office of the San Salvador Metropolitan Area
PC	Personal Computer
PCC	Pure Car Carriers
PEU	Port Environmental Unit to be formed by CEPA
PIANC	Permanent International Association of Navigation Congresses
PPL	Pennsylvania Power and Lighting
PPP	Puebla Panama Plan
PSI	Pound Per Square Inch
PVC	Polyvinyl Chloride
PCO	Navigation Control Office
PRO-ESA	Promotion of El Salvador
R.C	Reinforcement Concrete
RASA	Petroleum Refinery of Acajutla
RH	Relative Humidity
RO/RO	Roll on Roll off
RTG	Rubber Tired Gantry Crane System
S	South
SAND	Natural Protected Areas System
SANP	Natural Protected Area System
SC	Straddle Carrier
SCF	Standard Conversion Factor
SE	South East
SG	Gravelly Sand
SIGET	Superintendence of Electricity and Telecommunications
SHS	Trailing Suction Hopper Dredger
SMB	The Sverdrup Munk Bretschneider
SPT	Standard Penetration Tests
SP-SM	Poorly Graded Sand with Silt
SS	Suspended Solid
SW	South West
TBM	Temporary Bench Mark
TEU	Twenty Feet Equivalent Container Units
TSS	Total Suspended Solids
UDL	Uniformly Distributed Live Loads
UL	Underwriter's Laboratories, Inc.
UN	United Nation
USA	United States of America
UTM	Universal Transverse Mercator
UTP Network	Unshielded Twisted-Pair Network
VAC	Ventilation and Air-Conditioning
VHF	Very High Frequency
VTS	Vessel Traffic Service
W	West
WB	Word Bank
WGS 84	World Geodetic System 1984
WNW	West North West
WWTP	Waster Water Treatment Plant
XLPE/PVC	Polyvinyl Chloride Cross-Linked Polyethylene Insulated

Abbreviation of Common Weights Measures and Technical Terms

M^3/S or cu.m/sec.	Cubic Meter(s) per Second
Db	Decibel
GWh	Gigawatt-hour(s)
GT	Gross ton(s)
Ha	Hectare(s)
Hz	Hertz
Hp	Horsepower
hr or h	Hour(s)
l or lit	Liter
Lit/P	Liter per Person
MVA	Megavolt-ampere
MW	Megawatt(s)
MWh	Megawatt-hour(s)
In.	Inch(es)
Ka	Kilo-ampere
Kgf/cm^2	Kilogram Force per Square Centimeter
Kl	kiloliter(s)
Km	kilometers(s)
kN	Kilo-Newton
kN/m^2	Kilo-Newton per Square Mater
kN/m^3	Kilo-Newton per Cubic Mater
knots	Marine speed measurement
KV	Kilovolt
KVA	Kilovolt-ampere
KW	Kilowatt(s)
KWh	Kilowatt-hour(s)
mg	Milligram(s)
m^2/psn	Square Meter Per Parson
mm	Milimeter(es)
Mill	Million
MAF	Million acre-feet (=1,235 MCM)
MCM	Million Cubic Meter
Mgd	Million gallons per day
Min.	Minute(s) or minimum
Mpa	Mega-Pascal
NM	Nautical mile(s)
N/mm^2	Newton per square millimeter (=Pa)
No	Number (serial number)
no(s)	(units)
Pa	Pascal
ppm	Parts per million
Psi	Pound per square inch
Pf	Power factor
rpm	Revolutions per minute
S	Second(s)
$_^2$,m^2	Square e.g. square meter(s)
t	Ton(s) or tone(s)
t/m^2	Ton per square meter

V	Volt
VA	Volt-ampere
W	Watt(s)
WH	Watt-hour(s)
In.	Reactive kilovolt-ampere
S	Second(s)
_^{2},m^2	Square e.g. square meter(s)
t	Ton(s) or tone(s)

MEASUREMENT UNITS TABLE

Extent

cm^2	Square-centimeters (1.0 cm x 1.0 cm)
m^2	Square-meters (1.0 m x 1.0 m)
km^2	Square-kilometers (1.0 Km x 1.0 Km)
ha.	Hectares (10,000 m^2)
acr.	Acres (4,046.8 m^2 or 0.40468 ha.)

Length

mm	Millimeter
cm	Centimeters (10 mm)
m	Meters (100 cm)
km	Kilometers (1,000 m)

Currency

US$	United State Dollars
J¥	Japanese Yen (J120/1 US$)
cls.	Colones (cls 8.75/1 US$)

Weight

mg	Milligram (s)
g	Gram (s) (1,000 mg)
Kg	Kilogram (s) (1,000 g)
Ton or MT	Metric tone (1,000 kg)

Time

sec.	Seconds
min.	Minute (60 Sec.)
hr.	Hours (60 Min.)

Standard Conversions

In.	x	25.4	=	mm
Feet	x	0.3048	=	m
Psi	x	0.070307	=	kg/cm^2
Acre	x	0.404	=	ha

APPENDIX A EXISTING PORTS IN CENTRAL AMERICA

APPENDIX A EXISTING PORTS IN CENTRA L AMERICA

A.1 Quetzal Port

A.1.1 Port Facilities

Quetzal Port was built on the Pacific side to replace the old port of San José and at the present is the most important port of Guatemala in the Pacific Ocean.

Quetzal Port has an approach channel of about 625 m in length and 210 m in width. Presently, the channel has a depth of 10.5 m different from the original of 12.0 m.

Quetzal Port is protected from offshore waves by two breakwaters with the following dimension as well by a 368 m long secondary dam (North):

Table A.1.1 Breakwater of Quetzal Port

Designation	Length (m)	Maximum Depth (m)	Type of Structure
West Breakwater	1,140	18.0 m	Rock Mound with a Concrete Slab on Top
East Breakwater	307	14.0 m	Rock Mound with a Concrete Slab on Top

Quetzal Port is a multipurpose terminal that has the following jetties: 1) Commercial Jetty, 2) Auxiliary Jetty and 3) Fishing Jetty. The Commercial Jetty is located at the eastern part of the port. The Auxiliary Jetty is used for berthing of medium size vessels. The Fishery Jetty is a result of using of the cells of the protection levee.

There are also private investments at Quetzal Port as: Coal Terminal, Sugar Terminal, Cold Storage and Dry Cargo Warehouse, and Power Generator Barges.

The present dimensions of the berths and their current utilization are summarized in the following Table:

Table A.1.2 Berth Facilities of Quetzal Port

Jetty	Type of Jetty	Berth No.	Length (m)	Depth (m)	Type of Structure	Cargo/Vessel Handled
Commercial	Marginal	1	205.0	10.0	Sheet pile Type	Solid Bulk, Sugar in Bulk
		2	205.0	10.0	Sheet pile Type	Containers, Bulk and Bananas
		3	205.0	10.0	Sheet pile Type	Containers and Bulk
		4	205.0	10.0	Sheet pile Type	General Cargo, Ro-Ro and Cruisers
Auxiliary	Seawall Pier	North	171.0	5.0	Sheet pile Type	General Cargo, Bulk and Fishery
		South	171.0	5.0	Sheet pile Type	Power Generation Barges
Fishery	Duques de Alba		100.0	6.0	Concrete Cells	Fishery

The covered storage area is of 34,080 square meters and the open storage area of 48,613 square meters.

The Port has the following equipment detailed in Table A.1.3.

Table A.1.3 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat	960 HP	1
Tug Boat	2,200 HP	2
Tug Boat	3,508 HP	1
Pilot Boat	300 HP	1
Mobil Crane	6 – 40 MT	3
Straddle Carrier Crane	32 MT	1
Stacker	12 – 40 MT	2
Forklift	2.5 – 10 MT	24
Lift with Spreader	36 MT	1
Spreader	20 – 40 MT	6
Platform 40´	40 MT	9
Hopper	13 – 20 MT	22
Clam Shell Bucket		2
Head Terminal Type		7
Hauling Tractors		4

A.1.2 Present Traffic

The total number of ship calls in the port was of 703 in 1998 and 718 in 1999. The major number of vessels consists of container carriers that represent 28% of the total,

followed by solid bulk with 26%, and 6% each for general cargo, steel and Ro-Ro.

In 1999, Quetzal Port handled 4,083 thousand tons from which 2,627 thousand tons of import cargo, 1,292 thousand tons of export and 164 thousand in transit. In 1995, the cargo throughput was of 1,636 thousand tons in import, 1,100 thousand tons in export and 37 thousand in transit, for a total of 2,773 tons.

The cargo handled at Quetzal Port is showed in the following Table:

Table A.1.4 Cargo Handled by Type at Quetzal Port (MT)

Type of Vessel	1995	1996	1997	1998	1999
General Cargo	588	581	727	960	526
Containers	339	342	335	418	540
Liquid Bulk	189	161	215	224	207
Solid Bulk	1,628	1,553	2,083	2,427	2,672
Fishery	0	0	0	0	61
Others	29	0	0	0	77
Total	2,773	2,637	3,360	4,029	4,083

The Container volume handled in the port increased from 68,924 TEU in 1997 to 109,531 in 2000. The transit container share is about 20% of the total and these are to/from El Salvador.

Table A.1.5 Historical Trend of the Number of Containers Handled at Quetzal Port in 1997 - 2000

				1997	1998	1999	2000
Import	TEUs		Laden	21,771	31,149	33,765	40,026
			Empty	2,121	5,088	1,641	1,103
			Total	23,892	36,237	35,406	41,129
	Boxes	20'	Laden	6,457	7,912	9,123	9,478
			Empty	727	554	355	203
			Total	7,184	8,466	9,478	9,681
		40'	Laden	6,963	10,651	11,114	13,926
			Empty	697	2241	643	450
			Total	7,660	12,892	11,757	14,376
		45'	Laden	617	860	1,073	1,198
			Empty	0	23	0	0
			Total	617	883	1,073	1,198
		Total		15,461	22,241	22,308	25,255
Export	TEUs		Laden	11,203	12,268	12,590	14,826
			Empty	16,141	29,960	32,737	31,268
			Total	27,344	42,228	45,327	46,094
	Boxes	20'	Laden	4,175	4,146	4,674	4,911
			Empty	2900	4597	5736	5,105
			Total	7,075	8,743	10,410	10,016
		40'	Laden	3,443	4,009	3,868	4,883
			Empty	5969	11515	12101	11825
			Total	9,412	15,524	15,969	16,708
		45'	Laden	63	46	80	66
			Empty	579	1037	1244	1117
			Total	642	1,083	1,324	1,183
		Total		17,129	25,350	27,703	27,907
Transit	TEUs		Laden	17,214	19,051	21,154	22,308
			Empty	474	405	0	0
			Total	17,688	19,456	21,154	22,308
	Boxes	20'	Laden	2,559	2,704	3,037	3,706
			Empty	128	89	0	0
			Total	2,687	2,793	3,037	3,706
		40'	Laden	6,522	7,181	7,616	7797
			Empty	173	158	0	0
			Total	6,695	7,339	7,616	7,797
		45'	Laden	716	882	1,282	1,337
			Empty	0	0	0	0
			Total	716	882	1,282	1,337
		Total		10,098	11,014	11,935	12,840
Total	TEUs		Laden	50,188	62,467	67,509	77,159
			Empty	18,736	35,453	34,378	32,371
			Total	68,924	97,920	101,887	109,531

A.1.3 Current Port Development Project

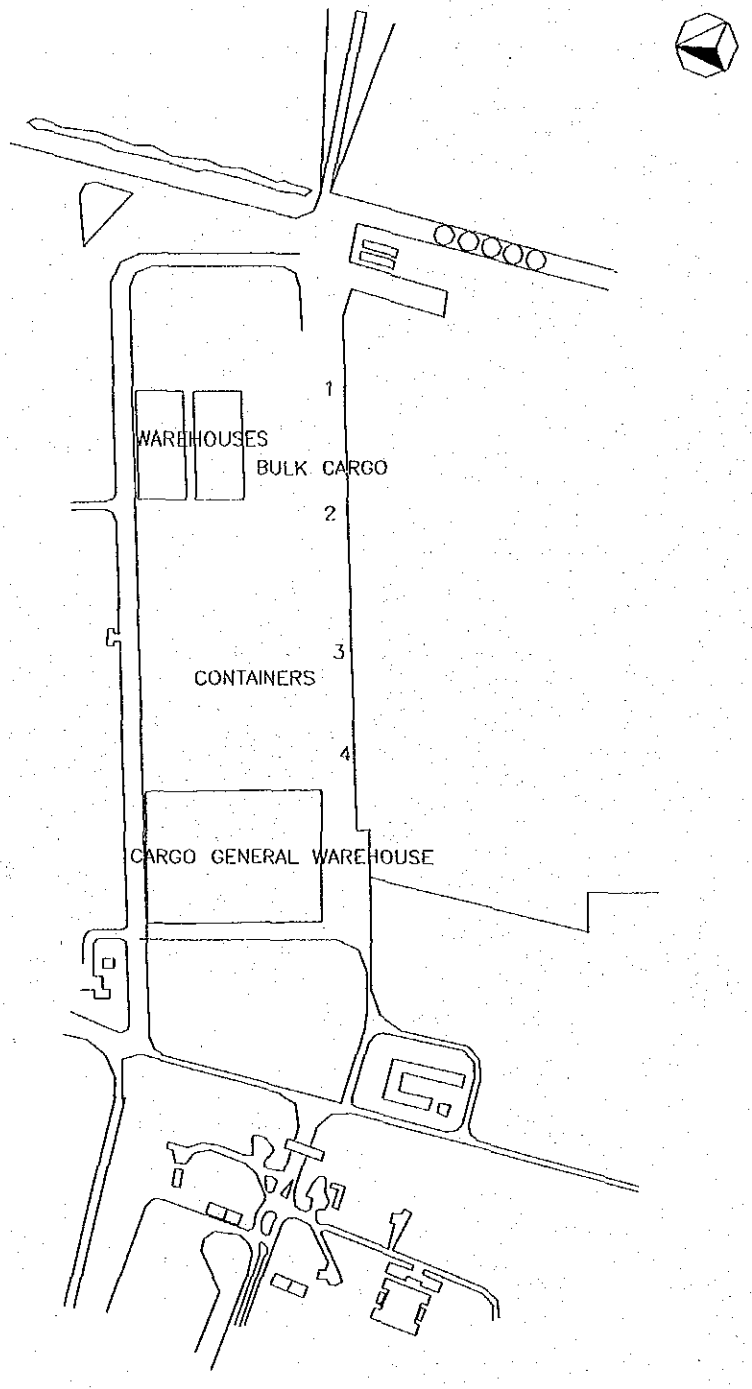
The approach channel and the basin of the port need to be cleared in order to correct the loss of 1.5 m from the original depth due to sedimentation.

The following projects to improve the port facilities are under execution:

- Dredging of the inner basin and approach channel to a depth of 14.0 m. (Completed).
- Design for construction of the third street, zone 1, of the port.
- Construction of second level of the Wharf and Equipment Department in the port enclosure.
- Construction of perimetric fence surrounding the oxidation lagoons.
- Pavement of the road to the weighbridge.

A major view of the port facilities is showed in the following Photo A.1.1 and the port plan in Figure A.1.1:

Photo A.1.1 Quetzal Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.1.1	**Quetzal Port**

A.2 San Lorenzo

A.2.1 Port Facilities

San Lorenzo Port is located on the Pacific Side in the Boca Henecan Bay in the Fonseca Gulf, it is Honduras only port on the Pacific Ocean. The construction of San Lorenzo Port was finalized in 1980. It is considered a very strategic port for Honduras, it is connected to the paved road network but not to the rail network. It is situated at 122 kilometres from Tegucigalpa and 90 Kilometres by land from Cutuco.

San Lorenzo Port has an access channel of approximately 2 kilometers and a ship maneuvering area of about 250 m in diameter. It is protected from offshore waves due to being in the inner most section of the Fonseca Gulf.

San Lorenzo Port is a multipurpose terminal that has a T shape jetty that servers General Cargo, Containers, RO-RO, Solid Bulk, Liquid Bulk, Wood, Petroleum and others. The Jetty has a length of 300 meters and a width of between 25 to 40 meters with 3 berths of 9.2 m depth. The access bridge is 160 metres long and 14 m wide.

The port has three covered storage warehouses with a total area of 8,700 m^2 and storage for general cargo of 39,000 m^2.

The Port has the following equipment detailed in Table A.2.1:

Table A.2.1 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat	-	1
Pilot Boat	-	1
Front Loader	-	1
Mobile Cranes	-	2

The berthing services of this port are provided by private companies, same as the other ports in Honduras.

A.2.2 Present Traffic

In 1999, San Lorenzo Port handled 10% of the total maritime cargo in the country or the equivalent of 563 thousand tons from which 520 thousand tons of import cargo, 43 thousand tons of export. In 1995, the cargo throughput was of 336 thousand tons in import, 66 thousand tons in export and 37 thousand in transit, for a total of 2,773 tons.

The cargo handled at San Lorenzo Port is shown in the following Table A.2.2.

Table A.2.2 Cargo Handled by Type at San Lorenzo Port (MT)

Type of Vessel	1995	1996	1997	1998	1999
General Cargo	41,632	79,855	76,322	88,291	89,361
Containers	2,726	2,691	2,073	3,175	3,119
Liquid Bulk	311,124	291,173	393,573	365,360	379,226
Solid Bulk	978	0	10,310	13,132	45,995
Transit	1,420	1,856	1,352	2,323	9,733
Special Cargo	42,377	27,381	35,469	48,746	33,269
Total	402,252	404,952	521,096	523,025	562,702

The total number of ship calls in the port was 130 in 1999 of which 22% where containers, 22% Ro-Ro, 15% General Cargo, 28% Petroleum, 9% wood and 9% for other solid and liquid bulk. An equivalent of 3,091 TEU's were mobilized at San Lorenzo in 1999.

Table A.2.3 Type of Vessel that Call San Lorenzo, 1999

Type of Vessel	1999
General Cargo	19
Containers	28
RO-RO	29
Solid Bulk	2
Liquid Buil	1
Wood	12
Petroleum	36
Others	3

A.2.3 Current Port Development Project

It is plan to undertake a Jetty rehabilitation at an estimated cost of 25,000,000 lempiras that come from the National Budget.

A major view of the port facilities is showed in the following Photo A.2.1 and the port plan in Figure A.2.1.

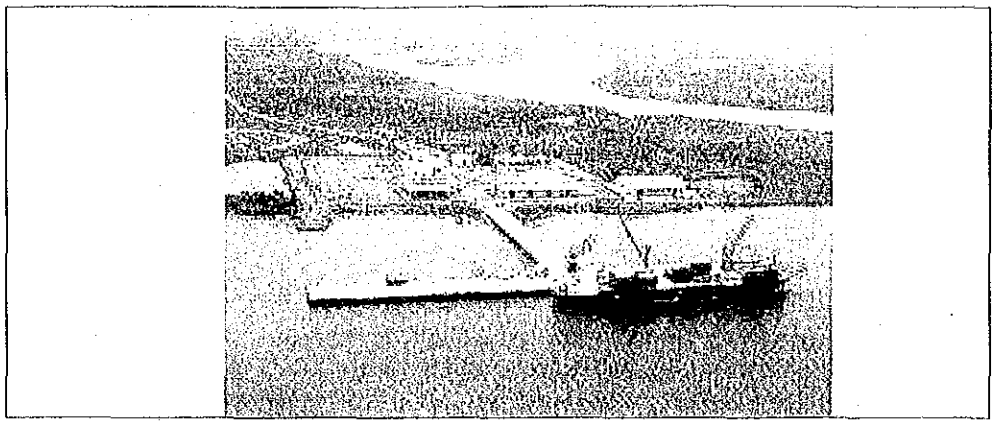
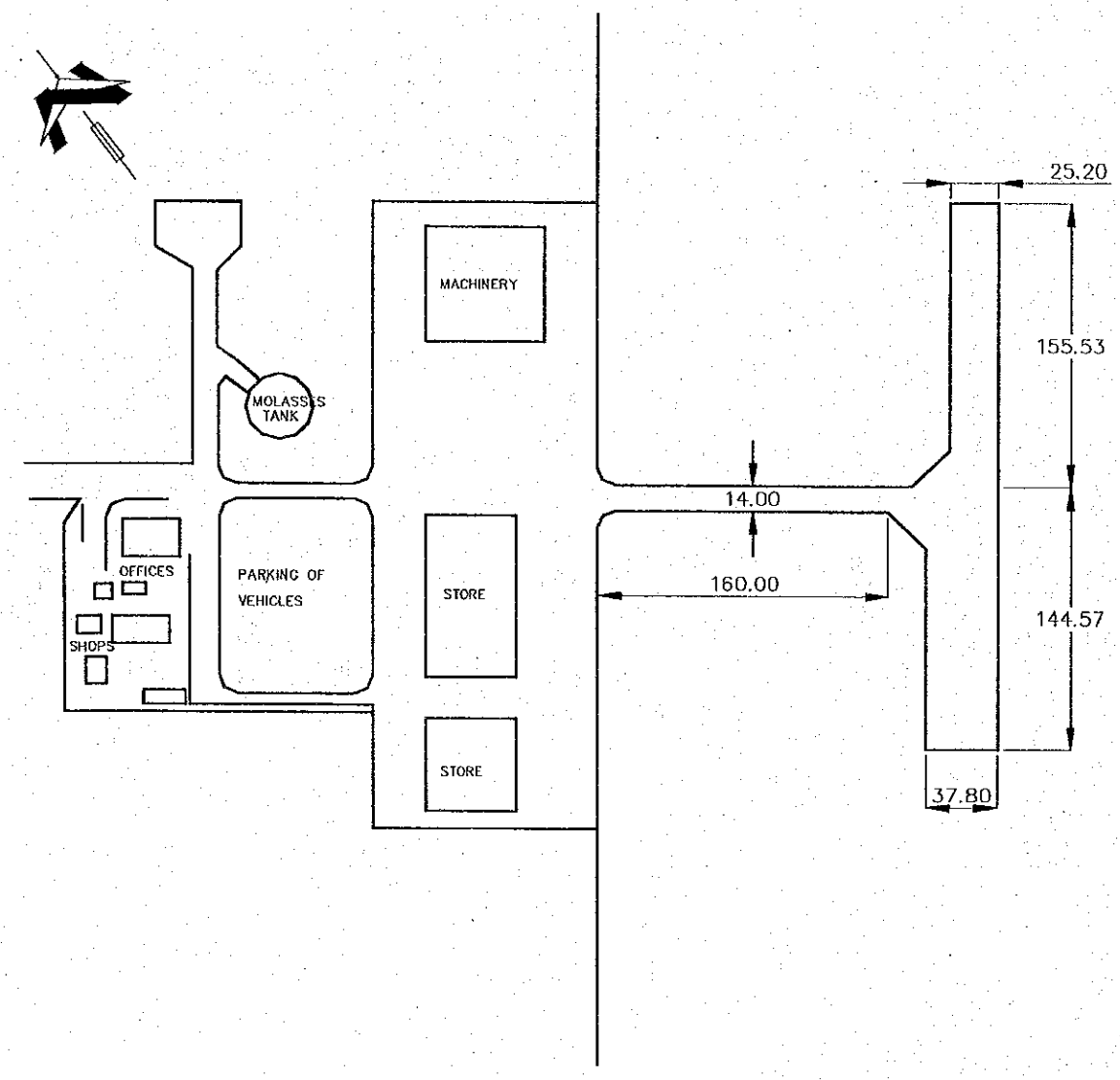


Photo A.2.1 San Lorenzo Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.2.1	**San Lorenzo Port Plan**

A.3 Corinto Port

A.3.1 Port Facilities

The Corinto Port in the Pacific Ocean of Nicaragua consists of a 610-meter long marginal jetty with depths from 9.00 to 13.50 m for handling of general cargo and containers. It has also two dolphin jetties for handling of bananas and liquid bulk.

Corinto Port has a partly dredged 6.4-km long approach channel, with an actual depth of around 14.60 m.

The present dimensions of the berths and their current utilization are summarized in the following table:

Table A.3.1 Berth Facilities of Corinto Port

Type of Jetty	Berth No.	Length (m)	Depth (m)	Type of Structure	Cargo/Vessel Handled
Dolphin	1		10.0		Bananas (Out of Service)
Marginal	2	185.0	12.2	Sheet pile Type	General Cargo
Marginal	3	185.0	13.3	Sheet pile Type	General Cargo
Marginal	4	240.0	13.3	Sheet pile Type	Containers
Dolphin	5		13.3		Liquid Bulk

The covered storage area is of 14,154 square meters and the open storage area of 80,000 square meters.

The Port has the following equipment detailed in Table A.3.2.

Table A.3.2 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat	2,250 HP	1
Tug Boat	2,028 HP	1
Pilot Boat		1
Survey Boat		1
Small Boat		2
Front Wheel Loaders	28 – 32 Ton	4
Container Gantry Crane	45 Ton	1
Truck Crane	50 MT	1
Forklift	7 – 12 MT	30
Spreaders	40 MT	5
Bulldozer	80 HP	3
Track Type Tractor	60 HP	3
Agricultural Tractor		8
Clam Shell Bucket	1.8 MT	4
Platform 40´	40 MT	9
Bin	17.5 MT	3
Head Terminal Type	10 – 12 MT	13
Generator		2
Fire Pump		2
Weighbridge	45 MT	2
Pump Truck		1

A.3.2 Present Traffic

In 1999, Corinto Port handled 914,039 tons from which 722,223 tons were of import cargo and 191,816 tons of export. This represents 43% of the total cargo throughput in the marine ports of Nicaragua.

In 1990, the cargo throughput was of 804,131 tons and in 1993 it descended to 431,779 tons. From 1993 to 1999 the traffic reflects a growth of 13.31%. The imports grew from 271,603 tons in 1993 to 722,223 in 1999. The exports were of 160,176 tons in 1993 and of 191,816 tons in 1999, this represents a light increment of the exports of 31,640 tons.

The containers handled in this port were 8,134 TEU's in 1999 and 7,033 in 1998.

The cargo handled at Corinto Port is summarized in the following Table:

Table A.3.3 Cargo Handled by Type at Corinto Port (MT)

Type of Vessel	1999
General Cargo	128,921
Containers	66,517.20
Ro-Ro	14,986
Liquid Bulk	301,805.30
Solid Bulk	401,810.30
Total	914,039.80

The total number of ship calls in Corinto Port was of 268 in 1990, but this quantity went down to 138 in 1995. From 1995 to 1999 the quantity of ship calls came to 244, this means an annual growth of 15.31%.

A.3.3 Current Port Development Project

Due to lack of a suitable port in the Nicaraguan Atlantic seacoast and bad condition of the road network, around 350,000 tons of cargo are mobilized to ports of Honduras and Costa Rica.

Corinto Port has low yields in the operations, this is due to different causes, and one of them is because the port infrastructure and equipment is deteriorated due to lack of maintenance. On the other hand, the costs are very high compared with the revenues that are perceived.

The sedimentation in the access channel and turning basin is constant, this represents the necessity to periodically dredge with the rising elevation of the maintenance costs, this, added to the lack of funds for the investment, limits the development and operation of the port.

The terminal for bananas of Corinto Port doesn't work because its discharge system is very rigid and can not work with new ships with side load system, this terminal is out of service.

In Corinto Port, the following projects for facilities improvement are under execution:

Dredging and Reinforcement Works:

- Dredging of 1.8 million cubic meters in the outer and inner channel and at the turning basin (completed).
- Enhancement of the turning basin from 300 to 360 m (completed).
- Enhancement of the inner channel from 90 to 115 m (completed).

- Reinforcement of the coastal protection with 1 million cubic meters sand coming from dredging (completed).
- Procurement and installation of new buoys in the inner channel.

Containers Berth:

- Repair of 370 m of steel sheet piles.
- Repair of 240 m of edge girders.
- Repair of 9,360 square meters of top slab.
- Repair of transversal girders.
- Design and installation of new protection works.

Liquid Bulk Berth:

- Repair of breasting and mooring dolphins.
- Repair of bitts.
- Rehabilitation of access handrail.
- Repair of access easel.

General Cargo Berth:

- Demolition and repair of concrete slabs.
- Supply and driving of steel sheet piles.
- Application of Rheoplastic and epoxic resin for repair of girders, slabs and piles.

A major view of the port facilities is showed in the following Photo A.3.1 and the port plan in Figure A.3.1.

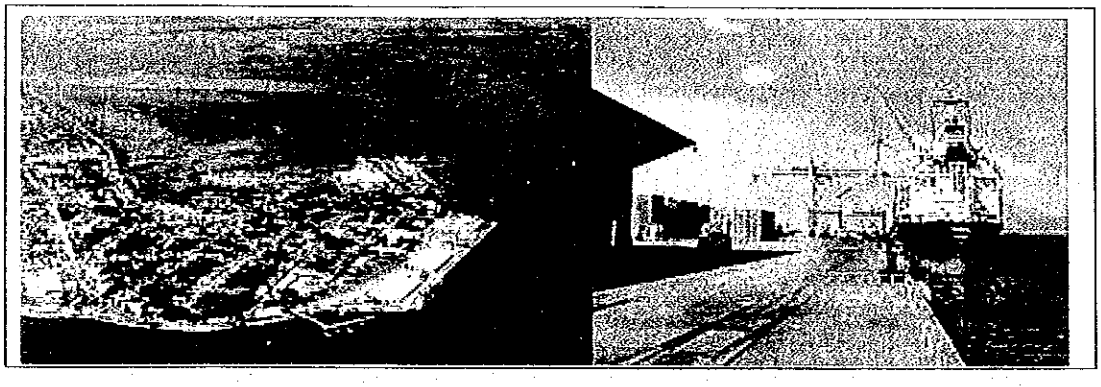
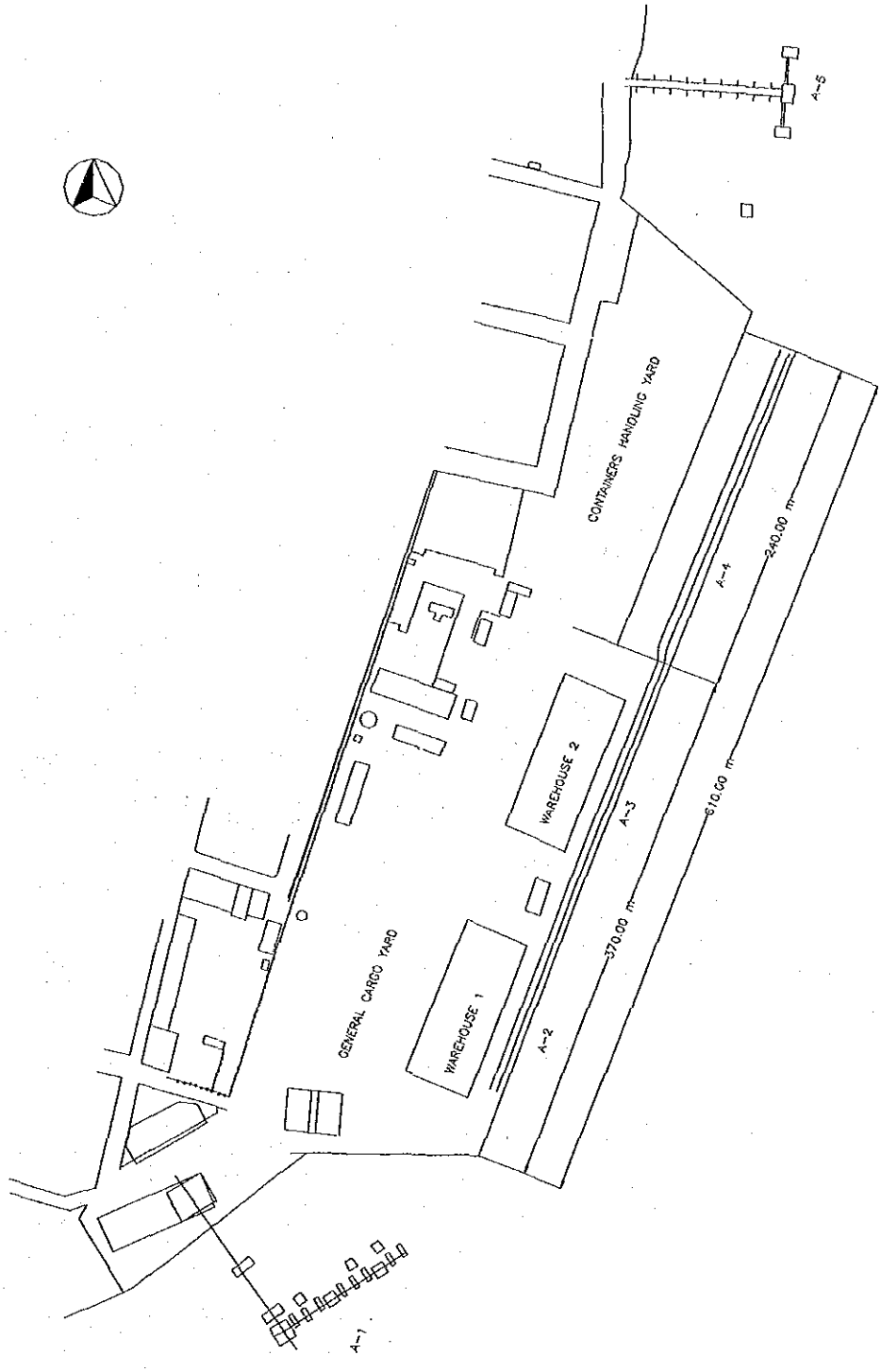


Photo A.3.1 Corinto Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.3.1	**Corinto Port Plan**

A.4 Caldera Port

A.4.1 Port Facilities

Caldera Port is the main port for the international trade in the Pacific coast of Costa Rica replacing Puntarenas Port. It was inaugurated in 1981.

The port was built in open sea so it has artificial protection that consists of a breakwater. The jetty is located in a basin protected by a 250 meters long breakwater that extends in northwest direction from the beginning of berth N-1. Later on, the breakwater was extended in 282 meters in order to prevent the sand sedimentation produced by the haulage of the coastline from Punta Coralillo.

Caldera Port has a 490 m long marginal jetty divided into three berths; the present dimensions of the berths and their current utilization are summarized in the following Table:

Table A.4.1 Berth Facilities of Caldera Port

Type of Jetty	Berth No.	Length (m)	Depth (m)	Cargo/Vessel Handled
Marginal	N – 1	210.0	11.0	Containers and Solid Bulk
	N – 2	150.0	10.0	Solid Bulk and General Cargo
	N – 3	130.0	7.5	General Cargo

The covered storage area is of 14,400 square meters and the open storage area of 61,000 square meters.

The port has also the equipment detailed in the following Table:

Table A.4.2 Type of Equipment

Item of Equipment	Capacity	Number
Crane	120 MT	1
Crane	10 – 45 MT	7
Forklift	2.5 – 35 MT	25
Spreader	20´ and 40´	5
Platforms		5
Chassis		6
Hauling Tractor		3

The loading and unloading of the containers and general cargo is carried out using the ship's gear from the jetty or the truck platform. Unloading of the dry bulk is made through the ship's gear and clamshell buckets to the trucks by means of conveyors.

A.4.2 Present Traffic

In 1999, Caldera Port handled 1,813,529 tons from which 1,756,722 tons were of import cargo and 56,807 tons of export. This represents 19.05% of the total cargo throughput of the Costa Rica ports. From 1995 to 1999, the handled cargo grew in an annual rate of 7.67%.

The cargo handled at Caldera Port is summarized in the following Table:

Table A.4.3 Cargo Handled by Type at Caldera Port (MT)

Type of Vessel	Number of Ships	1999
General Cargo	37	67,792
Reefer	2	2,549
Containers	123	202,511
Ro-Ro (Vehicles)	68	32,022
Solid Bulk	93	1,499,887
Liquid Bulk	1	8,102
Others	1	656
Total	325	1,813,529
Cruisers (passengers on board)	92	50,210

From the cargo handled by Caldera, 82.71% is solid bulk and 11.17% are containers.

The containers handled in this port were 21,541 units in 1999 and 24,823 in 1995, this means a reduction of 13%.

The total number of cargo ship call in Caldera Port was of 325 and 92 cruise ships in 1999, these numbers are lower than in 1998. The reduction in the cruise ship call is due to the attention paid by the cruise lines to the Puntarenas Port.

A.4.3 Current Port Development Project

Caldera Port is in urgent need of upgrading and expansion. There are only 3 docks, which have created bottlenecks for the last five years. The accumulation of sediment is hazardous, and must be dredged. The breakwaters are not effective and must be improved. The outdoor lighting is insufficient and must be improved. Three additional docks are needed, as well as silos, a relocation of the passenger dock, and a new patio for tractor-trailers. The construction of a grain terminal and a tuna terminal is needed.

There are no passenger amenities in Caldera Port except for a small, air-conditioned terminal with restrooms, information desk, public phones and a small selection of craft vendors.

In Caldera Port, the following projects of facilities improvement are under execution:

- Procurement and installation of defenses for the jetty.
- Repair of the tug boat "Don José".
- Dredging in the mooring line to provide uniformity in depth in the three berthing positions.
- Acquisition of the following port equipment: 2 front wheel loaders, 2 fork lift of 3 MT, 2 heads, 4 chassis and 4 spreaders.

A major view of the port facilities is showed in the following Photo A.4.1 and the port plan in Figure A.4.1.

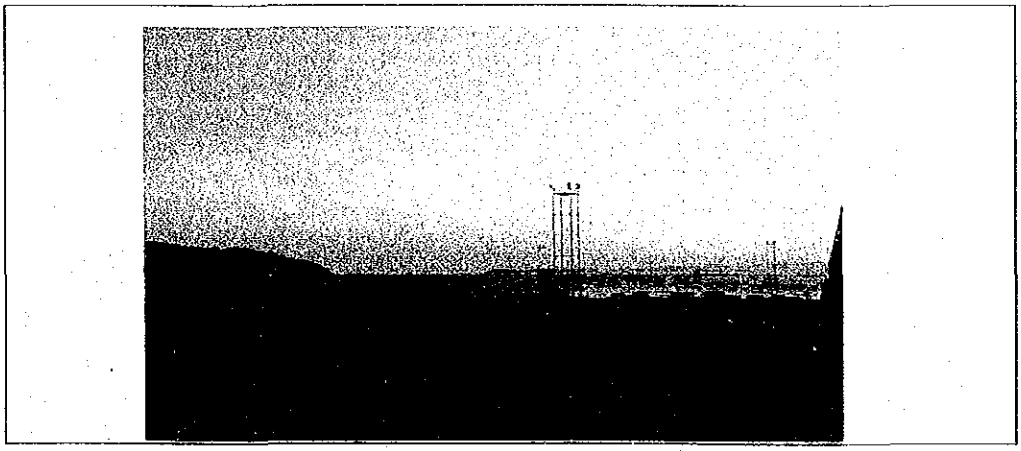
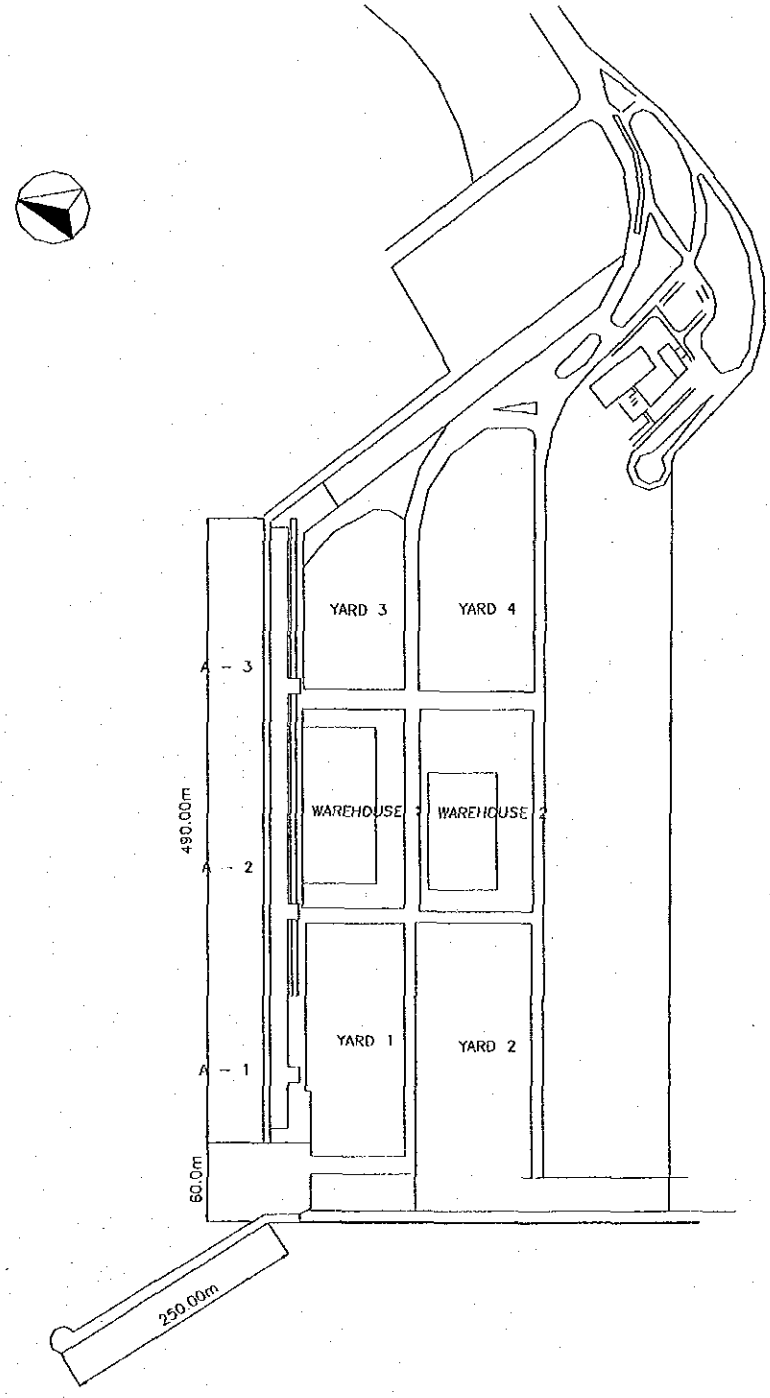


Photo A.4.1 Caldera Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.4.1	**Caldera Port Plan**

A.5 Limón – Moín Port Complex

A.5.1 Port Facilities

Limón Port and the neighbor Moín Port, both located at the Atlantic cost of Costa Rica and 6 km apart, operate as a port complex.

The Railroad Company constructed the original Limón Port for shipping of bananas in 1904. When the port became national property in 1968 it was enhanced and improved.

The Costa Rican national oil company constructed the Moín Port for unloading of imported petroleum in the 1980's.

Limon Port is a multipurpose port that consists of a 420 m marginal wharf and of a 550 m pier type jetties with depths from 8 to 10 m. The Moín Port is also a multipurpose port that has a 550 m marginal wharf of 12 m depth used as terminal for bananas, and a 210 m pier jetty of 13 m depth for liquid bulks. Both ports have breakwaters as artificial protection.

The total length of the berths under operation at Limón Port is of 1,245 m. The detail of the berths is the following:

Table A.5.1 Berth Facilities of Limón Port

Jetty	Berth No.	Length (m)	Depth (m)	Cargo/Vessel Handled
Alemán	4 – 2	210.0	9.0	Containers
	4 – 3	210.0	10.0	Containers
Access to Old Metallic Jetty	2 – 1	275.0	10.0	Ro – Ro
	2 – 2	275.0	10.0	Cruisers
	3 – 1	275.0	9.0	General Cargo

The total length of the berths under operation at the Moín Port is of 760 m, and the detail of the berths is the following :

Table A.5.2 Berth Facilities of Moín Port

Type of Jetty	Berth No.	Length (m)	Depth (m)	Cargo/Vessel Handled
Marginal	5 – 3	175.0	10.0	Bananas and Solid Bulk
	5 – 4	175.0	10.0	Containers
	5 – 5	200.0	10.0	Containers
Seawall Pier	5– 1	210.0	13.0	Petroleum

The available total area of the Port Complex Limón - Moín for storage of containers is of 126,800 square meters. The covered storage area is of 10,000 square meters, and the yard for general cargo of 17,000 square meters.

The port complex has the following equipment as detailed in Table A.5.3:

Table A.5.3 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat		3
Pilot Boat		2
Gantry Crane		1
Straddle Carrier Crane		6
Forklift	2.5 – 15 MT	56
Head Terminal Type		5
Tractor	60 MT	2

A.5.2 Present Traffic

In 1999, the Limón – Moín Port Complex handled 7,204,300 tons, from which 3,737,338 tons were of import cargo and 3,466,962 were of export cargo. The total handled volume represents 77.52% of the total cargo throughput of the Costa Rica ports. In the period 1995-1999 the cargo grew at an annual rate of 6.61 %.

The solid bulk cargo tends to decrease in the port complex as more is being transferred to the Caldera Port.

The cargo handled at the Limón - Moín Port Complex is summarized in the Table A.5.4:

Table A.5.4 Cargo Handled by Type at Limón – Moín Port Complex (MT)

Type of Vessel	1995	1996	1997	1998	1999
General Cargo	338,138	276,687	537,088	669,858	594,122
Reefer	1,739,002	1,584,632	1,753,534	2,055,625	1,969,069
Containers	1,396,645	1,601,728	1,760,405	2,048,165	2,593,307
Ro-Ro	366,590	346,954	323,623	305,541	206,880
Solid Bulk	93,799	112,741	141,770	63,311	47,563
Liquid Bulk	72,042	111,986	43,223	94,111	122,120
Petroleum	1,510,861	1,389,874	1,330,972	1,542,911	1,593,697
Liquefied Gas	60,586	39,731	44,891	59,137	77,542
Total	5,577,863	5,464,333	5,935,506	6,838,659	7,204,300
Cruisers (passengers on board)	37,880	37,771	57,173	71,200	77,551

In the Limón – Moín Port Complex, specifically in Limón Port, besides ship calls of different cargo type there are also passenger ships or cruisers. The quantity of tourists that arrived in 1999 was of 77,551; this movement has grown 19.62% annually from 1995 to 1999.

A total of 581,739 TEU's were handled in 1999. The volume of cargo was of 593,165 metric tons. In relation to the TEU's handled in 1998, there is an increment of 140,036 TEU's which means an increment in cargo of 545,142 metric tons.

The total number of ship call in the port was of 2,243 in 1999 and of 2,327 in 1998, this represents 84 ships less but bigger cargo volume, this is because the shipments were bigger as well as calling ships were larger.

A.5.3 Current Port Development Project

At present, it is necessary to separate the two big functions of Limón Port: traffic of containers and traffic of passengers, because there is no specialized terminal for cruise ships. Additionally, berth 70 of the port has completed the useful life and needs to be replaced.

The following projects to improve the port facilities are under execution:

Limón Port:

- Supplementary works for the cruisers terminal.
- Procurement and setting in operation of a container gantry crane.
- Procurement of the following equipment: 3 straddle carrier cranes, 30 forklifts of 2.5 MT, 6 heads, and 10 hoppers.
- Move warehouse No. 5.
- Repair of containers yard.
- Construction of security fence.
- Procurement of wharfs protections.
- Maintenance dredging of 150,000 cubic meters.

Moín Port:

- Construction of 250 m jetty, known as the Taiwanese Jetty, (berth 5-6).
- Construction of supporting yard for the Taiwanese Jetty.
- Procurement and setting in operation a container gantry crane for the Taiwanese Jetty.
- Dredging to 12 meters depth.
- Acquisition of lands for the port expansion.

- Construction of entrance huts and control weighbridges.
- Construction of building for documents and services to client.
- Marking of parking and circulation areas of the port.
- Lighting of the port access and exit road.

The previous projects are pending of execution due to the decision of the government of Costa Rica to do not carry out investments in infrastructure until a new opportunity.

Photos A.5.1 and A.5.2 show a view of the Limón - Moín Port Complex. The port plans are shown in Figure A.5.1 and A.5.2.

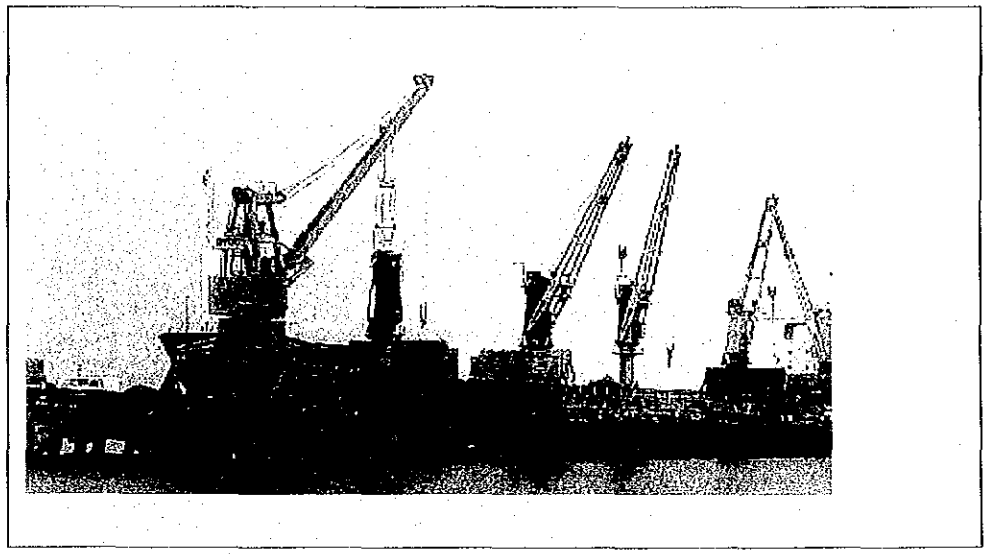


Photo A.5.1 Limón Port

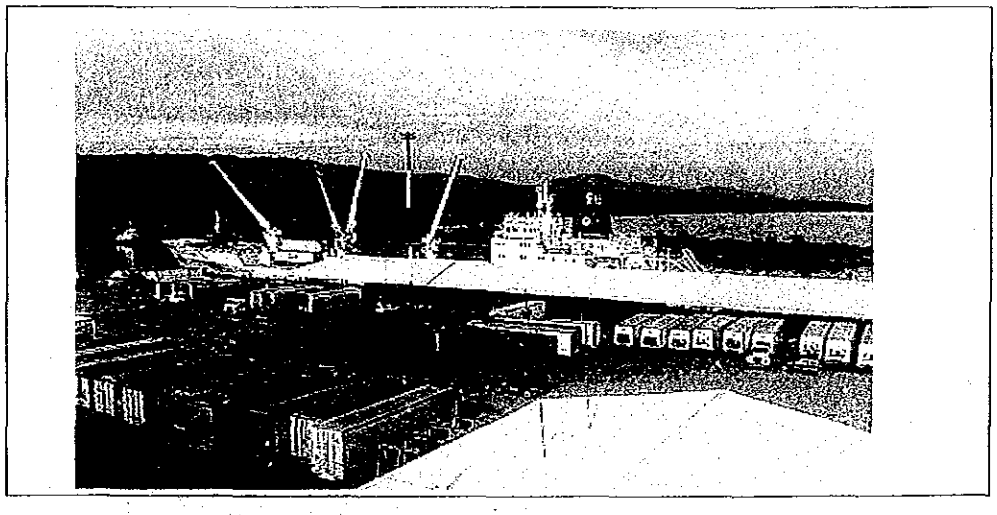
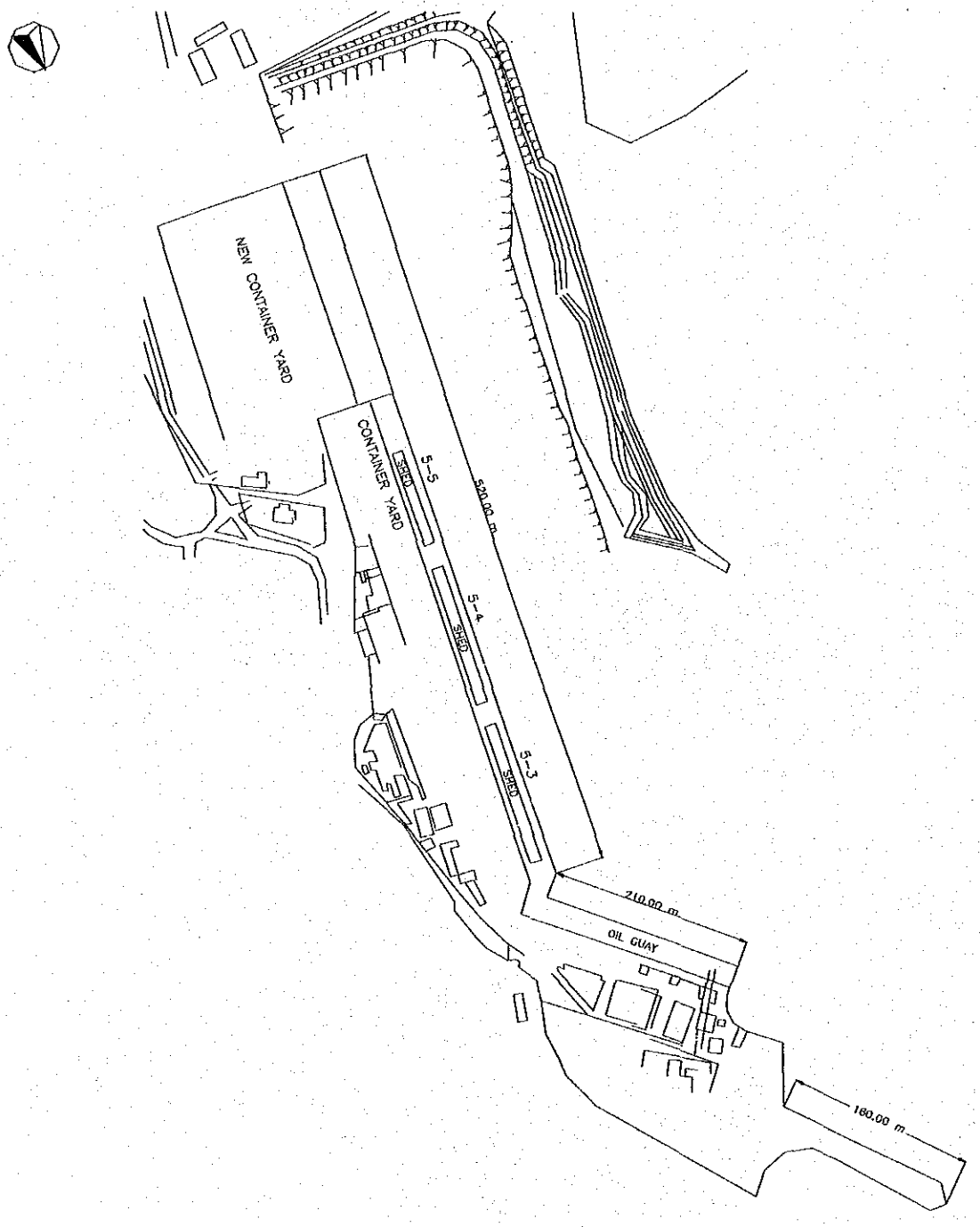
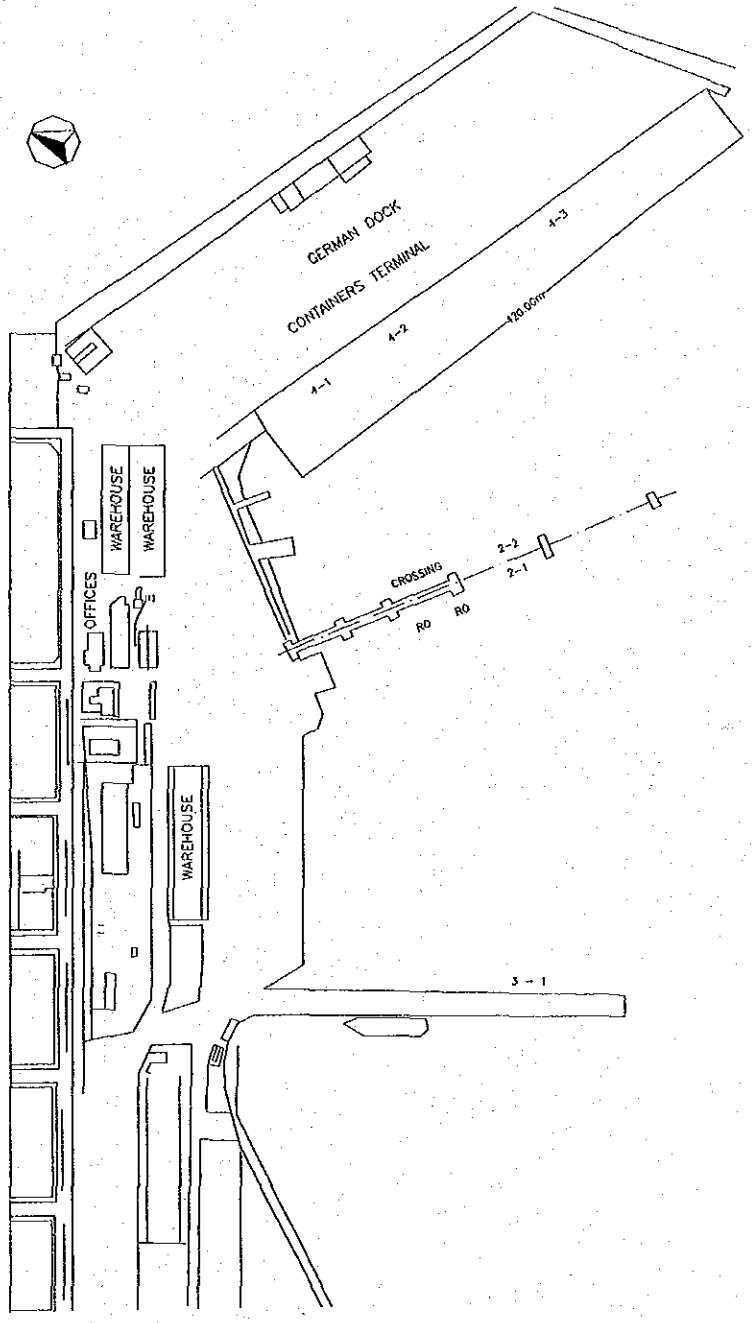


Photo A.5.2 Moín Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.5.1	**Moín Port Plan**



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.5.2	**Limón Port Plan**

A.6 Cortés Port

A.6.1 Port Facilities

The Cortés Port in the Caribbean coast is the most important port of Honduras; during 1999 it handled 89% of the country's seaborne cargo. This is a multipurpose port constructed under the concept of the Central American Common Market and that it could provide service to all countries of the area.

The port is built in a natural bay; it has a turning basin of 900 m diameter and an anchorage area of 400,000 m^2. At the moment, there are five berths: three are marginal type jetties and two pier type jetties. The berths and their characteristics are detailed in the following Table:

Table A.6.1 Berth Facilities of Cortés Port

Type of Jetty	Berth No.	Length (m)	Depth (m)	Cargo/Vessel Handled
Pier	1	46.0	10.0	Petroleum derived
Pier	2	113.0	11.0	Chemicals, Molasses
Marginal	3	198.0	11.0	Bananas, General Cargo
Marginal	4	325.0	9.3	General Cargo
Marginal	5	476.0	11.0	Containers/Ro-Ro

The covered storage area is of 9,800 square meters, the cold storage of 4,189 square meters, and the open storage area of 90,401 square meters.

The Cortés Port has the following equipment detailed in Table A.6.2:

Table A.6.2 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat		3
Pilot Boat		2
Gantry Crane	45 MT	2
Mobil Crane		7
Forklift	1.4 – 8.0 MT	53
Chassis		12
Low boy		24
Head Terminal Type		44
Head Road Type		4
Weighbridge	60 MT	3
Platform Scale	5 MT	2

The Cortés Port has also a FREE ZONE that is located 1 km away from the wharfs. Twenty-three factories and shopping centers are operating in this enclosure.

A.6.2 Present Traffic

In 1999, the external trade of Honduras by sea was of 5,614,890 tons, from which the Cortés Port handled 4,978,083 tons that represents 89% of the total of the country. The imports by the port were of 3,492,058 tons and the exports 1,486,025 tons. This cargo was transported in 1,728 ships. During 1992 the port mobilized a total of 2.809 millions of tons from which 1.530 were of import and 1.279 million tons of export. In the period 1992-1999, the total cargo of the port had a rate of growth of 8.52% , it can also be observed that the rate of growth of the imports is of 12.51%, while the exports grew to a rhythm smaller than 2.16%.

The cargo handled at the Cortés Port is summarized in the following Table:

Table A.6.3 Cargo Handled by Type at Cortés Port (MT)

Type of Vessel	1998	1999
General Cargo	205,333.7	473,887.2
Reefer	962,354.7	583,423.7
Containers	1,201,246.0	1,553,410.3
Ro-Ro	736,706.7	351,855.8
Solid Bulk	715,469.3	816,399.9
Liquid Bulk	124,292.4	125,915.2
Wood	20,207.2	38,230.8
Petroleum	1,069,347.5	1,054,959.7
Others	56,130.2	0
Total	5,091,087.8	4,978,082.6

The total number of ship calls in the port was of 1,694 in 1998 and it was saturated with 1,728 in 1999, this represents an increment of 45 ships. The container carriers were 33% of the total, RO-RO 9%, reefer vessels 19%, general cargo vessels 18%, and oil tankers 6%, the remaining 16% were vessels for transportation of wood, bulk carriers, tankers and cruise ships

A.6.3 Current Port Development Project

The Honduran ports have experienced a drop in the mobilized cargo starting from 1998 due to the loss of the banana tree plantations as consequence of the Hurricane Mitch.

At the Cortés Port investments has been made in over-dimensioned infrastructure (Cold storage) that are not adapted to the necessities of exports of fruits and vegetables.

Some berths of the port need to be cleared in order to correct depth loss due to

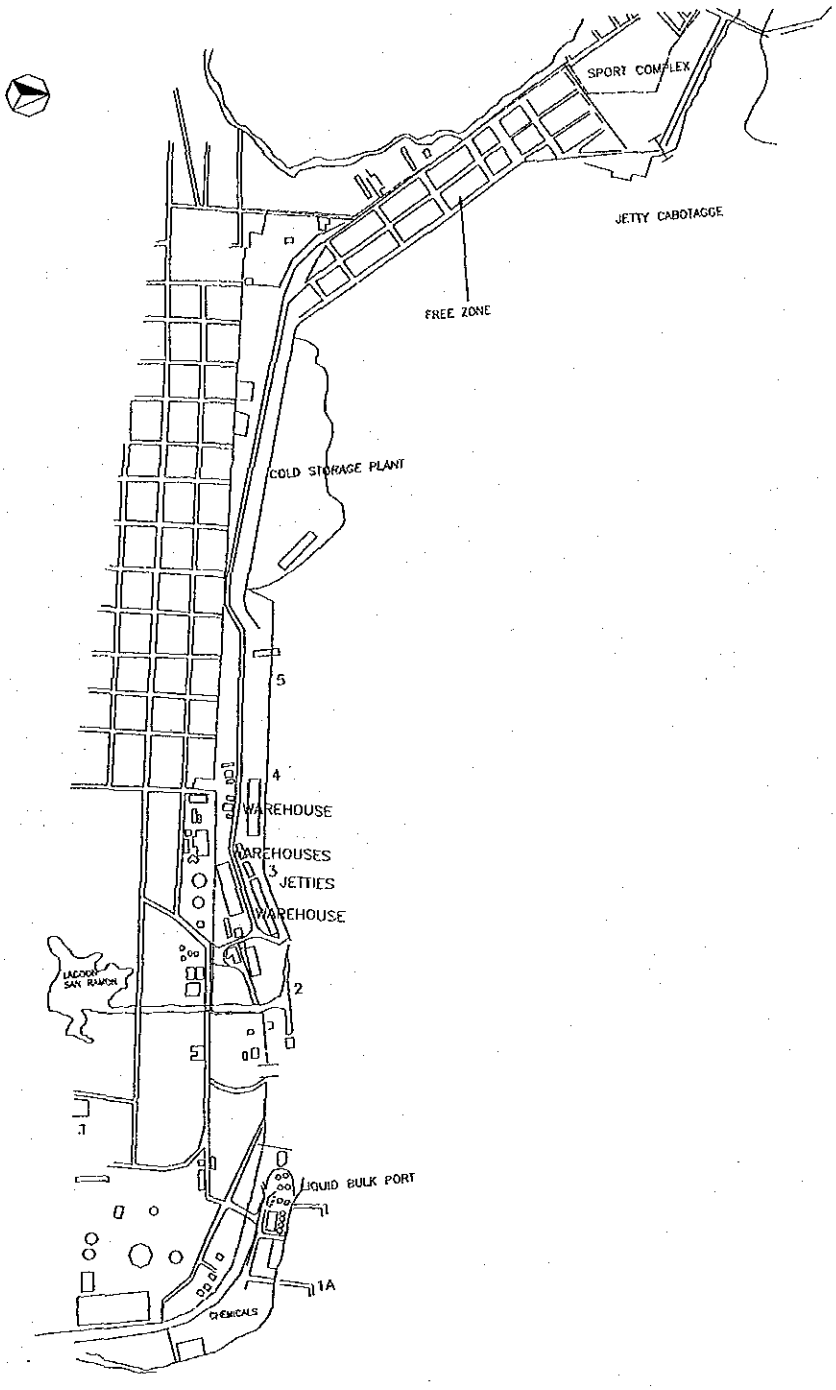
sedimentation.

The following projects are under execution in order to improve the port facilities:

- Construction of a new terminal for containers.
- Rehabilitation of berths No. 4 and 5.
- Construction of wharf No. 2.
- Dredging of berths No. 1, 4, 5, 6 and the one for coastal traffic.
- Reconstruction and improvement of containers yard.

A partial view of the Cortés Port facilities are showed in the following Photo A.6.1 and the port plan in Figure A.6.1.

Photo A.6.1 Cortés Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.6.1	**Cortés Port Plan**

A.7 Santo Tomás de Castilla Port

A.7.1 Port Facilities

The Santo Tomás de Castilla Port was built in the 1960's by the Guatemalan government to replace Puerto Barrios, which was controlled by foreign commercial interests. At the present Santo Tomás de Castilla is the most important Guatemalan port in the Caribbean coast.

The port has an 11.0-meter depth navigation channel shared with the neighbor Puerto Barrios. The port consists of a 915 meters long marginal wharf, in straight line. Six berths are operating, with a maximal guaranteed depth of 9 meters. The vessel more than 9 meters draft shall submit a compromise letter exempting to the Santo Tomás de Castilla National Port Company (EMPORNAC) of responsibility for any damage to be caused in the ship or to the facilities.

The covered storage area is of 35,072 square meters; the open storage area of 15,833 square meters. Also, the port has 93,511 square meters of containers yard and freight trucks.

The Port has the following equipment detailed in Table A.7.1:

Table A.7.1 Type of Equipment

Item of Equipment	Capacity	Number
Tug Boat	3,000 HP	1
Tug Boat	1,600 HP	2
Tug Boat	350 HP	1
Crane	15 – 20 MT	2
Mobil Crane on Rails	35 MT	1
Forklift	2.5 – 18 MT	60
Lift with Spreader	36 MT	1
Straddle Carrier Crane		11
Platform 40´	30 – 40 MT	29
Hopper	10 – 40 MT	50
Head Terminal Type		33
Hauling Tractors		4

A.7.2 Present Traffic

In 1999, the Santo Tomás de Castilla Port handled 4,513 thousand tons from which 2,272 thousand tons of import cargo and 2,241 thousand tons of export. This volume represents 44% of the cargo handled at the Guatemala ports and 73% of the cargo handled in the Caribbean coast. In 1995, the cargo throughput was of 1,542 thousand tons in import and 1,294 thousand tons in export, for a total of 2,836 tons. The cargo handling from 1995 to 1999 has grown to an annual average rate of 12.1%.

The cargo handled in container has grown from 646,644 tons to 889,899 tons from 1995 to 1998, this growth has an annual average rate of 11.2%. The cargo in tank ships has grown from 1,041,428 tons to 1,966,828 tons from 1995 to 1998, the annual growing rate is of 23.6%. The solid bulks, which had disappeared from the port, were 2,821 tons in 1995 and 164,647 tons in 1998, being the cargo with more rate of growth in the period of 28%. The general cargo grew 9.8% during the period.

The total number of ship calls in the port grew from 984 to 1,249 during 1995 to 1998, with an average growing rate of 8.4%. The ship type that moors the most at the port is the RO-RO, after this type the container carriers, refrigerated, conventional and tanker types in that order.

A total of 261,147 TEU's were handled in 1999, from which 126,646 were full and 134,501 empty. The total of TEU's handled in 1998 was of 371,031, that is to say, there was a reduction of 109,884 TEU's. The cargo in containers and freight trucks was increased in 329,638 tons.

A.7.3 Current Port Development Project

The berth structure has an obstacle for surcharge at apron since its bearing capacity is only 2.9 tons per square meter and it along doesn't allow the installation of a gantry crane for containers.

Another technical restriction is the depth along the berthing line of the Santo Tomás's jetty, which varies from 9.0 m to 11.0 m, especially shallow in the place dedicated for handling of liquid bulk. The importance of the traffic of liquids in this port, given its magnitude in volume, has required the decisions to have a terminal of liquid bulks far from the existing public port facilities due to the risk that implies handling of hydrocarbons and other extreme dangerous substances.

The following projects for improvement of the port facilities are under execution:

- Lighting of yards in front of berths 1, 2 and 3.
- Repair of revetment, first phase.
- Pavement of first and second street and entrance road.
- Construction of a bridge for connection to the second stage of the berth.
- Improvement of the water supply system.

A major view of the port facilities is showed in the following Photo A.7.1 and the port plan in Figure A.7.1.

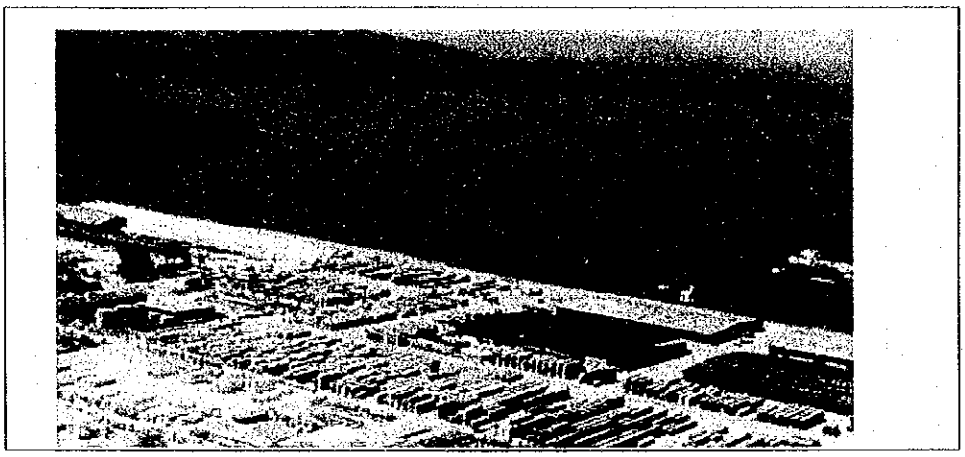
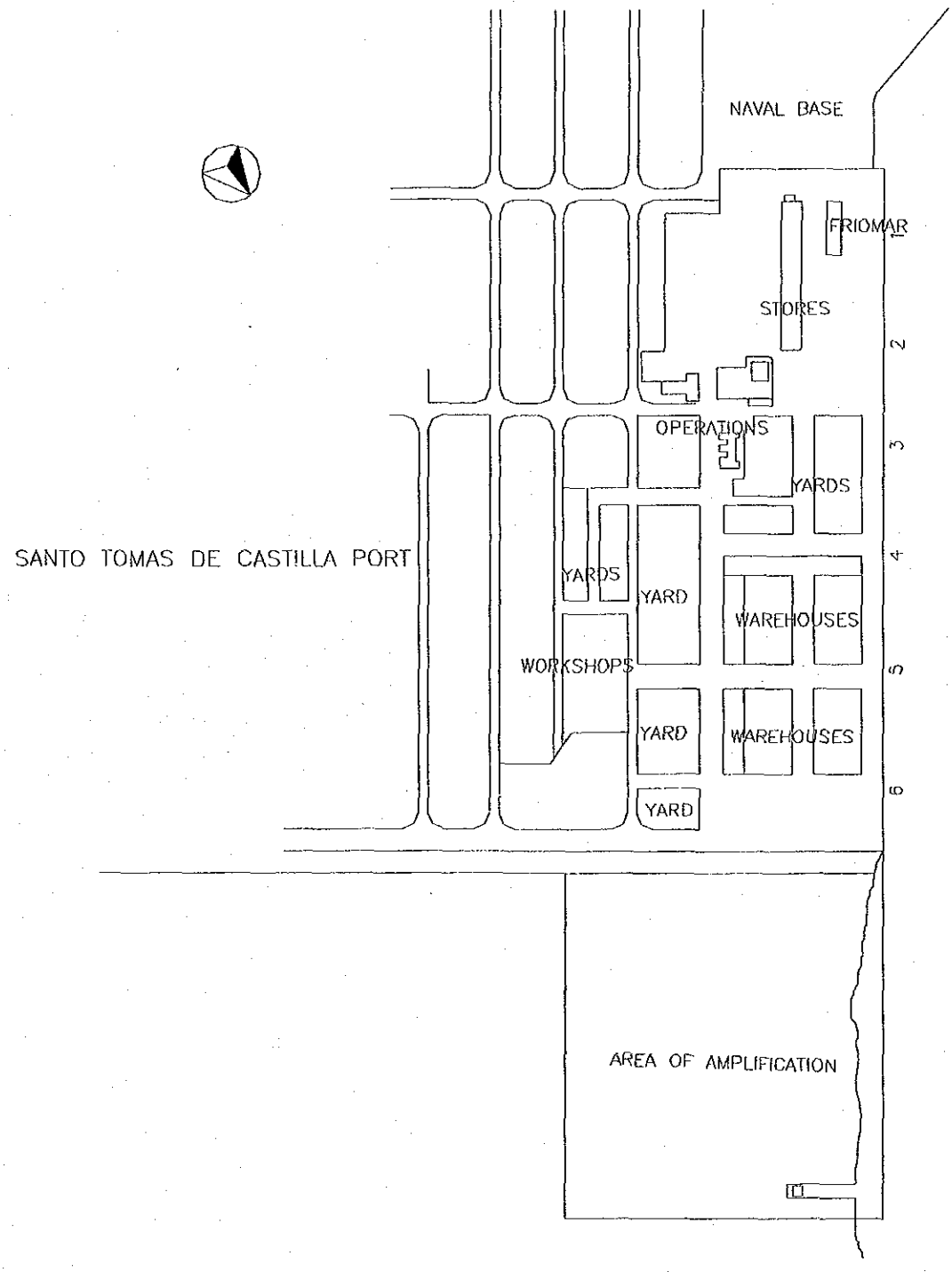


Photo A.7.1 Santo Tomás de Castilla Port



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	A.7.1	**Santo Tomás de Castilla Port Plan**