

APPENDIX 4

APPENDIX 4 Appraisal of Alternative Port Development Projects

1. The following 4 alternative port development projects to increase cargo handling capacity of El Salvadoran coastal ports are considered.

1. Major investment in Acajutla port for construction of new wharves to handle forecast cargo volume.
2. Limited investment in Acajutla port for installation of dual-purpose crane.
3. Small investment in Cutuco port to repair and maintain existing facility for a limited period
4. Construction of new port in La Union

2. Costs and benefits of each of the 4 cases are calculated and compared with the case in which no investment is made. Next, the most profitable project for El Salvador is selected by means of Net Present Value (NPV). NPV is a standard used to measure the benefits of a project to society as a whole. This is different from EIRR, which shows only the profitability of the project itself. To evaluate the degree to which the project will impact social development, NPV is used since it indicates absolute social benefits.

Case 1

3. Large scale investment in Acajutla port is made to construct new container wharf and bulk cargo wharf to handle the forecast cargo volume. Project costs and benefits are calculated through a comparison with the "Without case" (in which no investment is made). The construction cost of new wharves is obtained from "Port of Acajutla Container Terminal Feasibility Study Update Final Report in January 1992" by Frederic Harris, inc. This cost is converted into current price in 1997. Two types of benefits are countable. One is the savings in land transportation which is the difference of Salvadoran ports cargo handling capacity between the case with investment and without investment multiplied by the difference of land transportation cost of cargoes. The other is cost savings in cargo handling in foreign ports which is the difference of Salvadoran ports cargo handling capacity between the case with investment and without investment multiplied by the cargo handling charge. Investment in new wharves takes place in 2004 and from 2005 new wharves would be available. It is assumed that the capacity of the wharves would be sufficient to cope with the forecast volume up to 2015.

Case 2

4. A dual-purpose crane at existing wharf is installed at Acajutla port to increase cargo handling capacity. Project costs and benefits are calculated through a

difference of Salvadoran ports cargo handling capacity between the case with investment and without investment multiplied by the difference of land transportation cost of cargoes. The other is cost savings in cargo handling in foreign ports which is the difference of Salvadoran ports cargo handling capacity between the case with investment and without investment multiplied by the cargo handling charge. Investment in new wharves takes place in 2004 and from 2005 new wharves would be available. It is assumed that the capacity of the wharves would be sufficient to cope with the forecast volume up to 2015.

Case 2

A dual-purpose crane at existing wharf is installed at Acajutla port to increase cargo handling capacity. Project costs and benefits are calculated through a comparison with the "Without case". Installation cost of dual-purpose crane is obtained from "Port of Acajutla Container Terminal Feasibility Study Update Final Report in January 1992" by Frederic Harris, inc. This cost is converted into current price in 1997. Types of countable benefits are the same as Case 1. However, the increase in cargo handling capacity is smaller than in Case 1, which means that overflowing cargoes which could not be handled in Acajutla port would be handled in Quetzal port. Investment in the dual-purpose crane takes place in 2004 and from 2005 it would be available although it must be renewed every 15 years.

Case 3

Small investment is made in Cutuco port to repair and maintain present facility for a period of about 10 years. Project costs and benefits are calculated through a comparison with the "Without case". Repair and maintenance cost of present facility is obtained from "Repair and reform of Cutuco Port in November 1995" by CEPA. This cost is converted into the current price in 1997. Types of countable benefits are the same as Case 1. Annual cargo handling capacity of Cutuco port is assumed at only 250,000 tons and container cargo will not be handled there. The overflowing cargoes which are not able to be handled in Salvadoran ports will be handled in Quetzal port.

Case 4

New port is constructed in La Union and forecast cargo volume is handled by Acajutla port and La Union new port. Project costs and benefits are calculated through a comparison with the "Without case". New port construction cost is estimated by the study team. Types of countable benefits are the same as Case 1. Investment in the new port takes place in 2004 and from 2005 the new port would be available. It is assumed that the capacity of the new port is sufficient to cope with the forecast volume up to 2015.

Evaluation

To evaluate the Net Present Value of projects, the standard value of EIRR of IBRD and IDB for social-infrastructure project of 12% is applied as the discount rate. Table A-1-1 shows summary of NPV calculation. Detailed calculation of NPV is shown in Table A-1-2, A-1-3, A-1-4 and A-1-5.

Table A-1-1 Summary of NPV calculation

unit : million US\$

Discount rate	Case 1	Case 2	Case 3	Case 4
12.0%	73.8	30.2	20.7	75.7

NPV values of case 1 and 4 are almost the same, however, investment in Acajutla port (Case 1) will widen the economic gap between the Western and Eastern regions. However, Eastern regional economic development will be accelerated as a result of the investment in La Union (Case 4). Regional economic development effects which are introduced by the new port development in La Union are mentioned in Chapter 22 Economic Analysis.

Table A-1-2 NPV of Case 1(New Wharf Construction at Acajutla Port)

	year	Cost Total	Benefit Total	Benefit - Cost	Net Present Value (NPV)		
					Benefit	Cost	Benefit - Cost
1	2004	213,000,000	0	-213,000,000	0	213,000,000	-213,000,000
2	2005	0	16,654,936	16,654,936	14,870,479	0	14,870,479
3	2006	0	20,099,618	20,099,618	16,023,292	0	16,023,292
4	2007	0	23,544,299	23,544,299	16,758,367	0	16,758,367
5	2008	0	26,988,981	26,988,981	17,151,985	0	17,151,985
6	2009	0	30,433,663	30,433,663	17,268,878	0	17,268,878
7	2010	0	33,878,344	33,878,344	17,163,824	0	17,163,824
8	2011	0	37,323,026	37,323,026	16,883,042	0	16,883,042
9	2012	0	40,767,708	40,767,708	16,465,393	0	16,465,393
10	2013	0	44,212,389	44,212,389	15,943,431	0	15,943,431
11	2014	0	47,657,071	47,657,071	15,344,301	0	15,344,301
12	2015	0	51,101,685	51,101,685	14,690,513	0	14,690,513
13	2016	0	51,101,685	51,101,685	13,116,530	0	13,116,530
14	2017	0	51,101,685	51,101,685	11,711,187	0	11,711,187
15	2018	0	51,101,685	51,101,685	10,456,417	0	10,456,417
16	2019	0	51,101,685	51,101,685	9,336,087	0	9,336,087
17	2020	0	51,101,685	51,101,685	8,335,792	0	8,335,792
18	2021	0	51,101,685	51,101,685	7,442,671	0	7,442,671
19	2022	0	51,101,685	51,101,685	6,645,242	0	6,645,242
20	2023	0	51,101,685	51,101,685	5,933,252	0	5,933,252
21	2024	0	51,101,685	51,101,685	5,297,546	0	5,297,546
22	2025	0	51,101,685	51,101,685	4,729,952	0	4,729,952
23	2026	0	51,101,685	51,101,685	4,223,172	0	4,223,172
24	2027	0	51,101,685	51,101,685	3,770,689	0	3,770,689
25	2028	0	51,101,685	51,101,685	3,366,686	0	3,366,686
26	2029	0	51,101,685	51,101,685	3,005,970	0	3,005,970
27	2030	0	51,101,685	51,101,685	2,683,902	0	2,683,902
28	2031	0	51,101,685	51,101,685	2,396,341	0	2,396,341
29	2032	0	51,101,685	51,101,685	2,139,590	0	2,139,590
30	2033	0	51,101,685	51,101,685	1,910,348	0	1,910,348
31	2034	0	51,101,685	51,101,685	1,705,668	0	1,705,668
	Total	213,000,000	1,343,593,735	1,130,593,735	286,770,548	213,000,000	73,770,548

EIRR= 0.12000

Table A-1-3 NPV of Case 2 (Dual purpose Crane Installation at Acajutla Port)

	year	Cost Total	Benefit Total	Benefit - Cost	Net Present Value (NPV)		
					Benefit	Cost	Benefit - Cost
1	2004	12,349,000	0	-12,349,000	0	12,349,000	-12,349,000
2	2005	0	5,566,650	5,566,650	4,970,223	0	4,970,223
3	2006	0	5,566,650	5,566,650	4,437,699	0	4,437,699
4	2007	0	5,566,650	5,566,650	3,962,231	0	3,962,231
5	2008	0	5,566,650	5,566,650	3,537,706	0	3,537,706
6	2009	0	5,566,650	5,566,650	3,158,666	0	3,158,666
7	2010	0	5,566,650	5,566,650	2,820,238	0	2,820,238
8	2011	0	5,566,650	5,566,650	2,518,070	0	2,518,070
9	2012	0	5,566,650	5,566,650	2,248,276	0	2,248,276
10	2013	0	5,566,650	5,566,650	2,007,390	0	2,007,390
11	2014	0	5,566,650	5,566,650	1,792,312	0	1,792,312
12	2015	0	5,566,650	5,566,650	1,600,279	0	1,600,279
13	2016	0	5,566,650	5,566,650	1,428,820	0	1,428,820
14	2017	0	5,566,650	5,566,650	1,275,732	0	1,275,732
15	2018	0	5,566,650	5,566,650	1,139,047	0	1,139,047
16	2019	12,349,000	5,566,650	-6,782,350	1,017,006	2,256,116	-1,239,110
17	2020	0	5,566,650	5,566,650	908,041	0	908,041
18	2021	0	5,566,650	5,566,650	810,751	0	810,751
19	2022	0	5,566,650	5,566,650	723,885	0	723,885
20	2023	0	5,566,650	5,566,650	646,326	0	646,326
21	2024	0	5,566,650	5,566,650	577,077	0	577,077
22	2025	0	5,566,650	5,566,650	515,247	0	515,247
23	2026	0	5,566,650	5,566,650	460,042	0	460,042
24	2027	0	5,566,650	5,566,650	410,752	0	410,752
25	2028	0	5,566,650	5,566,650	366,743	0	366,743
26	2029	0	5,566,650	5,566,650	327,449	0	327,449
27	2030	0	5,566,650	5,566,650	292,365	0	292,365
28	2031	0	5,566,650	5,566,650	261,040	0	261,040
29	2032	0	5,566,650	5,566,650	233,072	0	233,072
30	2033	0	5,566,650	5,566,650	208,100	0	208,100
31	2034	0	5,566,650	5,566,650	185,803	0	185,803
	Total	24,698,000	166,999,486	142,301,486	44,840,386	14,605,116	30,235,270

EIRR= 0.12000

Table A-1-4 NPV of Case 3 (Repair and Maintenance of Cutuco Port Facility)

	year	Cost Total	Benefit Total	Benefit - Cost	Net Present Value (NPV)		
					Benefit	Cost	Benefit - Cost
1	2004	1,400,000	0	-1,400,000	0	1,400,000	-1,400,000
2	2005	0	3,912,552	3,912,552	3,493,350	0	3,493,350
3	2006	0	3,912,552	3,912,552	3,119,063	0	3,119,063
4	2007	0	3,912,552	3,912,552	2,784,877	0	2,784,877
5	2008	0	3,912,552	3,912,552	2,486,498	0	2,486,498
6	2009	0	3,912,552	3,912,552	2,220,087	0	2,220,087
7	2010	0	3,912,552	3,912,552	1,982,221	0	1,982,221
8	2011	0	3,912,552	3,912,552	1,769,840	0	1,769,840
9	2012	0	3,912,552	3,912,552	1,580,214	0	1,580,214
10	2013	0	3,912,552	3,912,552	1,410,905	0	1,410,905
11	2014	0	3,912,552	3,912,552	1,259,737	0	1,259,737
	Total	1,400,000	39,125,520	37,725,520	22,106,791	1,400,000	20,706,791

EIRR= 0.12000

Table A-1-5 NPV of Case 4(La Union New Port Construction)

	year	Cost Total	Benefit Total	Benefit - Cost	Net Present Value (NPV)		
					Benefit	Cost	Benefit - Cost
1	2004	158,000,000	0	-158,000,000	0	158,000,000	-158,000,000
2	2005	0	13,631,033	13,631,033	12,170,565	0	12,170,565
3	2006	0	16,427,271	16,427,271	13,095,720	0	13,095,720
4	2007	0	19,223,508	19,223,508	13,682,914	0	13,682,914
5	2008	0	22,019,746	22,019,746	13,993,947	0	13,993,947
6	2009	0	24,815,984	24,815,984	14,081,256	0	14,081,256
7	2010	0	27,612,221	27,612,221	13,989,211	0	13,989,211
8	2011	0	30,408,459	30,408,459	13,755,243	0	13,755,243
9	2012	0	33,204,697	33,204,697	13,410,820	0	13,410,820
10	2013	0	36,000,934	36,000,934	12,982,298	0	12,982,298
11	2014	0	38,797,172	38,797,172	12,491,651	0	12,491,651
12	2015	0	41,593,345	41,593,345	11,957,093	0	11,957,093
13	2016	0	41,593,345	41,593,345	10,675,976	0	10,675,976
14	2017	0	41,593,345	41,593,345	9,532,121	0	9,532,121
15	2018	0	41,593,345	41,593,345	8,510,822	0	8,510,822
16	2019	0	41,593,345	41,593,345	7,598,949	0	7,598,949
17	2020	0	41,593,345	41,593,345	6,784,776	0	6,784,776
18	2021	0	41,593,345	41,593,345	6,057,835	0	6,057,835
19	2022	0	41,593,345	41,593,345	5,408,782	0	5,408,782
20	2023	0	41,593,345	41,593,345	4,829,269	0	4,829,269
21	2024	0	41,593,345	41,593,345	4,311,848	0	4,311,848
22	2025	0	41,593,345	41,593,345	3,849,864	0	3,849,864
23	2026	0	41,593,345	41,593,345	3,437,378	0	3,437,378
24	2027	0	41,593,345	41,593,345	3,069,088	0	3,069,088
25	2028	0	41,593,345	41,593,345	2,740,257	0	2,740,257
26	2029	0	41,593,345	41,593,345	2,446,658	0	2,446,658
27	2030	0	41,593,345	41,593,345	2,184,516	0	2,184,516
28	2031	0	41,593,345	41,593,345	1,950,461	0	1,950,461
29	2032	0	41,593,345	41,593,345	1,741,483	0	1,741,483
30	2033	0	41,593,345	41,593,345	1,554,895	0	1,554,895
31	2034	0	41,593,345	41,593,345	1,388,300	0	1,388,300
	Total	158,000,000	1,094,007,925	936,007,925	233,683,993	158,000,000	75,683,993

EIRR= 0.12000

APPENDIX 5

Appendix 5

CEPA-JICA STUDY
FOR
PORT REACTIVATION
IN
LA UNION PROVINCE

- Draft FINAL REPORT -

September 1998

Progress of the Study

- Related Data and Information
- Master Plan (2015)
- Short-Term Plan (2005)

Basic Roles of the Master Plan

- Guideline for Development of Port Facilities (long/short-term)
- Guideline for Port Administration (and Vital Source of Information for Private Sector)
- Coordination with Other Public Plans and Works

Background for the Port of La Union

- Creation of "National Port System"
 - *Acajutla: the largest (bulk) near S. Sal, but container flows to Quetzal due to swell*
 - *Cutuco: closed, but has good natural and geographical conditions*
- Development of Eastern Region
 - *economically far behind other regions affected by the civil war*
 - *few projects such as "Dry Canal"*

Expected Function for the Port of La Union (1)

- Handle Pacific Cargo with Acajutla
 - cf. Atlantic ports: keener competition*
 - Pacific: Quetzal (reliable & efficient)*
 - S. Lorenzo (nat. and environ. constraints)*
- Share Cargo with Acajutla
 - La Union: container for the country*
 - others for east. region (7 provinces)*
 - Acajutla: general, dry and liquid bulk for west./cent. region (7 provinces)*

Expected Function for the Port of La Union (2)

- Cope with Containerization
 - Import^(*): 25%('85), 56%('96),... 80% (2015)*
 - Export^(**): 30%('85), 80%('96),... 90% (2015)*
 - (*) iron, vehicle; (**) bagged sugar excluded*
- Alternate to Acajutla
 - *complement the capacity of Acajutla*
 - *alternate in the event of a big earthquake*
 - *handle high, long and heavy cargoes*

Expected Function for the Port of La Union (3)

- Contribute to Development of the Eastern Region
- reduce the economic gap with w./c. regions (GDP/cap: much lower, but... population: 30%, past cargo share: 20%)
- ex.: shrimp, tuna product (P.G.), melon(H.)
- im.: goods for improvement of daily life...
- development of new EPZs utilizing the port

Development of the Port of La Union

- New Port: container for the country & other cargoes for eastern region
- Cutuco: no appropriate proposal for concession, totally utilized for the new port
- Punta Gorda: fishing port as originally designed (with Spanish investment)

Important Aspects for the Port of La Union

- Based on Acajutla's Experience -
for Progress of Containerization

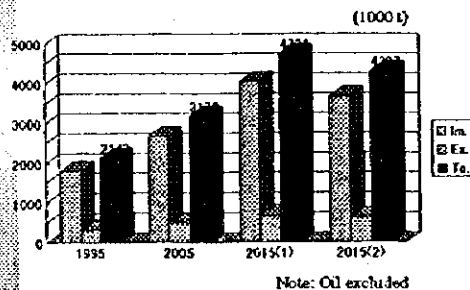
- High Efficiency
 - modern handling system
 - well-trained workers
- Reliability
 - free from swells
 - priority berth for container-liner
- Competitive Tariff
 - against neighboring ports (Quetzal)

Traffic Projection (1)

- Socio-economic Framework
 - Population: 1.4-2.1% (M. of Economy)
 - GDP: (IDB and Past Performance)
 - Case 1: 5.0%(-2005), 5.0%(-2015)
 - Case 2: 5.0%(-2005), 3.5%(-2015)
- Cargo Forecast
 - Macro & Micro forecast by Cargo Type
- Ship Forecast
 - General (Container) ship & Bulk ship

Traffic Projection (2)

- for Salvadoran Sea Borne Cargo -



Traffic Projection (3)

- Others
 - Quetzal
 - 80 boxes/week transit container
 - El S.: H.:N. = 4:1:1
 - EPZ (100ha)
 - new EPZs in e.r. (inc. Usulután, 30ha)
 - cf. 6 existing EPZs in w./c. r. (200ha)
 - neighboring South Honduras
 - 50% of S. Lorenzo container
 - Domestic oil distribution from Acajutla
 - half volume by sea and the other by land

Traffic Projection (4)

■ Share and Cargo Vol. of La Union

Total Cargo (Case 1, 2): (x 1000 ton)
 2005: 20%^(*); 980 (1), 980 (2)^(**)
 2015: 30%^(*); 2230 (1), 1970 (2)^(**)

Container: - Acajutla cap. 40^(***) (x 1000 TEU)

2005: 47 (1), 47 (2)
 2015: 159 (1), 130 (2)

(*) Container excluded. (**) Domestic oil sea transportation from Acajutla to La Union included.
 (***) In 1995, 32 containers handled at Acajutla. "

Physical Requirements (1)

- the same for Case 1 & 2 -

■ Ship size

Container (General): 40-50,000 DWT

Bulk (Solid and Liquid): 40-50,000 DWT

■ Berth Dimension and Number^(*) (2015)

Container: -13(-14)m x 300m x 1B

2 x gantry crane, 12 ha terminal area

Bulk: -13(-14)m x 260(-280)m x 2B^(**)

(*) conventional cargo handling adopted with exception of container. (**) 1B for 2005 "

Physical Requirements (2)

- the same for Case 1 & 2 -

■ Water Facilities

	2005	2015
berthing place	-13 m	-13 m
turning basin*	-11 m ^(**)	-13 m
inner channel**	-11 m ^(**)	-12 m ^(**)
outer channel**	-11 m ^(**)	-13 m

(*) diameter = 2L, (**) width = 0.5L, L=300m
 (***) Tidal benefit is fully utilized.

■ Road Network including Bypass Road

■ Land Use: as much will be utilized as possible "

Project Alternatives

■ Between Cutuco and Punta Gorda (A-1)
no future expansion

■ To the east of Punta Gorda (B-1, 2, 3)
longer road access, shorter channel, future expansion, coordination with development plans of tourism (CORSAIN,B-1), power plant (CEL,B-2), existing private piers (3)

■ Around Cutuco (C-1, 2, 3)
shorter road access, longer channel (but less dredging), future expansion utilizing Cutuco "

Natural Condition & Structural Design

- Tide: 3.0 m
- Current: max. 1.4m/sec
- Wave: less than 0.3 m in height
- Subsoil: hard layer with N=30 or more, surface layer of clay with N=0
- Seismicity (design seismic coefficient method): kh=0.15
- Design Load: equipment and others
- Structure Type: gravity type cf. Acajutla "

Overall Evaluation of Master Plan (2015)

- B-3 is recommended.
 other public projects are also possible.
- C-3 also deserves consideration.
 as the Cutuco site is now available.
- For the Short Term Plan,
 a more economical plan will be examined. "

Implementation Work & Construction Cost

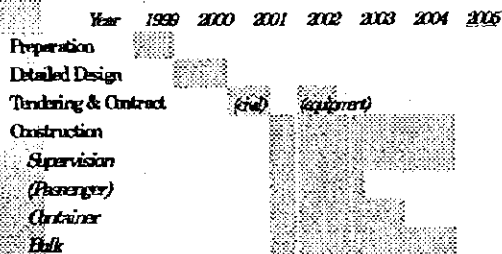
- Opening Schedule
 - *Container Terminal: at once*
 - *Bulk Terminal (1st): as soon as possible*
 - *Bulk Terminal (2nd): - 2009(1), -2010(2)*
- Cost Estimate (for Master Plan) :
 - *min. US\$ 150-60 million for B-3 & C-3*
- Implementation Work:
 - *D/D (10%), Construction Supervision*
 - *Construction (Civil Work, Equipment)*

Short Term Physical Plan (2005)

- for Alternative *B-3 & C-3* -

- *One Container & One Bulk Terminal*
- *West Revetment for Passenger Cruisers up to 15,000GT (-7.5m x 220m)*
- *Full Utilization of Tidal Benefit (3m) dredging up to -11m (M/P: -13m)*
- *Future Expansion for Land Use reservation of adjacent area for port use*
- *Access Road Bypassing Town Area crucial requirement for port users*

Short Term Implementation (2005)



Short Term Cost Estimate (2005)

- *B-3: US \$ 101 million*
- *C-3: US \$ 94 million*
- *Cost Savings*
 - *Site materials for landfill, Reduction of dredging & mobilization, Structural review*
- *Cost Increase*
 - *Fenders for passenger cruisers, bypass-road, 2 tugboats, land acquisition*

Economic Analysis (1)

- *Comparison: "With" and "Without case"*
- *Cost (C): Construction, Renewal, Maintenance, Operation costs*
- *Benefit (B): Land transportation, Handling costs at foreign ports, Handling and land transport of foreign container*
- *(Others) Job generation (400 for construction, 450 for port operation, more than 5 times for port related industries), Regional development (10,000 for EPZ), Savings in interest costs, etc.*

Economic Analysis (2)

- *Calculation of EIRR*
 - *B-3: 13.4% - 17.3% (") (") C+10%, B-10%*
 - *C-3: 14.2% - 18.2% (") (") Base Case*
- *Net Present Value (NPV)*
 - *B-3: US\$ 32(12)-117(8) million () Discount Rate*
 - *C-3: US\$ 37(12)-122 (8) million*
- *Benefit Cost Ratio (BCR)*
 - *B-3: 1.36(12)-2.03(8) () Discount Rate*
 - *C-3: 1.44(12)-2.13(8)*

Financial Analysis (1)

- Cost : *Investment cost, Operational cost (personnel, administration, maintenance & repair cost)*
- Revenue : *Tariff based on present Acajutla with revisions to compete with Quetzal (cont.)*
- Calculation of FIRR of the project
 - B-3: 5.9% - 8.7% (*) (*) C+10%, B-10%
 - C-3: 6.3% - 9.3% (*) (*) Base Case
- Fund Raising : 3.525% (weighted average) = 2.2% x 75% (25-7 yrs) + 7.5% x 25% (12 yrs)

Financial Analysis (2)

- Financial soundness of port management body
 - Profit and Loss Statement, Cash Flow Statement & Balance Sheet*
- Good Performance in a few yrs after oper.
 - Profitability (the rate of return on net fixed assets), Loan repayment capacity (the debt service coverage ratio) & Operation efficiency (the operation ratio and working ratio)*

Basic Understanding on Public Ports

- *El Salvador has only 2 ports* -

- Economic and Social Infrastructure
- Basic Roles of Public Sector

*Port Owner
Policy Making
Overall Port Management for Public Use
Arrangement of Basic Facilities
Contribution to Regional Development*

Modernization of CEPA

- Formulation of basic policy and plan for national ports
- Utilization of statistics for marketing and port planning
- Overall enhancement of organization "autonomous" (decision-making)
 - executive, administration, planning, technical, marketing, environment...*

Conditions for Private Sector Involvement (*)

- Public Sector provides ...
 - basic infrastructure such as piers, channel, major equipment, access roads (national, local)...*
 - and incentives to create an attractive and competitive environment*
- ... and retains overall control
 - (*) many small users are also expected to be involved*

Expected Role of the Office of La Union (CEPA)

- Authority to control port activities
- Know-how cultivated in Acajutla

Category	Short Term	Long Term
Overall Supervision	CEPA	CEPA
Administrative Operation	CEPA	Private
Cargo Handling Service	Private	Private
Ship Service	CEPA	Private
Navigation Safety	MDR(MDD)	MDR(MDD)
Security Service	CEPA	CEPA
CIQ Service	CIQ office	CIQ office

Initial Environmental Examination (IEE)

- **Environmental Policy**
1997 Ministry of Environment (MENR)
1998 Comprehensive environmental law
- **Current Situation around the Bay**
Water pollution, solid wastes, deforestation, and river sediments
- **Port related or City related**
Disposal of dredged material, Treatment of private facilities

31

Environmental Impact Assessment (EIA)

- **Air, Noise and Smell**
A new road bypassing the town area
- **Water Quality**
Sewage processing system in the city
- **Displacement of Villages and Facilities**
Coordination concerning private piers (B-3)
- **Disposal of Dredged Material**
Reduction of material, use of silt protector, appropriate disposal site & monitoring system.

32

Overall Evaluation for Short Term Plan (2005)

- *Engineering Aspect "good"*
- *Economic Feasibility "good"*
- *Financial Feasibility "good"*
- *Environmental Aspect "good"*
- *C-3 is preferable to B-3 due to its lower construction cost and full utilization of existing Cutuco*

33

Recommendation

- *Responsibility as public sector*
- *Enhancement of CEPA function*
- *Preparations for the new port*
- *Contribution to regional and national development*
- *Overall administration of port development based on the Maser Plan*
- *Environmental consideration*

34

Report (Schedule)

- 97.11 Inception Report
- 98. 1 Progress Report
- 98. 5 Interim Report
- 98. 9 Draft Final Report
(and Summary)
- 98.12 Final Report
(..... and Project Implementation)

35

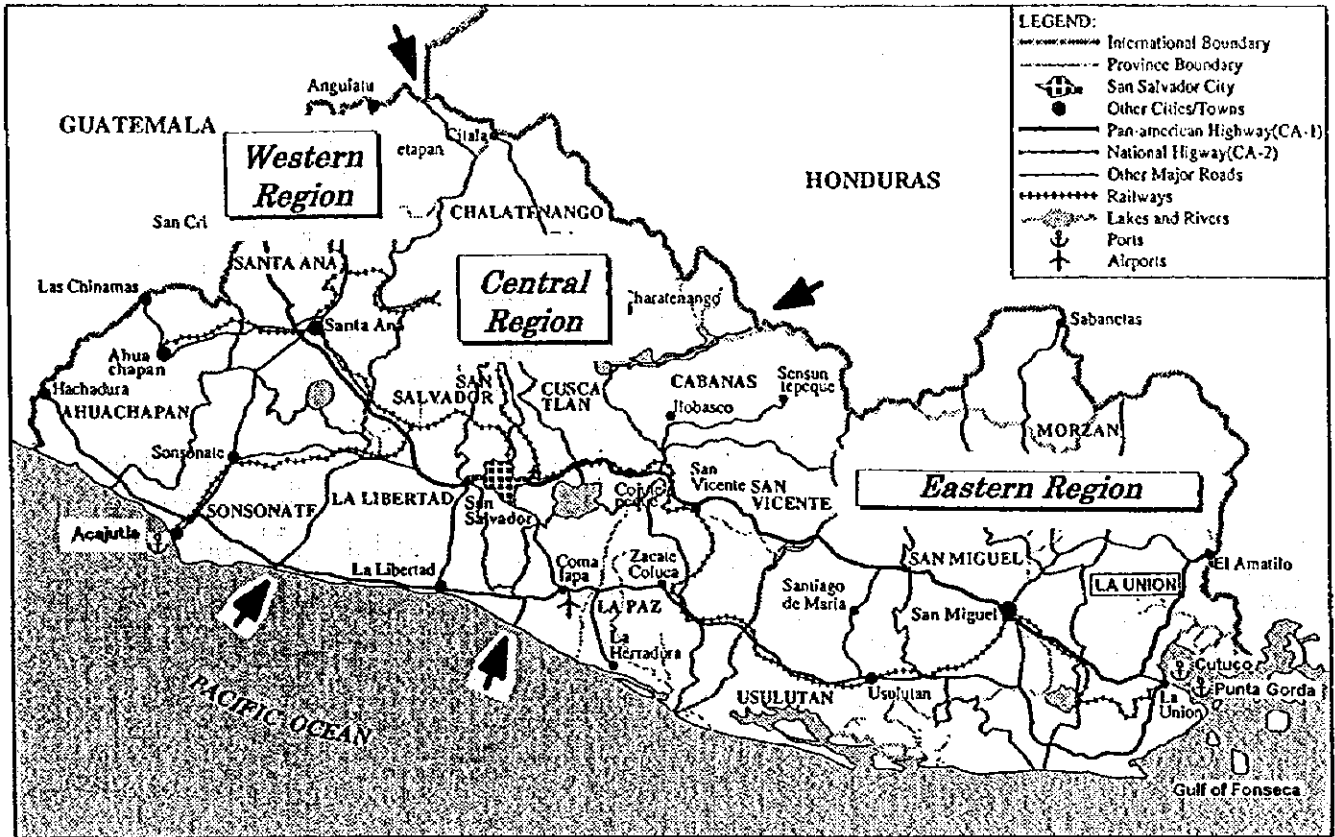


Figure 1 Western Region, Central Region, and Eastern Region

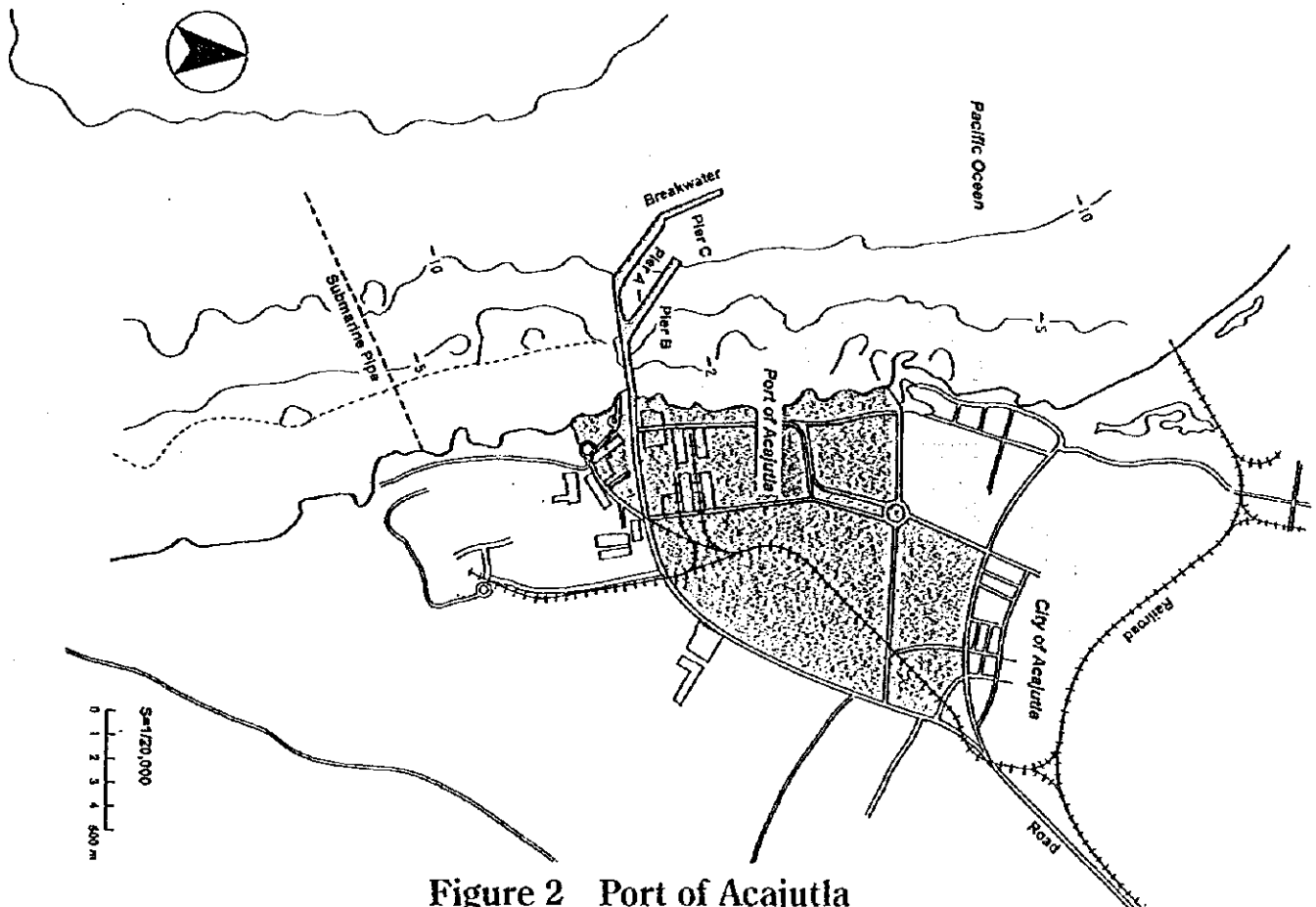


Figure 2 Port of Acajutla

Figure 3 Master Plan : Alternative Layout Plans (Site-A, B and C)

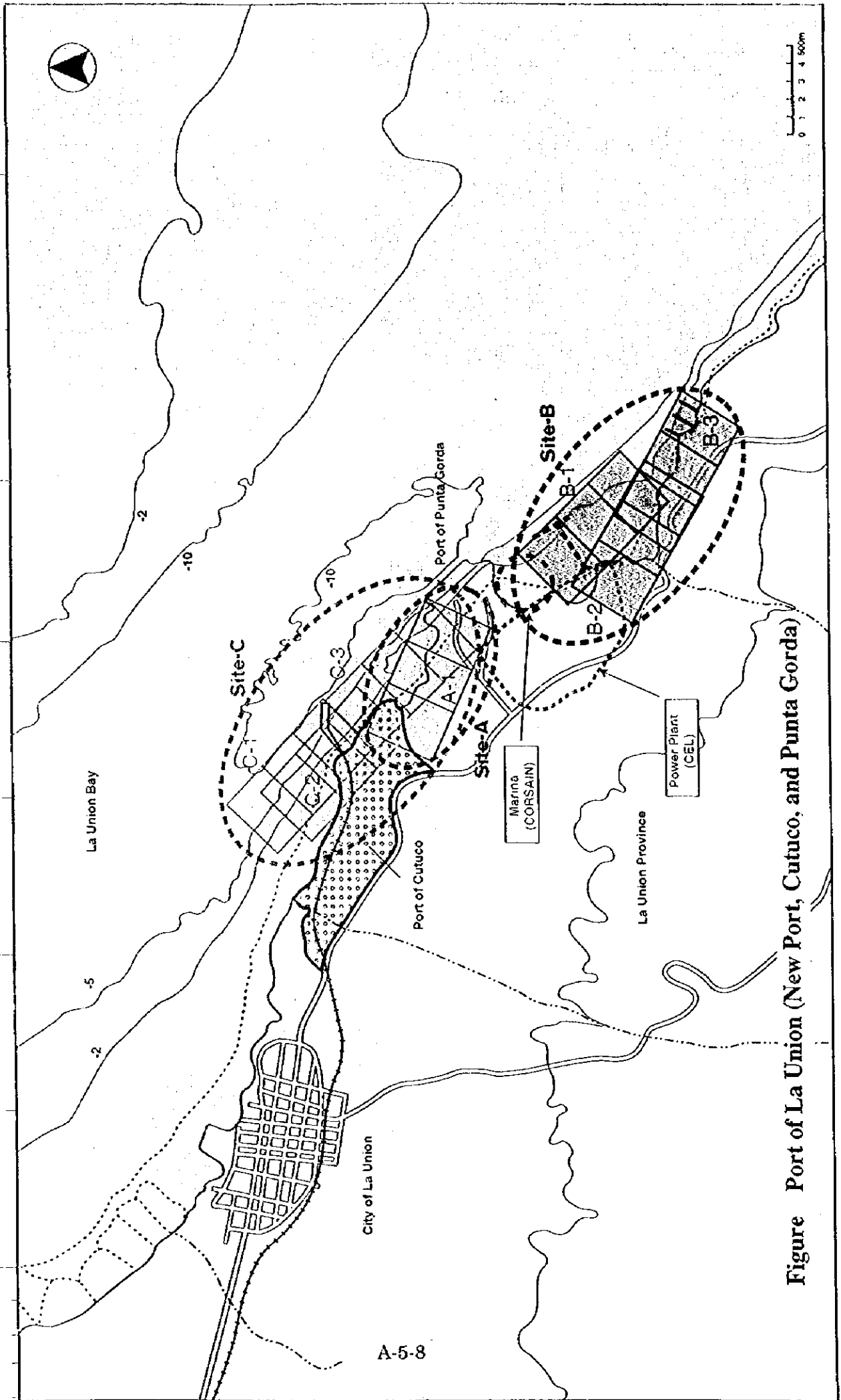
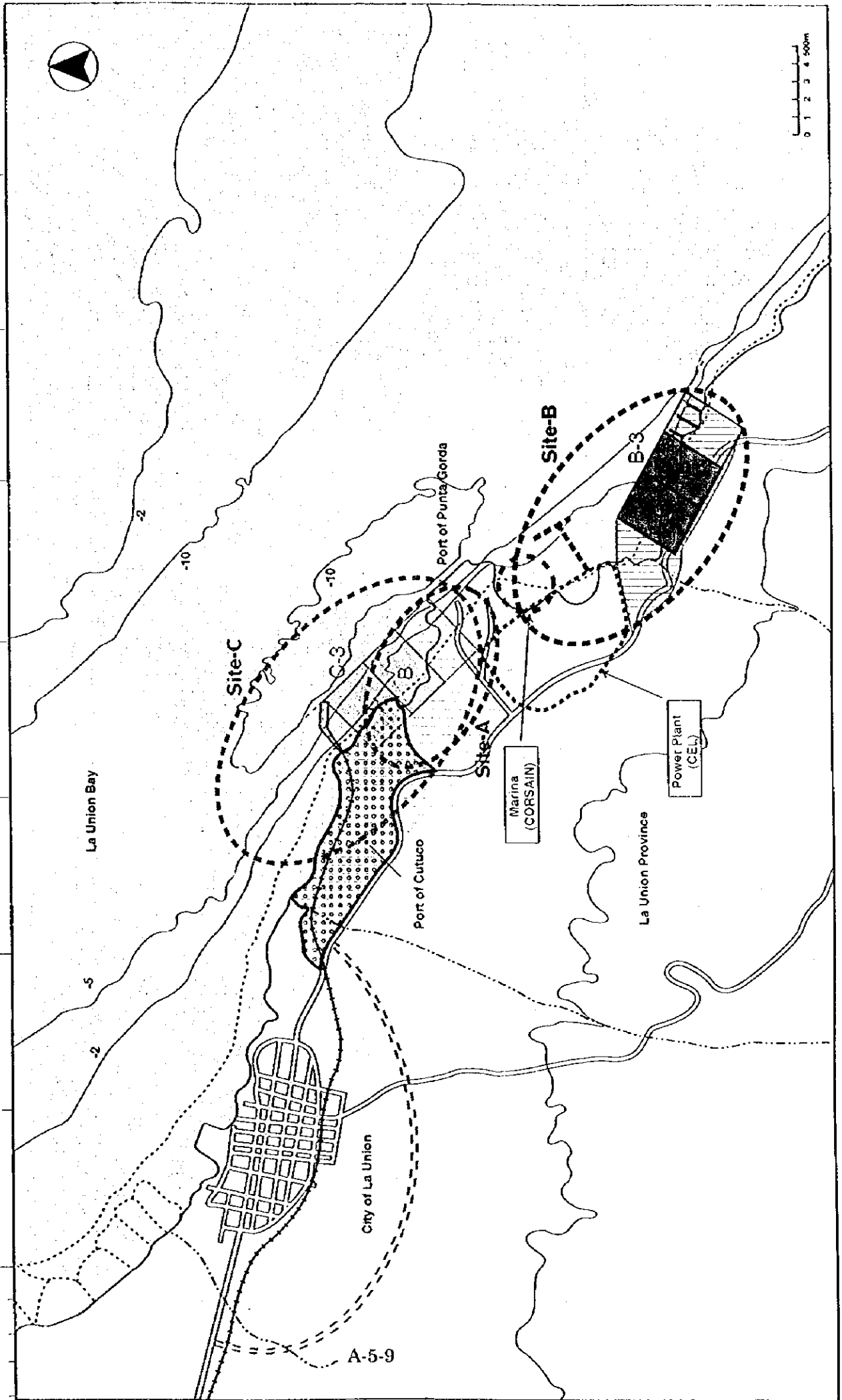


Figure Port of La Union (New Port, Cutuco, and Punta Gorda)

Figure 4 Short Term Plan : Alternative B-3 and C-3

– Container Terminal (C) and Bulk Terminal (B) –



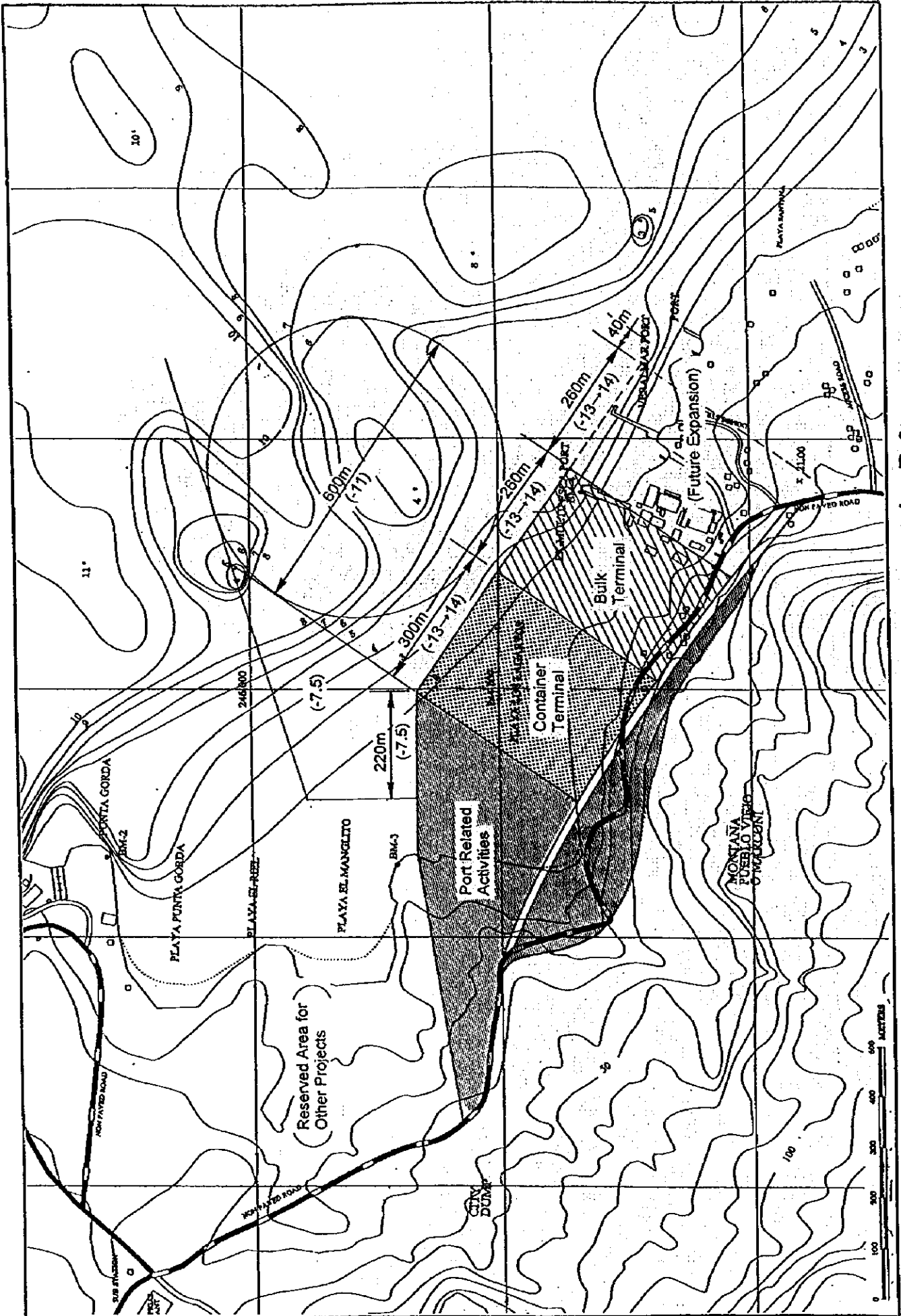


Figure 5 Layout Plan for Alternative B-3

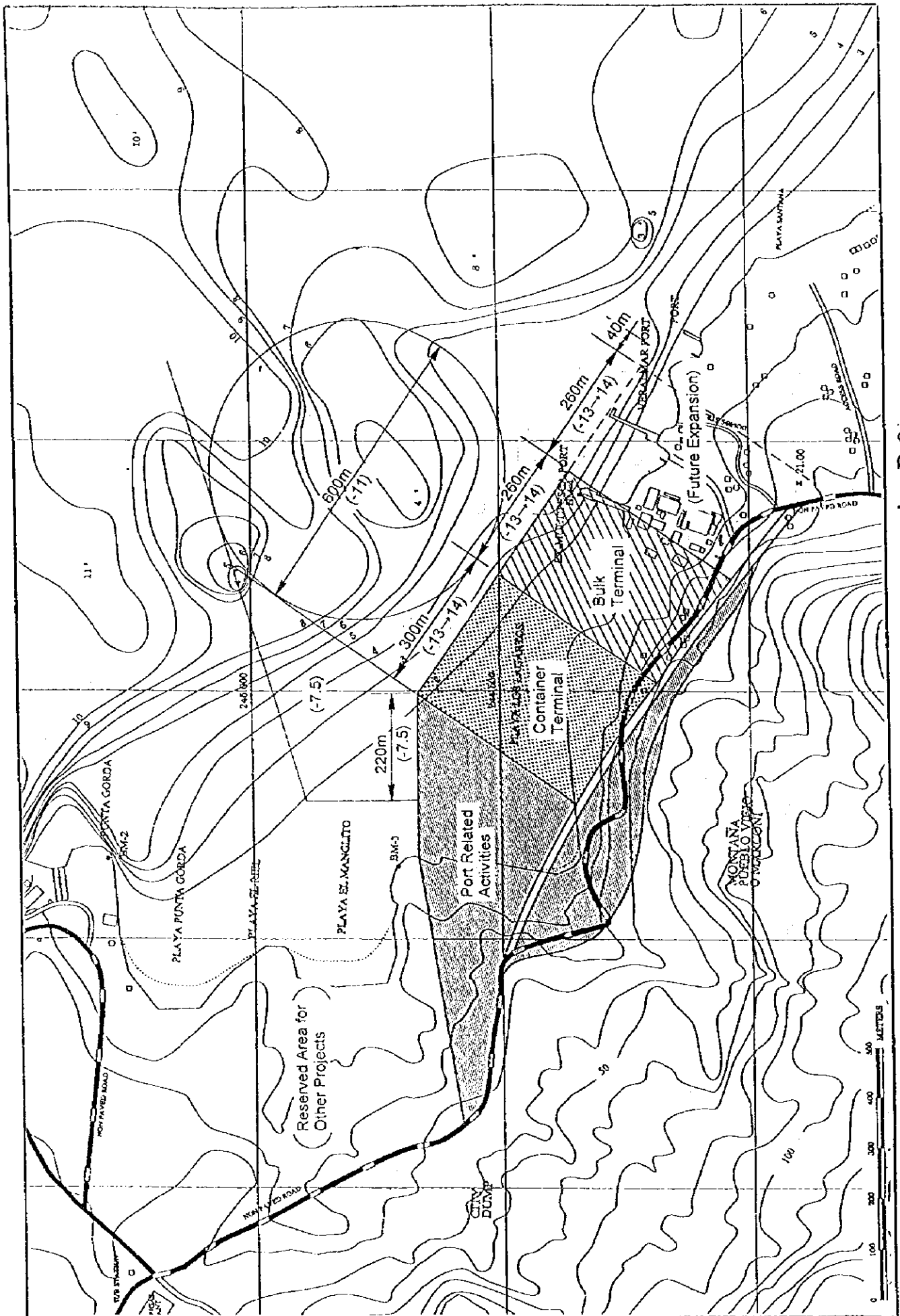


Figure 5 Layout Plan for Alternative B-3

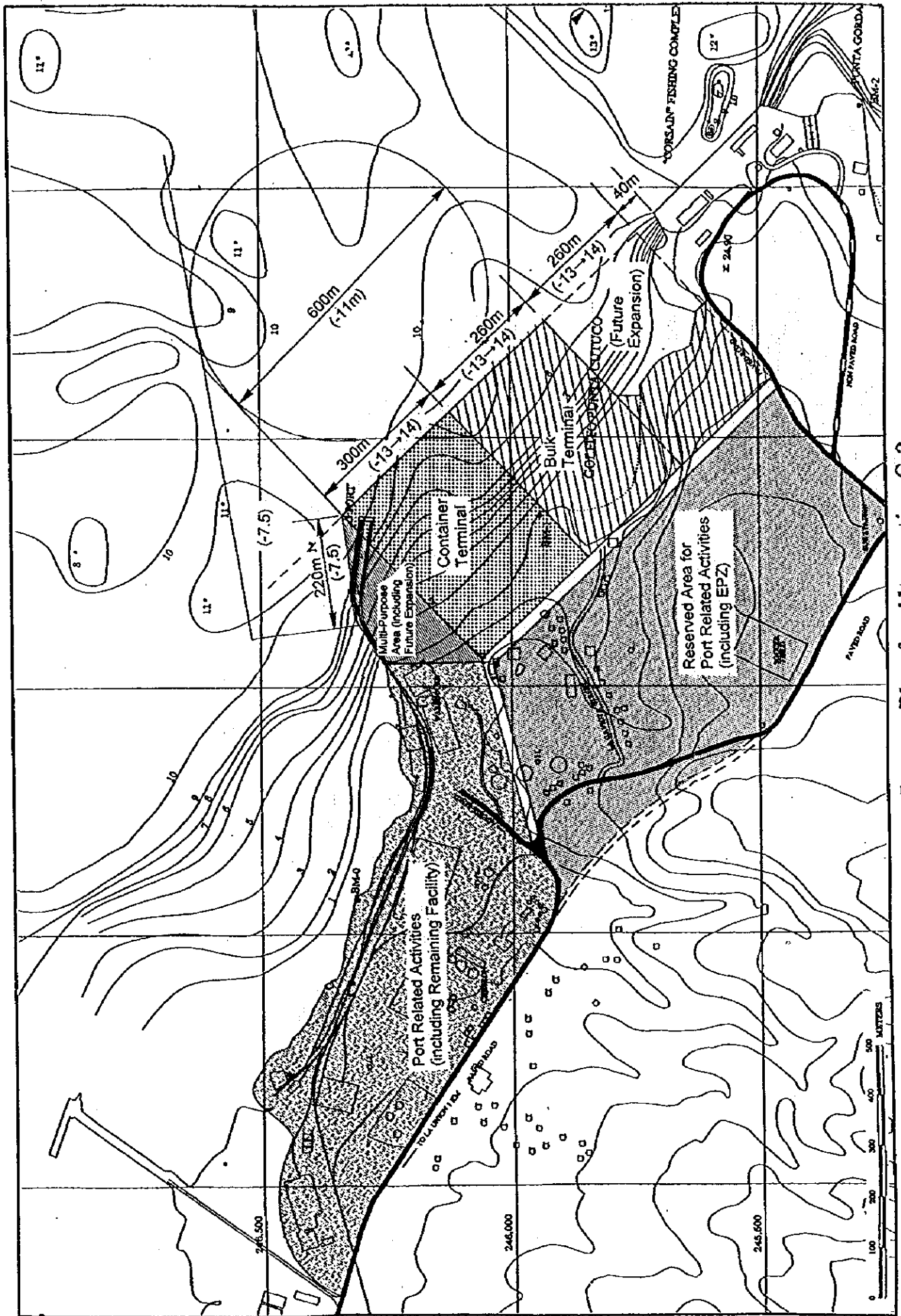


Figure 6 Layout Plan for Alternative C-3

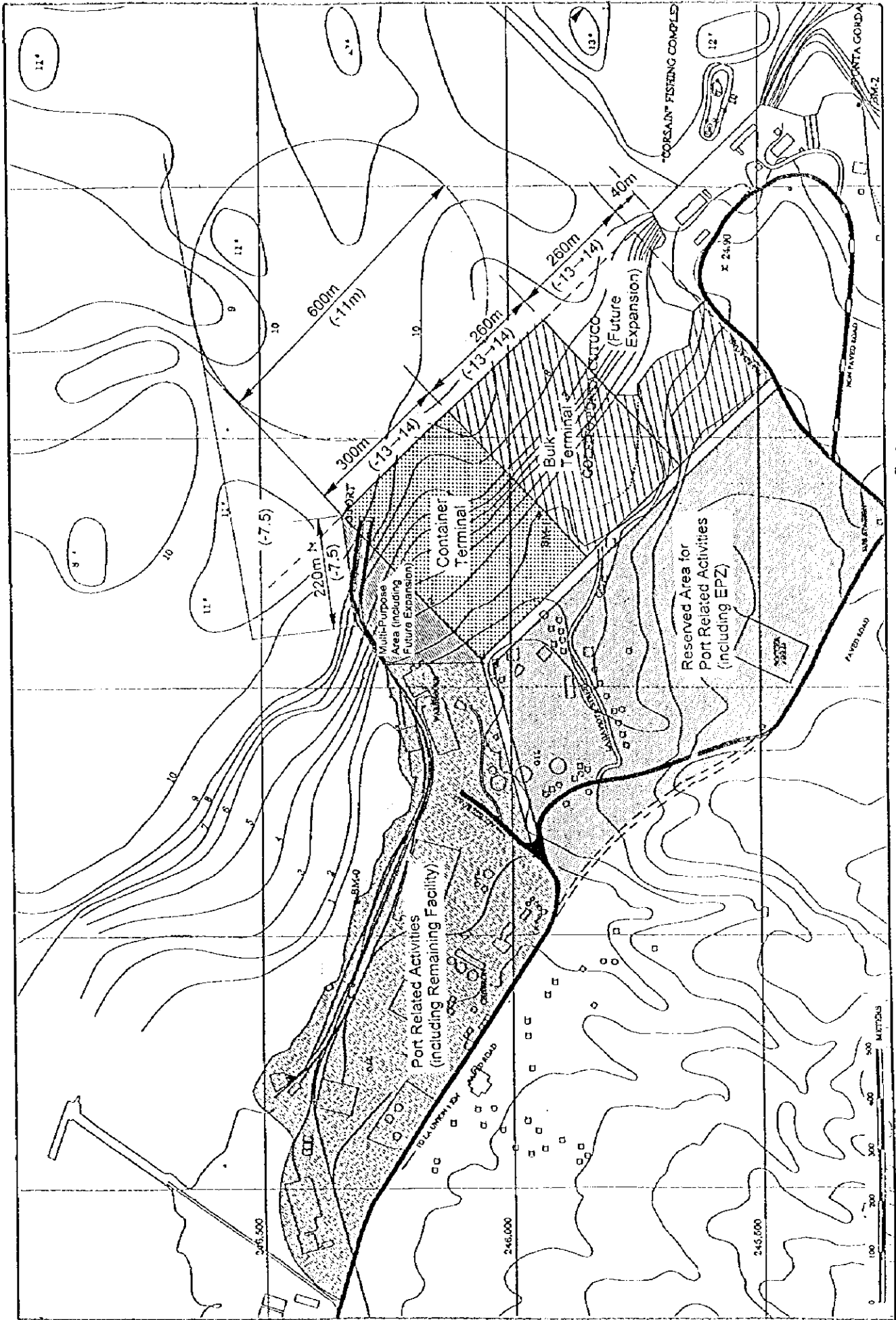


Figure 6 Layout Plan for Alternative C-3

APPENDIX 6

Appendix 6

ESTUDIO CEPA-JICA PARA

LA REACTIVACION PORTUARIA EN EL DEPARTAMENTO DE LA UNION

- Borrador de REPORTE FINAL -
Septiembre 1998

Progreso del Estudio

- Recopilación de Información y Datos Relacionados
- Plan Maestro (2015)
- Plan de Corto Plazo (2005)

Funciones Básicas del Plan Maestro

- Lineamientos para el Desarrollo de Facilidades de Puerto (corto/largo plazo)
- Lineamientos para Administración Portuaria (y la Fuente Vital de Información para el Sector Privado)
- Coordinación con Otros Planes y Trabajos Públicos

Antecedentes del Puerto de La Unión

- Creación del Sistema Nacional Portuario
 - Puerto de Acajulla: El puerto más grande (de granel) cercano a S. Salv., pero Contenedores fluyen al puerto Quetzal debido al oleaje
 - Puerto de Cutuco: cerrado, pero con buenas condiciones naturales y geográficas
- Desarrollo de la Región Oriental
 - Económicamente Lejos de Otras Regiones.
 - Afectado por la Guerra Civil.
 - Pocos Proyectos como el "Canal Seco"

Funciones Esperadas para el Puerto de La Unión (1)

- Manejar Carga del Pacífico con Acajulla
 - Puertos del Atlántico: Competencia Fuerte
 - Puertos del Pacífico:
 - Quetzal (confiable y eficiente)
 - San Lorenzo (limitantes nat. y ambient.)
- Compartir Carga con Acajulla
 - La Unión: contenedores para el país otros para la región oriental (7 deptos.)
 - Acajulla: general, granel seco y líquido para la región oeste/central (7 deptos.)

Función Esperada para el Puerto de La Unión (2)

- Cooperar con la Contenedorización
 - Import. (*): 25%(85), 56%(96),... 80% (2015)
 - Export. (**): 30%(85), 80%(96),... 90% (2015)
 - (*): hieno, vehiculo. (**) azúcar en bolsa excluida
- Alternativo a Acajulla
 - Complementar la Capacidad de Acajulla
 - Puerto alternativo en el caso de un gran terremoto
 - Manejar cargas altas, grandes y pesadas

Función Esperada para el Puerto de La Unión (3)

- Contribuir al Desarrollo de la Región Oriental
 - Reducir la disparidad económica con las regiones centro y occidental.
 - (PIB/cap.: muy bajo, pero... población 30%, carga manejada en el pasado: 20%)
 - exp.: camarón, atún (P. Gorda), melón (Honduras)
 - Imp.: bienes para mejorar la calidad de vida
 - Desarrollo de nuevas Zonas Francas que utilizarán el puerto

Desarrollo del Puerto de La Unión

- **Nuevo Puerto:** manejará todos los contenedores del país y otras cargas de la región oriental.
- **Cutuco:** ninguna propuesta apropiada para la concesión. El área será utilizada totalmente para el nuevo puerto.
- **Punta Gorda:** puerto pesquero, tal como se diseñó (con inversión española)

Aspectos Importantes para el Puerto de La Unión

- Basado en Experiencia de Acajutla -

Para el Progreso de Contenedorización

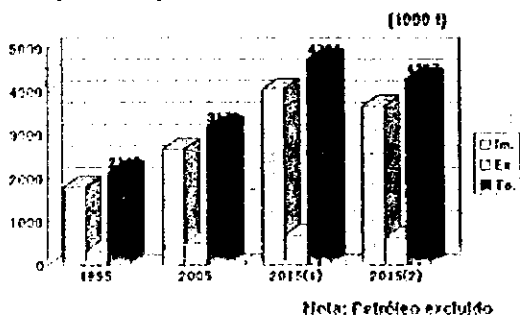
- Alta Eficiencia
 - Sistema de manejo moderno
 - Mano de obra calificada
- Confiabilidad
 - Libre de fuerte oleaje
 - Muelle prioritario para línea de contenedores
- Tarifa Competitiva
 - Contra puertos vecinos (Quezaltenango)

Proyecciones de Trafico (1)

- Marco Socio-económico
 - Población: 1.4-2.1% (M. de Economía)
 - PIB: (BID y Datos Históricos)
 - Caso 1: 5.0%(-2005), 5.0%(-2015)
 - Caso 2: 5.0%(-2005), 3.5%(-2015)
- Pronóstico de Carga
 - Pronóstico Macro y Micro por Tipo de Carga
- Pronóstico de Buque
 - Buque de carga General (Contenedores) y Barcos Graneleros

Proyecciones de trafico (2)

- para Carga Marítima de El Salvador -



Proyecciones de Trafico (3)

- Otros Aspectos
 - Quezaltenango 80 contenedores de tránsito/semana, de y hacia El Salv.:Hond.:Nica. = 4:1:1
 - Zonas Francas(100ha), Nuevas Zonas Francas en r.o. (inc. 30 ha en Usulután) Ref. 8 Zonas Francas existentes en r.occ. /c. (200 ha)
 - Colindante con el Sur de Honduras 50% de los contenedores de San Lorenzo.
 - Distribución Interna de Petróleo desde Acajutla. Mitad del volumen por vía marítima y el otro por vía terrestre

Proyecciones de Trafico (4)

■ La Unión en el Volumen de Carga

- Carga Total (Caso 1, 2): (x 1000 ton)
2005: 20%^(*); 980 (1), 980 (2)^(**)
2015: 30%^(*); 2230 (1), 1970 (2)^(**)
- Contenedor: - Cap.de Acajutla 40^(**) (x 1000 TEU)
2005: 47 (1), 47 (2)
2015: 159 (1), 130 (2)

(*) Contenedor excluido. (**) Se incluye la Transportación Interna de Petróleo vía marítima desde Acajutla a La Unión.
(***) En 1995, 32 contenedores fueron manejados en Acajutla.

11

Requerimientos Físicos (1) - Lo Mismo para Caso 1 y 2 -

- Tamaño de Barco
Contenedores (General): 40-50,000 DWT
Carga a Granel (Sólido y Líquido): 40-50,000 DWT
- Dimensiones de Muelles y Número^(*) (2015)
Contenedores: -13(-14)m X 300m X 1M
2 X Grúas de Fórtico, 12 ha Area de Terminal
Graneles: -13(-14)m X 260(-280)m X 2 M^(*)
(*) se ha adoptado manejo convencional de carga exceptuando contenedores. (**) 1 M para 2005

11

Requerimientos Físicos (2) - lo mismo para el caso 1 y 2 -

■ Instalaciones Marítimas

	2005	2015
en Muelle	- 13 m	- 13 m
en Dársena	- 11 m ^(**)	- 13 m
en Canal Interior ^(*)	- 11 m ^(**)	- 12 m ^(**)
en Canal Exterior ^(*)	- 11 m ^(**)	- 13 m

(*) diámetro = 2L, (**) ancho = 0.5L, L=300m
(***) el Beneficio de la Marea es Utilizado totalm.

- Red Vial Incluyendo Carretera Perimetral
- Uso de Terreno: se utilizará a lo máximo posible.

15

Alternativas de Ubicación del Proyecto

- Entre Cutuco y Punta Gorda (A-1)
no hay posibilidad de expansión en el futuro
- Al este de Punta Gorda (B-1, 2, 3)
carretera de acceso mas larga, canal de acceso mas corto, posibilidad de expansión futura, coordinación con planes de turismo (CORSAIN B-1), plantas de energía (CEL B-2), existencia de tres muelles privados(B-3)
- Alrededor de Cutuco (C-1, 2, 3)
carretera de acceso corta, canal mas largo (pero menos dragado), expansión futura utilizando Cutuco

16

Condición Natural y Diseño Estructural

- Marea: 30m
- Corriente: max. 1.4m/seg.
- Olas: menor que 0.3 m en altura
- Subsuelo: capa sólida N= 130 o mas, capa superior de arcilla N=0
- Sismicidad: (Método de diseño a base de Coeficiente Sísmico) Kh=0.15
- Carga de Diseño: equipo de manejo de carga y otros
- Estructura: tipo de gravedad, ref. Acajutla

17

Evaluación Total del Plan Maestro (2015)

- B-3 es recomendada.
..... otros proyectos públicos son también posibles
- C-3 también merece consideración.
.... Como el terreno de Cutuco esta ya disponible.
- Para el Plan de Corto Plazo,
un plan mas economico sera examinado.

18

Cronograma de Ejecución y Costos de Construcción

- Cronograma de Ejecución
 - Terminal de Contenedores: de inmediato
 - 1ra. Terminal de Graneles: tan pronto como sea posible
 - 2da. Terminal de Graneles: 2009(1), 2010(2)
- Costo Estimado (para Plan Maestro):
 - mínimo US\$ 150-60 millones para B-3 y C-3
- Ejecución de la Obra:
 - D/D y Supervisión de Construcción (10%)
 - Construcción (Obra civil, equipos)

19

Plan Físico de Corto Plazo (2005)

- Para Alternativas B-3 y C-3 -

- Una Term. Contenedores y una Term. Granel
- Lado oeste de relleno de terreno para Cruceros de Pasajeros.
- hasta 15,000GT (-7.5m X 220m)
- Utilización Máxima de Beneficio de Marea (3m)
- dragado hasta -11m (MP: -13m)
- Expansión Futura para Uso de Tierra.
- reservación de area adyacente para uso portuario
- Carretera de Acceso, perimetral a la ciudad.
- requerimiento crucial para usuarios del puerto

20

Cronograma de Ejecución de Corto Plazo (2005)

Año	1999	2000	2001	2002	2003	2004	2005
Preparación							
Diseño Detallado							
Licit. y Contrato			(civil)	(equipo)			
Construcción							
Supervisión (Pasajeros)							
Contenedores							
Graneles							

21

Costo Estimado de Corto Plazo (2005)

- B-3 : US \$ 101 millones
- C-3 : US \$ 94 millones
- Ahorro de Costo.
 - Mat. para relleno de terreno, Reducc. del volumen de dragado y Costo de preparacion, Estructura mas economica.
- Incremento de costo
 - Defensas para Cruceros de Pasajeros, Carretera Perimetral, 2 Remolcadores, Adquisición de Terreno.

22

Análisis Económico (1)

- Comparación: "con" y "sin caso"
- Costo (C): Construcción, Renovación, Mantenimiento, Costos Operacionales
- Beneficio (B): Transportación Terrestre, Costos de Manejo en Puertos Extranjeros, Manejo y Transportación Terrestre de Contenedores Extranjeros
- (Otros) Generación de Empleos (400 para construcción, 450 para operación de puerto, más de 5 veces para las industrias relacionadas con el puerto).
- Desarrollo Regional (10,000 para Zonas Francas).
- Ahorro de Costos por Intereses, etc.

23

Análisis Económico (2)

- Tasa Interna de Retorno Económico (EIRR)
 - B-3: 13.4(7) - 17.3 % (7) (7) C+10%, B-10%
 - C-3: 14.2(7) - 18.2 % (7) (7) Caso Base
- Valor Neto Actual (NPV)
 - B-3: US\$ 32(12)-117(8) millones () tasa de
 - C-3: US\$ 37(12)-122 (8) millones descuento
- Tasa de Costo Beneficio (BCR)
 - B-3: 1.36(12)-2.03(8) () Tasa de descuento
 - C-3: 1.44(12)-2.13(8)

24

Análisis Financiero (1)

- Costo : Costo de Inversión, Costo operacional (personal, administración, mantenimiento y costo de reparación)
- Ganancia : Tarifa basada en Acajutla actual con revisiones para competir con Quetzal (Conf.)
- Tasa Interna de Retorno Financiero (FIRR)
 - B-3: 5.9% - 8.7% (*) (*) C+10%, B-10%
 - C-3: 6.3% - 9.3% (*) (*) Caso Base
- Recolección de Fondos : 3.525% (promedio esperado)
 - = 2.2% x 75% (25 años de pago y 7 años de gracia)
 - + 7.5% x 25% (préstamo de otra fuente, 12 años)

25

Análisis Financiero (2)

- Solidez Financiera para el
 - Cuerpo Administrativo del Puerto
 - Estado de Pérdidas y Ganancias, Flujo de Efectivo y Balance General.
- Buen Rendimiento en unos años después de operación.
 - Rentabilidad (la Tasa de Retorno en Activos Fijos Netos),
 - Capacidad de pago del préstamo (Tasa de Servicio de Cobertura de deuda) y Eficiencia de Operación (la Tasa de Operación y Tasa de Trabajo)

26

Comprensión Básica sobre Puertos Públicos

- El Salvador tiene solo dos puertos -

- Infraestructura Económica y Social
- Papel Básico del Sector Público

*Dueño de Puerto.
Formulación de Políticas.
Administración Gral. de Puerto para Uso Público.
Preparación de Instalaciones Básicas
Contribución al Desarrollo Regional*

27

Modernización de CEPA

- Formulación de Políticas Básicas y Plan para Puertos Nacionales
- Utilización de Estadísticos para Mercadeo y Planeación de Puerto.
- Refuerzo total de la Organización.
 - "autónoma" (Toma de Decisión)
 - ejecutivo, administración, planeación, técnico, mercadeo, medio ambiente...

28

Condiciones para Involucrar al Sector Privado(*)

- El Sector Público ofrece ...
 - Infraestructuras Básicas tales como: muelles, canales, equipos principales, Cameteras de Acceso (nacionales, locales)...
 - E incentivos para crear un ambiente atractivo y competitivo
 - ... y mantener el control total
- (*) Se espera muchos usuarios menores

29

Papel Esperado de la Oficina de La Unión (CEPA)

- Autoridades para controlar las actividades portuarias
- Know-how cultivado en Acajutla

Categoría	Corto Plazo	Largo Plazo
Supervisión Gral.	CEPA	CEPA
Operación Administrativa	CEPA	Privado
Servicio de manejo de carga	Privado	Privado
Servicio de buque	CEPA	Privado
Seguridad de Navegación	MOP(MOD)	MOP(MOD)
Servicio de seguridad	CEPA	CEPA
Servicio de CIQ	Oficina de CIQ	Oficina de CIQ

30

Examinación Ambiental Inicial (IEE)

- Política de Medio Ambiente
1997 *Ministerio del Medio Ambiente (MERN)*
1998 *Ley comprensiva del Medio Ambiente*
- Situación Actual alrededor de la Bahía
Contaminación del agua, desechos sólidos, deforestación, y sedimentos de ríos
- Relacionados con el Puerto o con la Ciudad
*Desecho de material dragado,
Atención a las instalaciones privadas*

24

Evaluación del Impacto Ambiental (EIA)

- *Aire, Sonido y Olor*
Una nueva Carretera Perimetral del área de la ciudad
- *Calidad del Agua*
Sistema de Alcantarillado en la ciudad
- *Reubicación de las Viviendas e Instalaciones.*
Coordinación concerniente a muelles privados (B-3)
- *Desecho de Material Dragado*
Reducción de material, red de protección contra esparcimiento de lodo, botadero apropiado y sistema de monitoreo.

25

Evaluación general para el Plan de Corto Plazo (2005)

- *Aspectos de Ingeniería "bueno"*
- *Facilidad Económica "bueno"*
- *Facilidad Financiera "bueno"*
- *Aspectos Ambientales "bueno"*
- *C-3 es preferible a B-3 debido a su bajo costo de construcción y el uso completo de Cutuco existente*

26

Recomendaciones

- *Responsabilidad como sector público*
- *Refuerzo de las funciones de CEPA*
- *Preparaciones para el nuevo puerto*
- *Contribución para el desarrollo regional y nacional*
- *Administración general del desarrollo portuario basado en el Plan Maestro*
- *Consideración Ambiental*

27

Reporte (del Progreso del Programa)

- 97.11 Reporte Preliminar
- 98. 1 Reporte de Progreso
- 98. 5 Reporte Intermedio
- 98. 9 Borrador del Reporte Final (y Resumen)
- 98.12 Reporte Final (..... e Implementación del Proyecto)

28

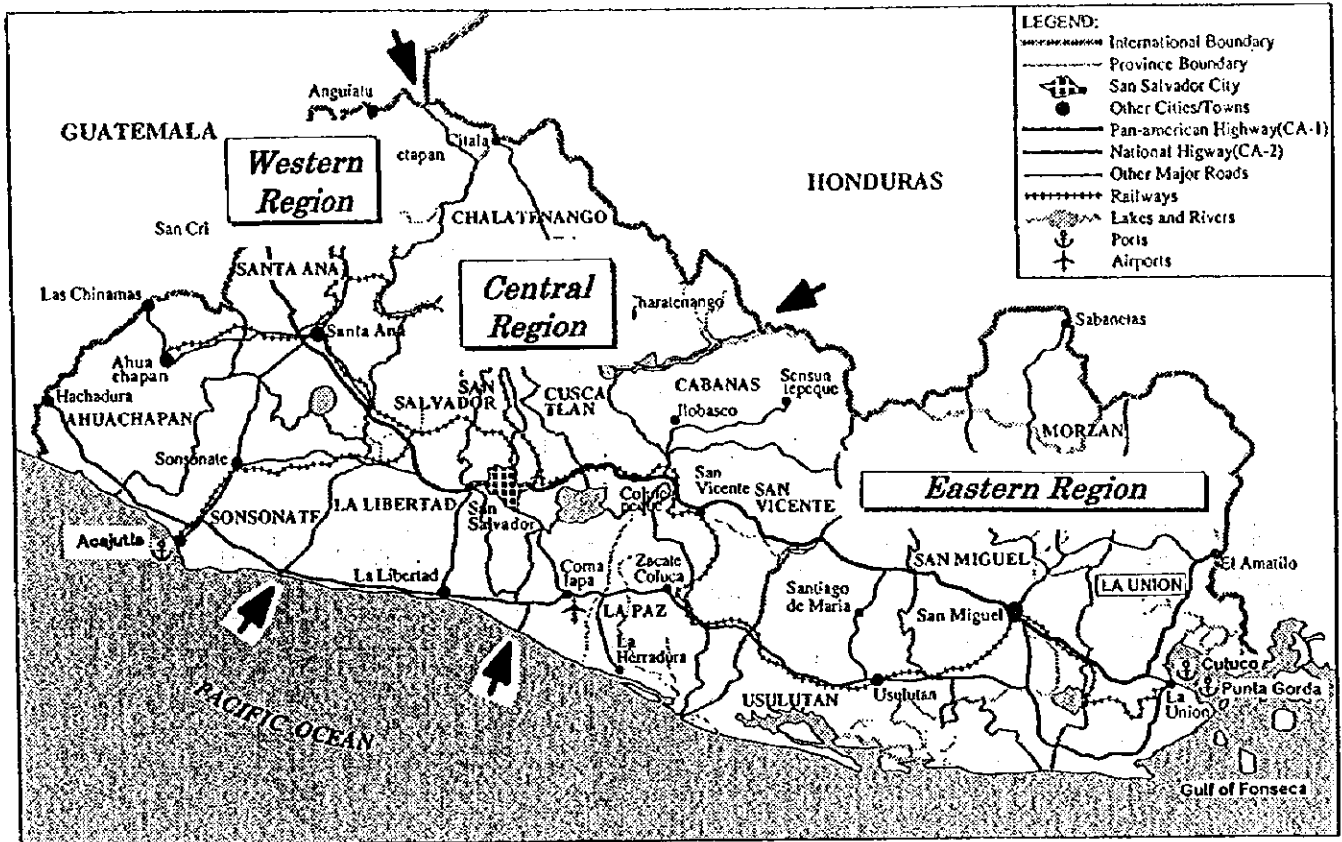


Figure 1 Western Region, Central Region, and Eastern Region

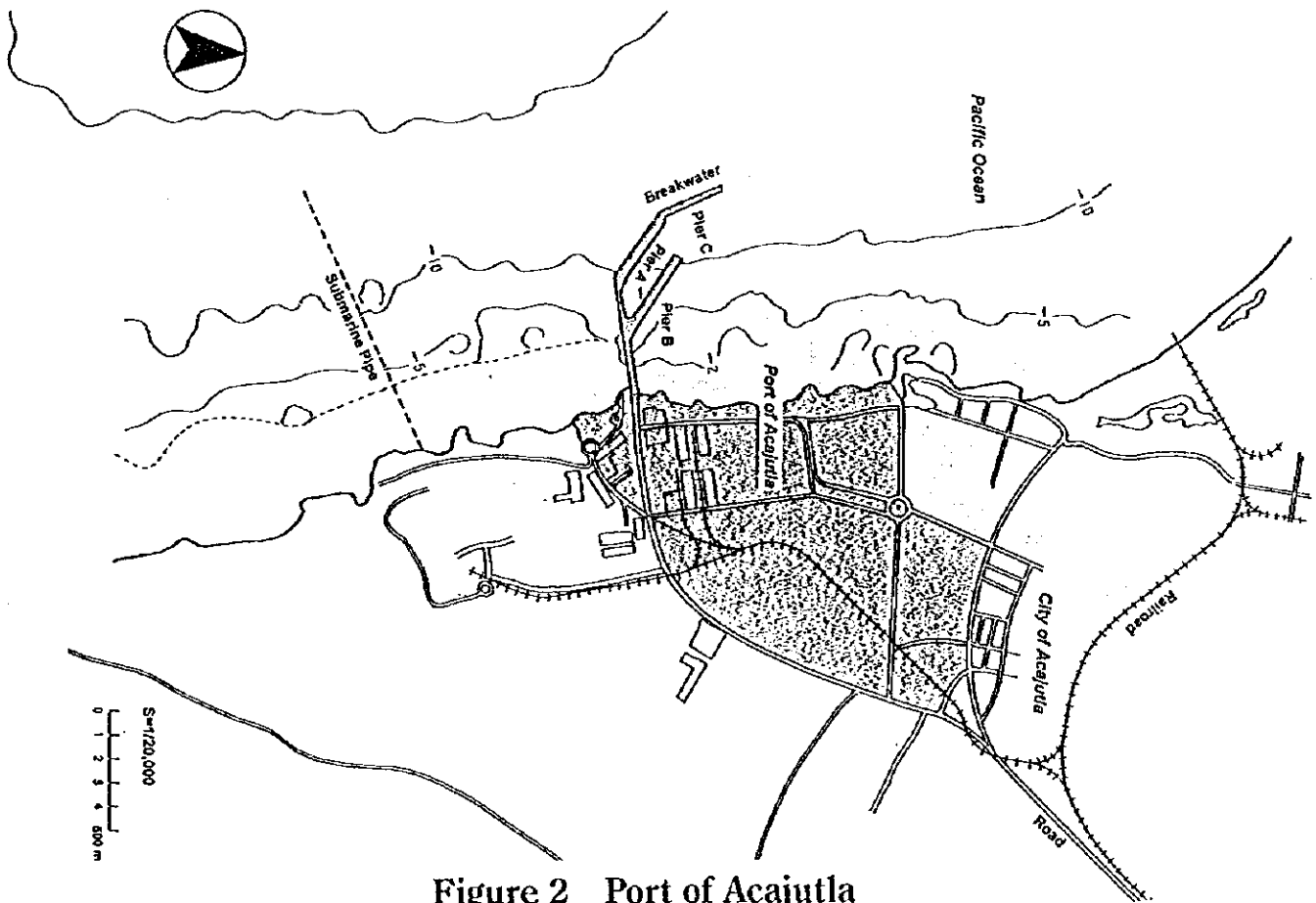


Figure 2 Port of Acajutla

Figure 3 Master Plan : Alternative Layout Plans (Site-A, B and C)

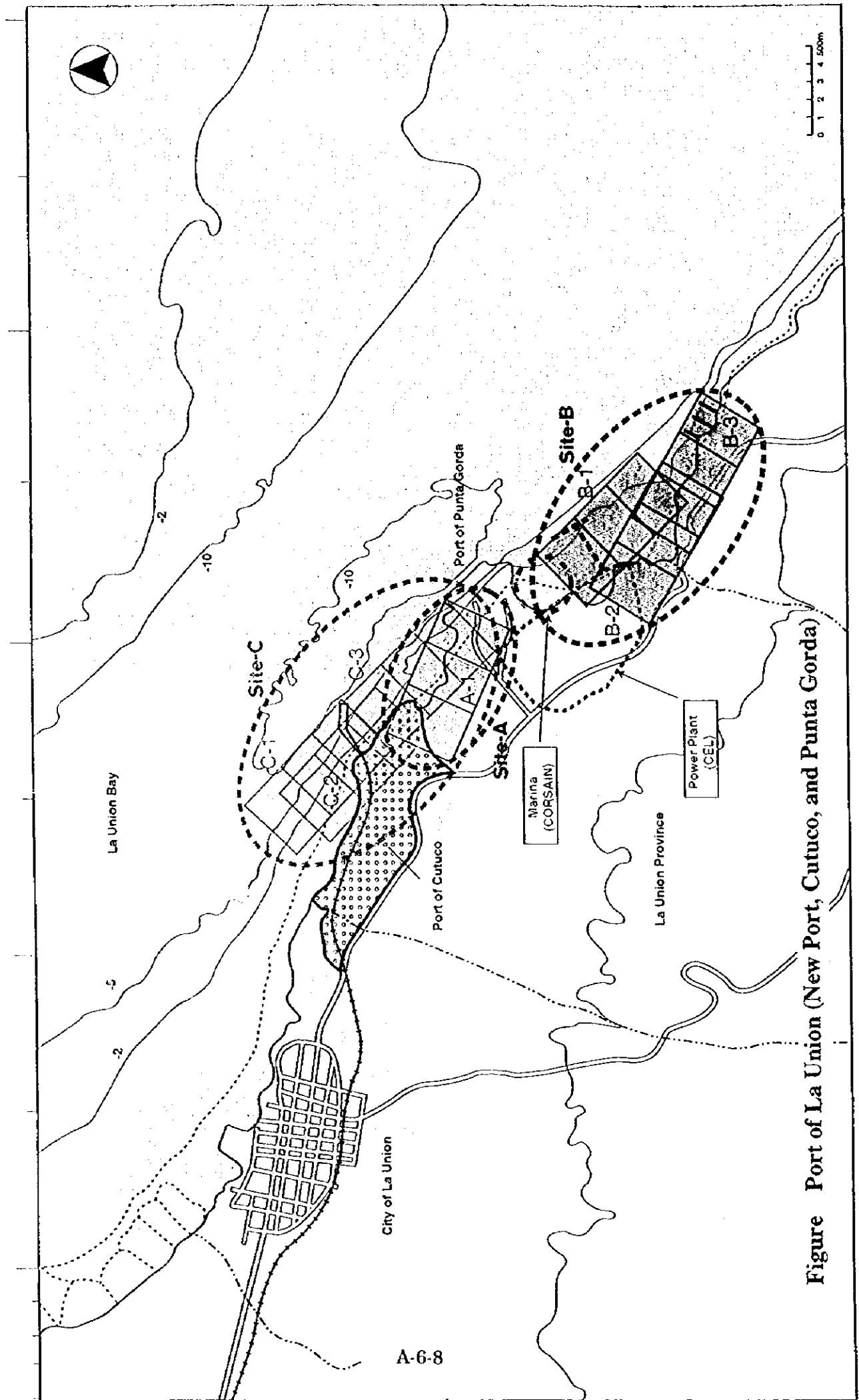
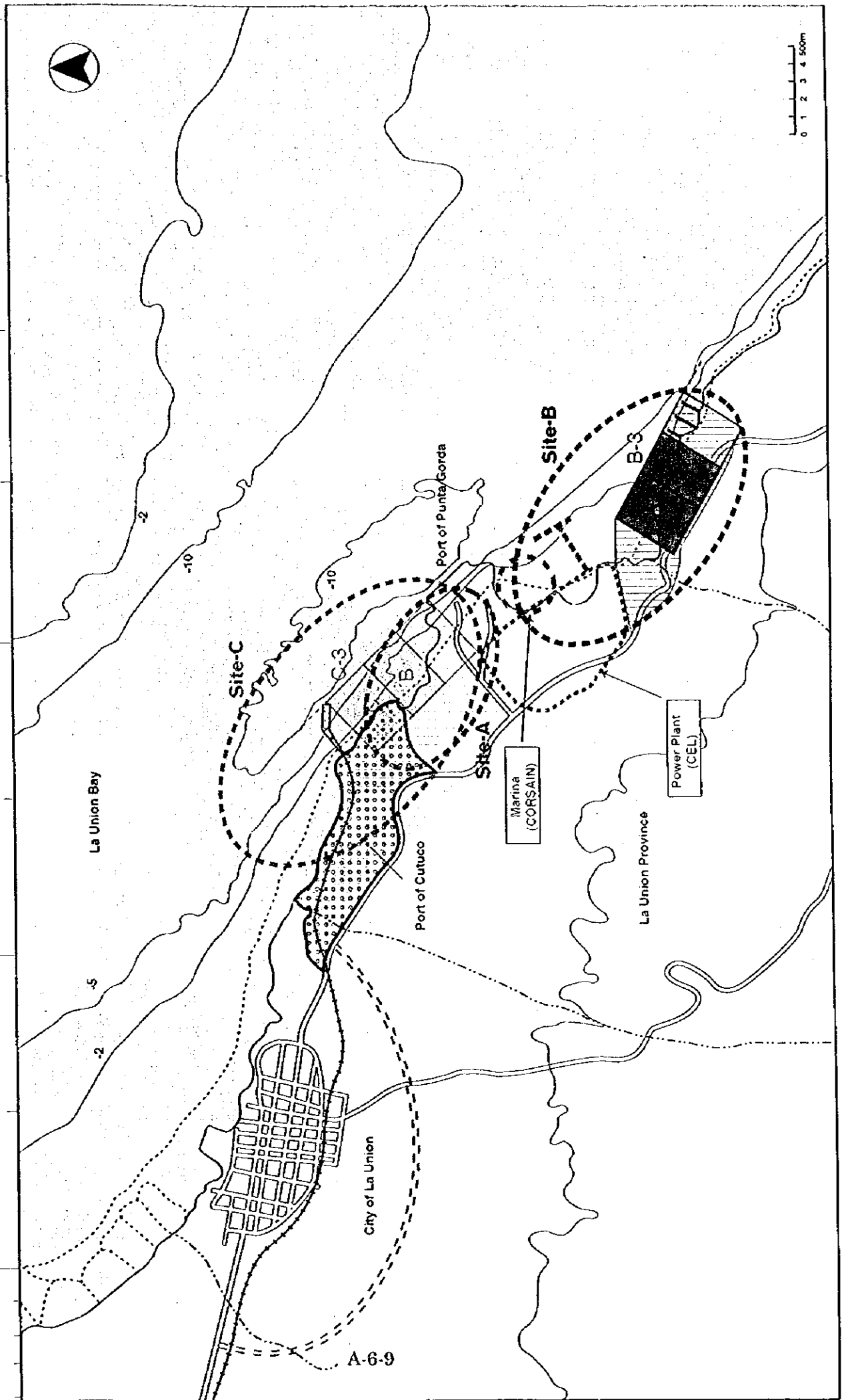


Figure Port of La Union (New Port, Cutuco, and Punta Gorda)

Figure 4 Short Term Plan : Alternative B-3 and C-3
- Container Terminal (C) and Bulk Terminal (B) -



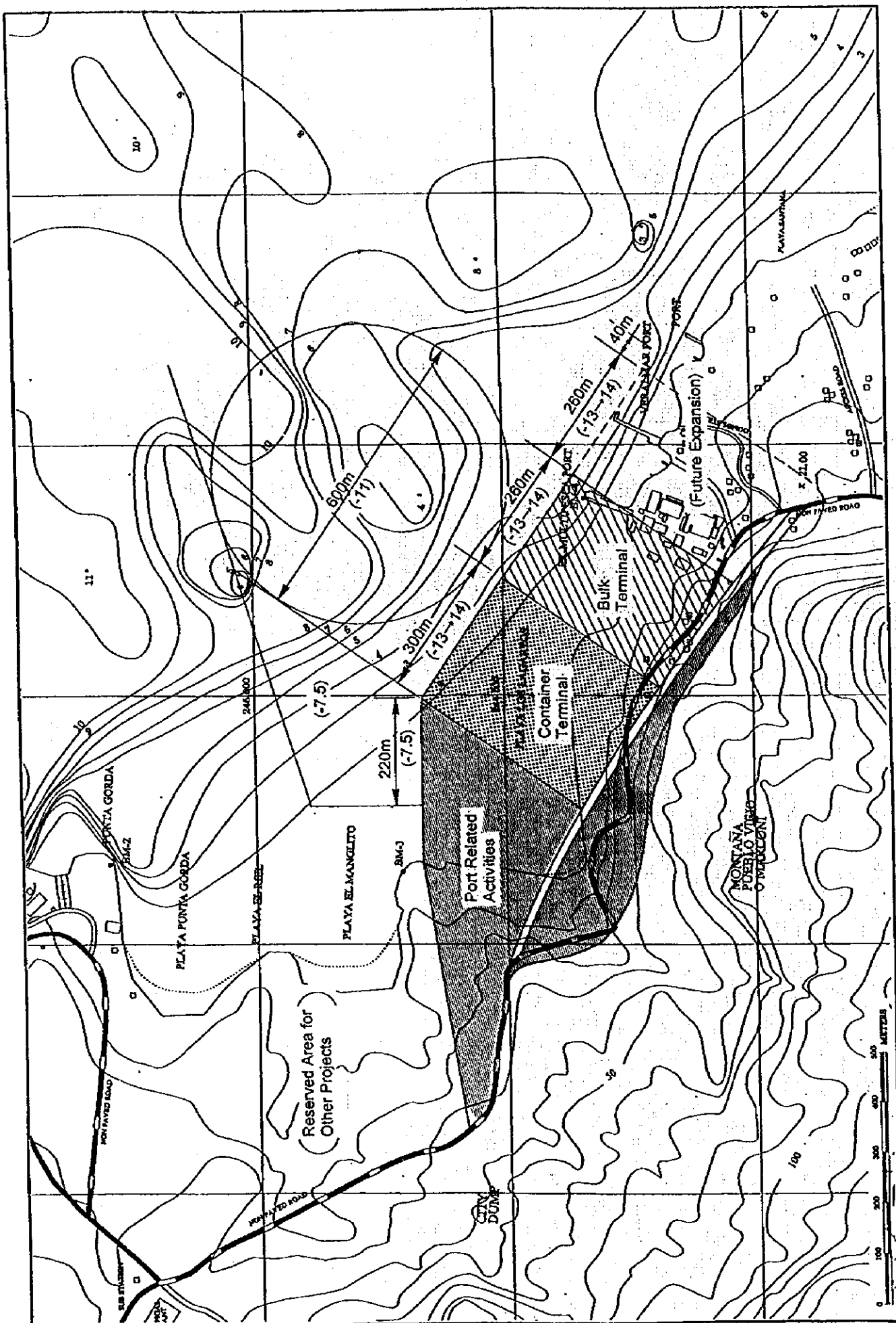


Figure 5 Layout Plan for Alternative B-3

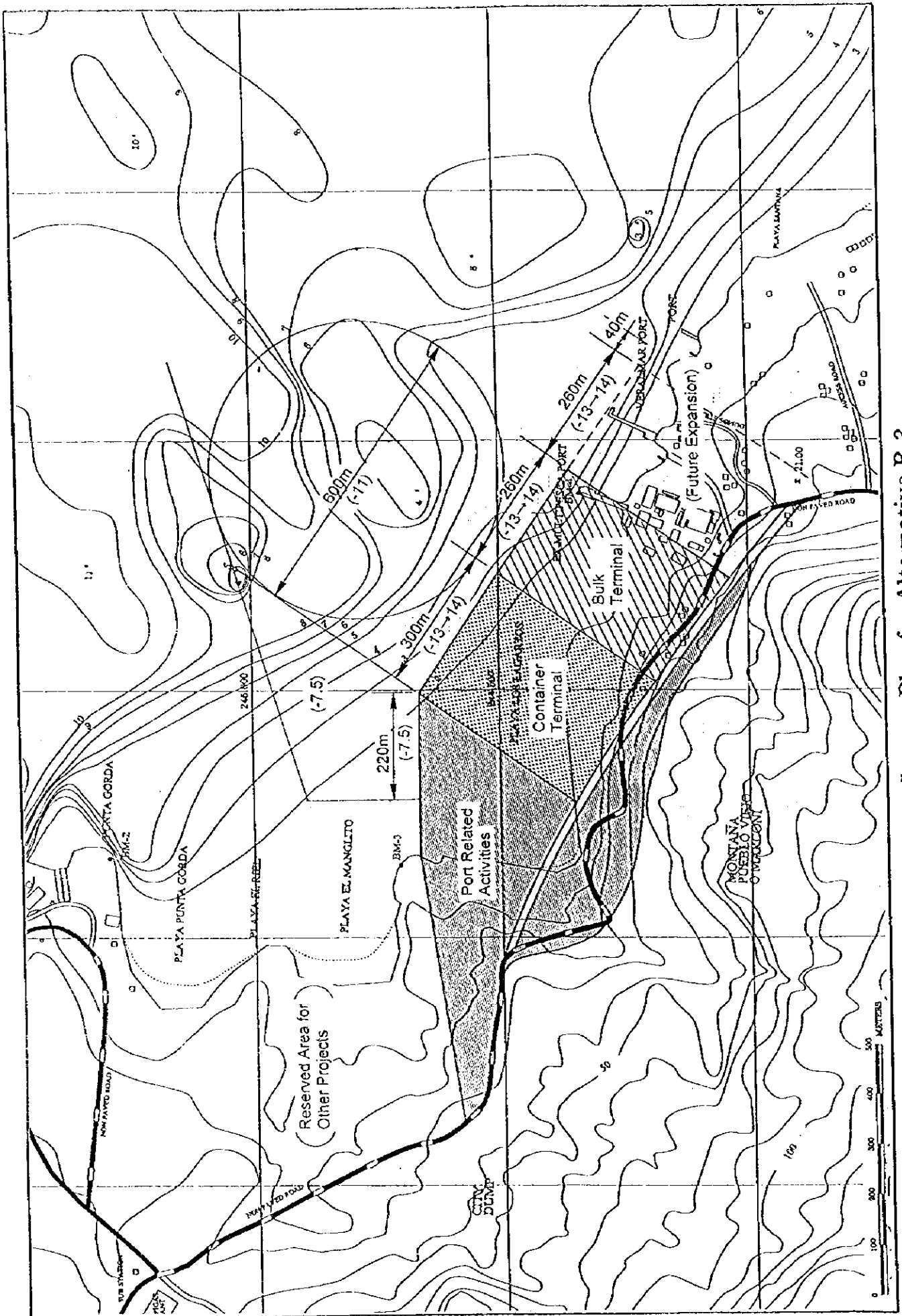


Figure 5 Layout Plan for Alternative B-3

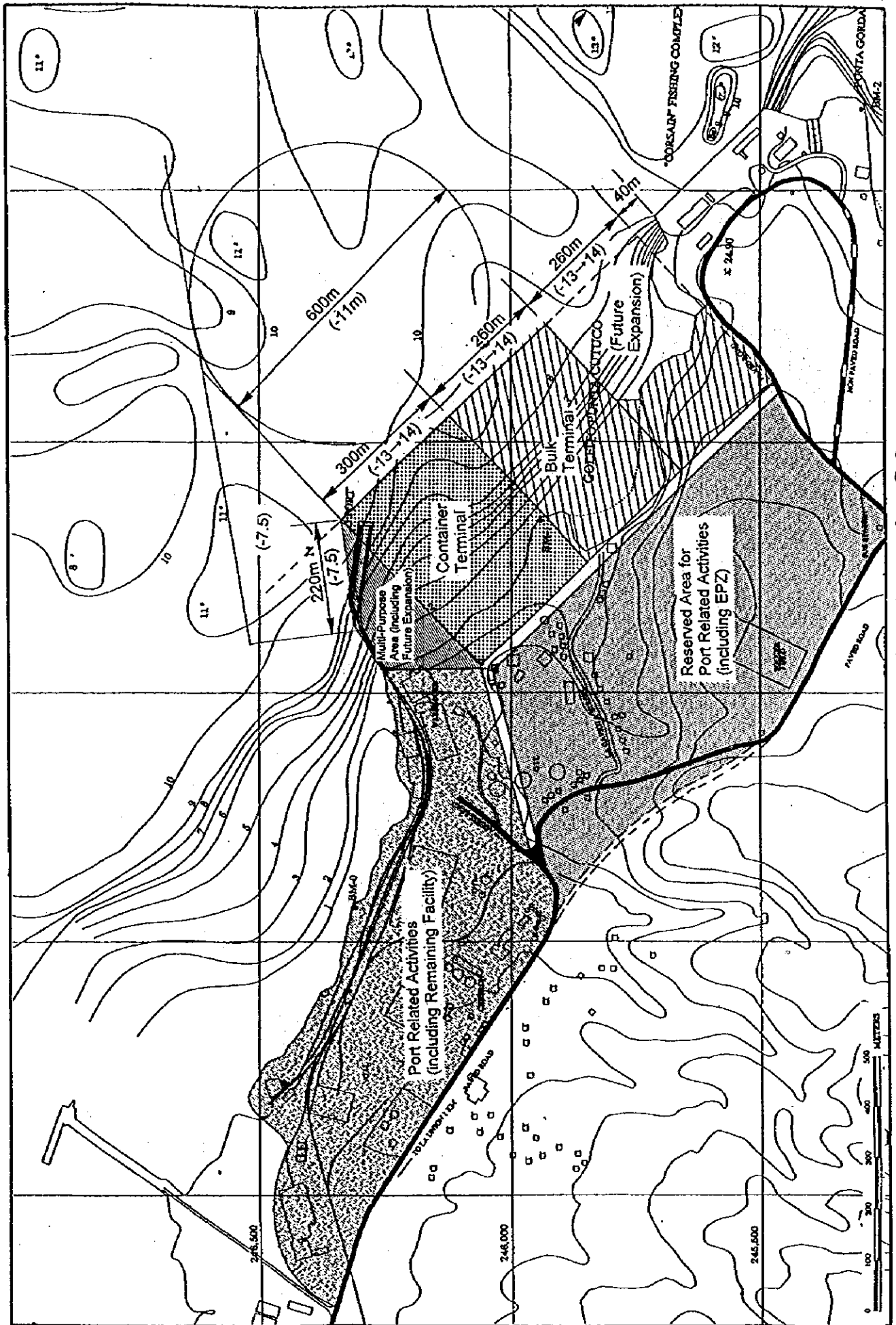


Figure 6 Layout Plan for Alternative C-3

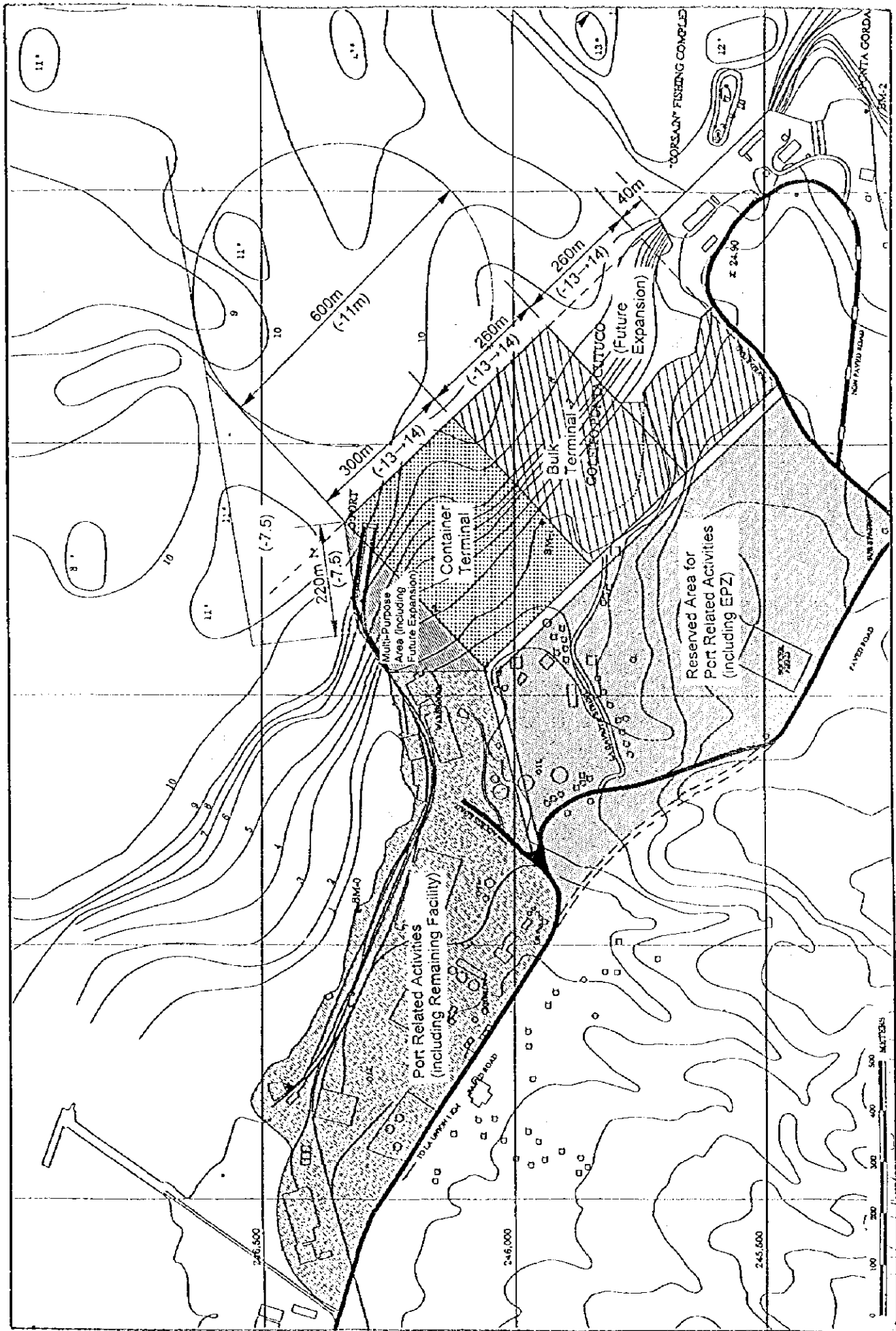
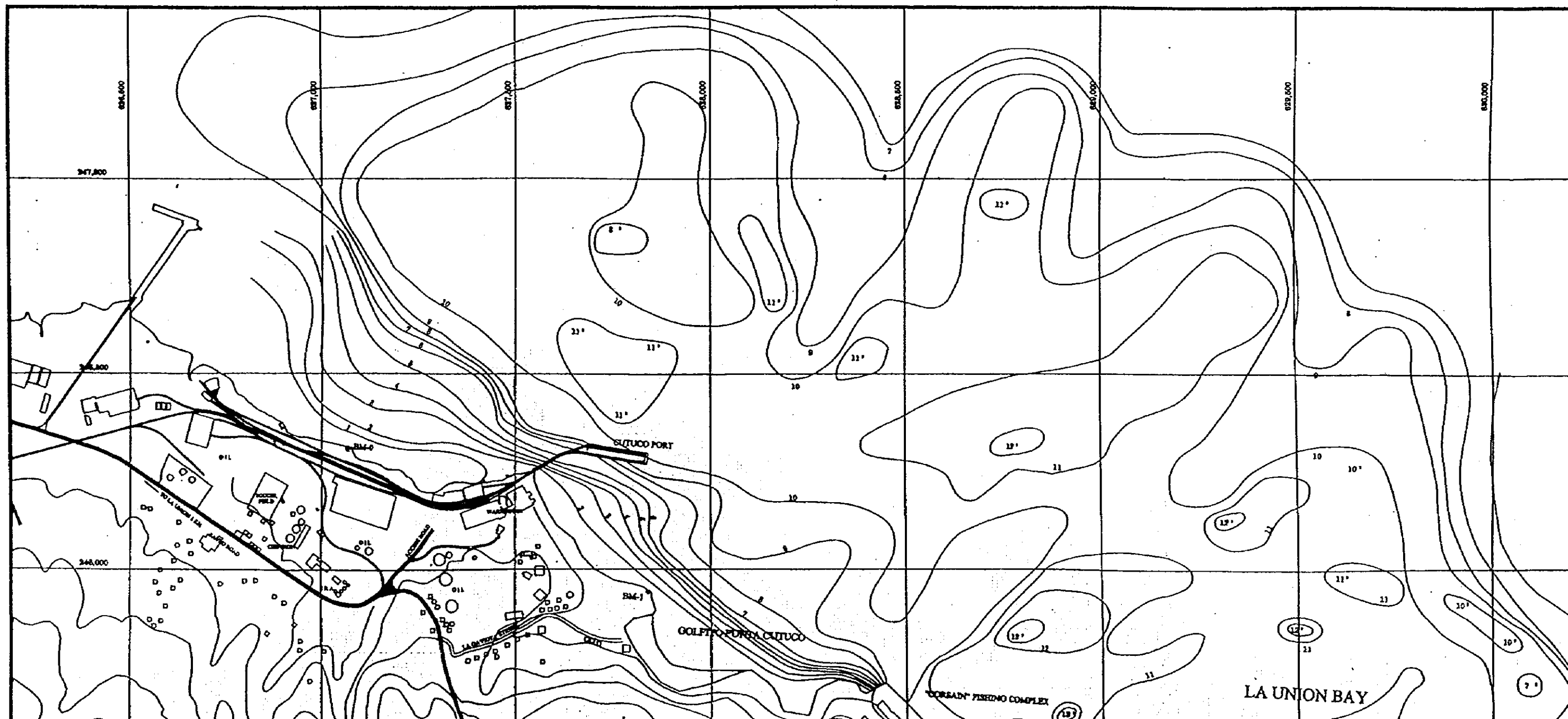
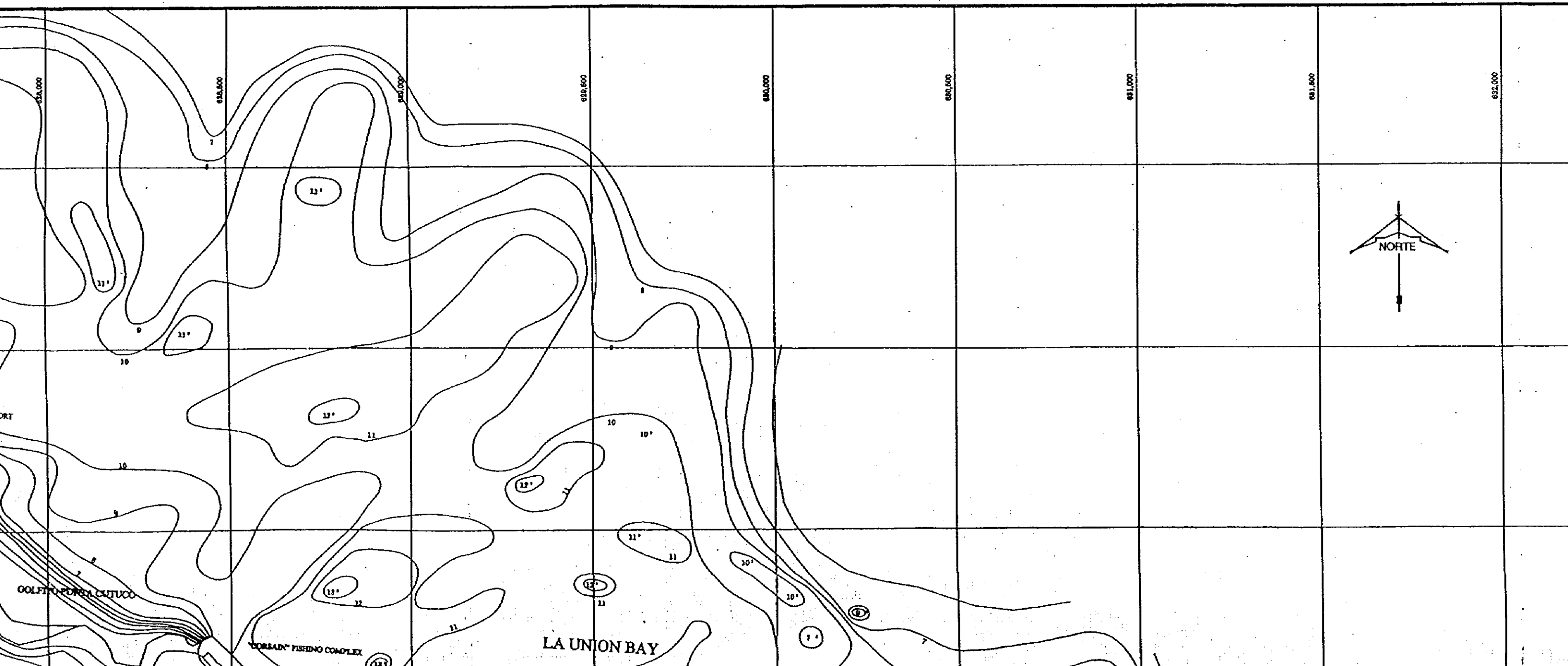


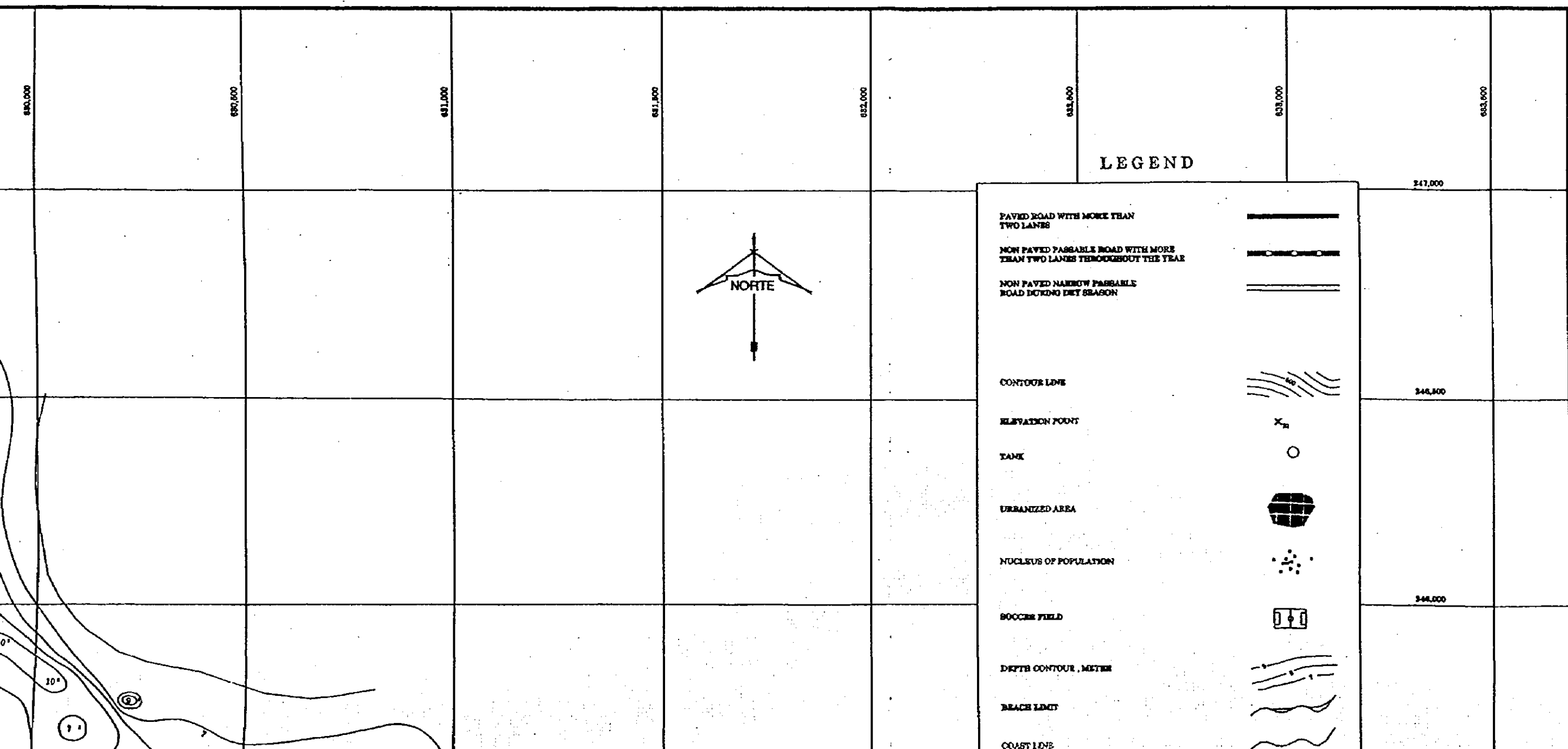
Figure 6 Layout Plan for Alternative C-3

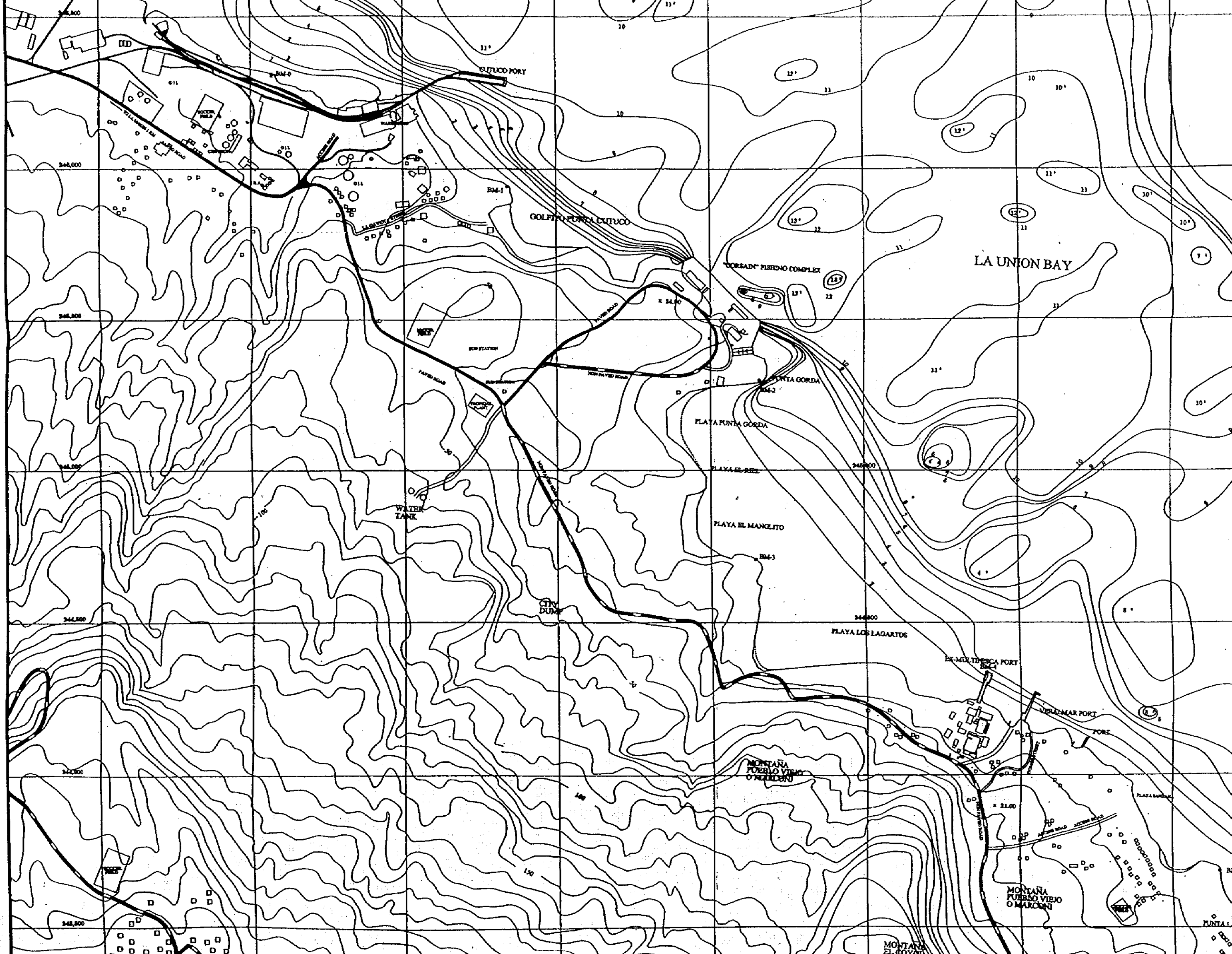
APPENDIX 7

Appendix 7 Topographic and Bathymetric Survey









CUITUCO PORT

GOLFINO PUNTA CUITUCO

LA UNION BAY

CORRADO FISHERY COMPLEX

PUNTA GORDA

PLAYA PUNTA GORDA

PLAYA EL REE

PLAYA EL MANGLITO

PLAYA LOS LAGARTES

EX-MULTIPESCA PORT

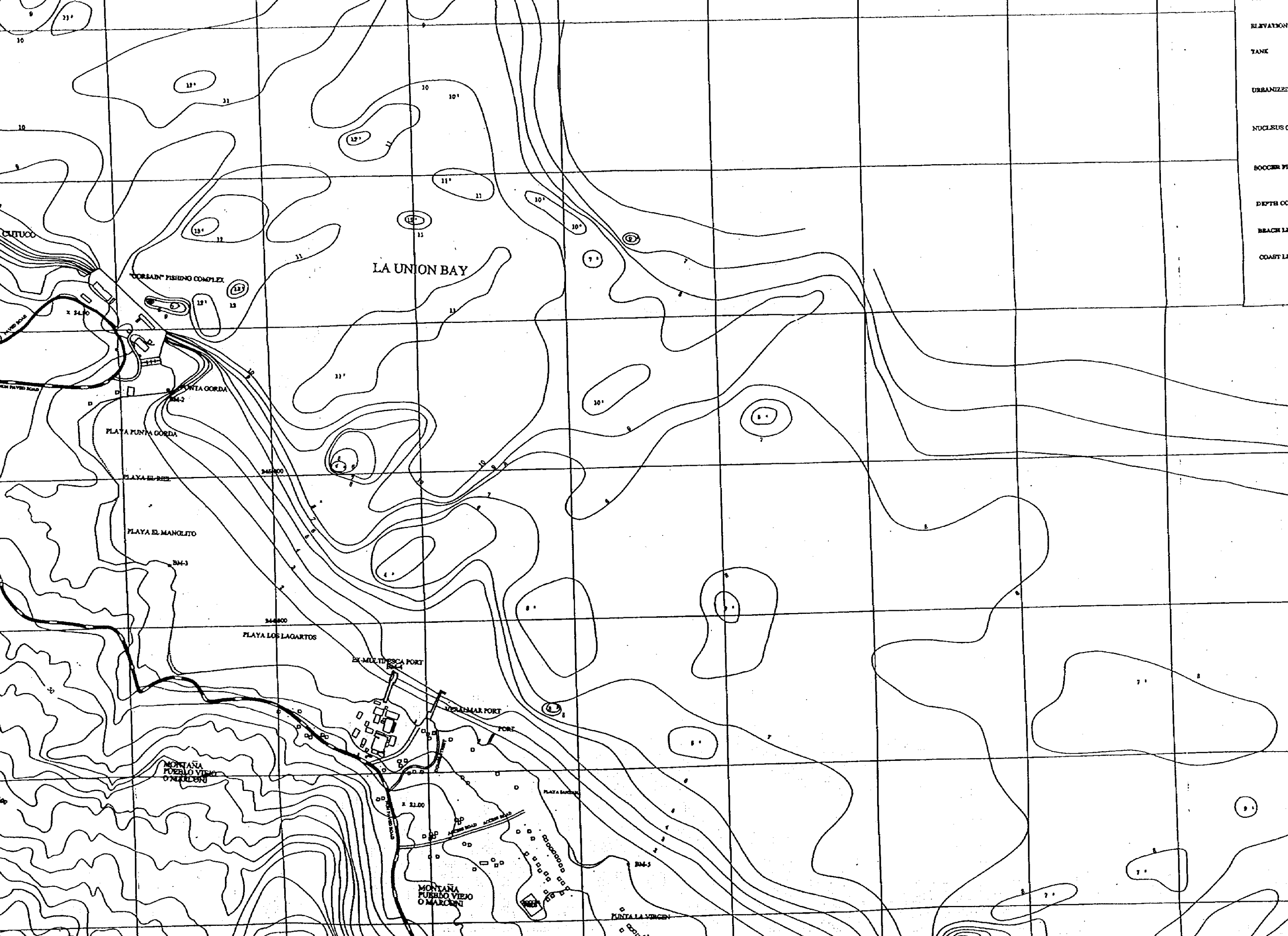
VIEJO MAR PORT

PORT

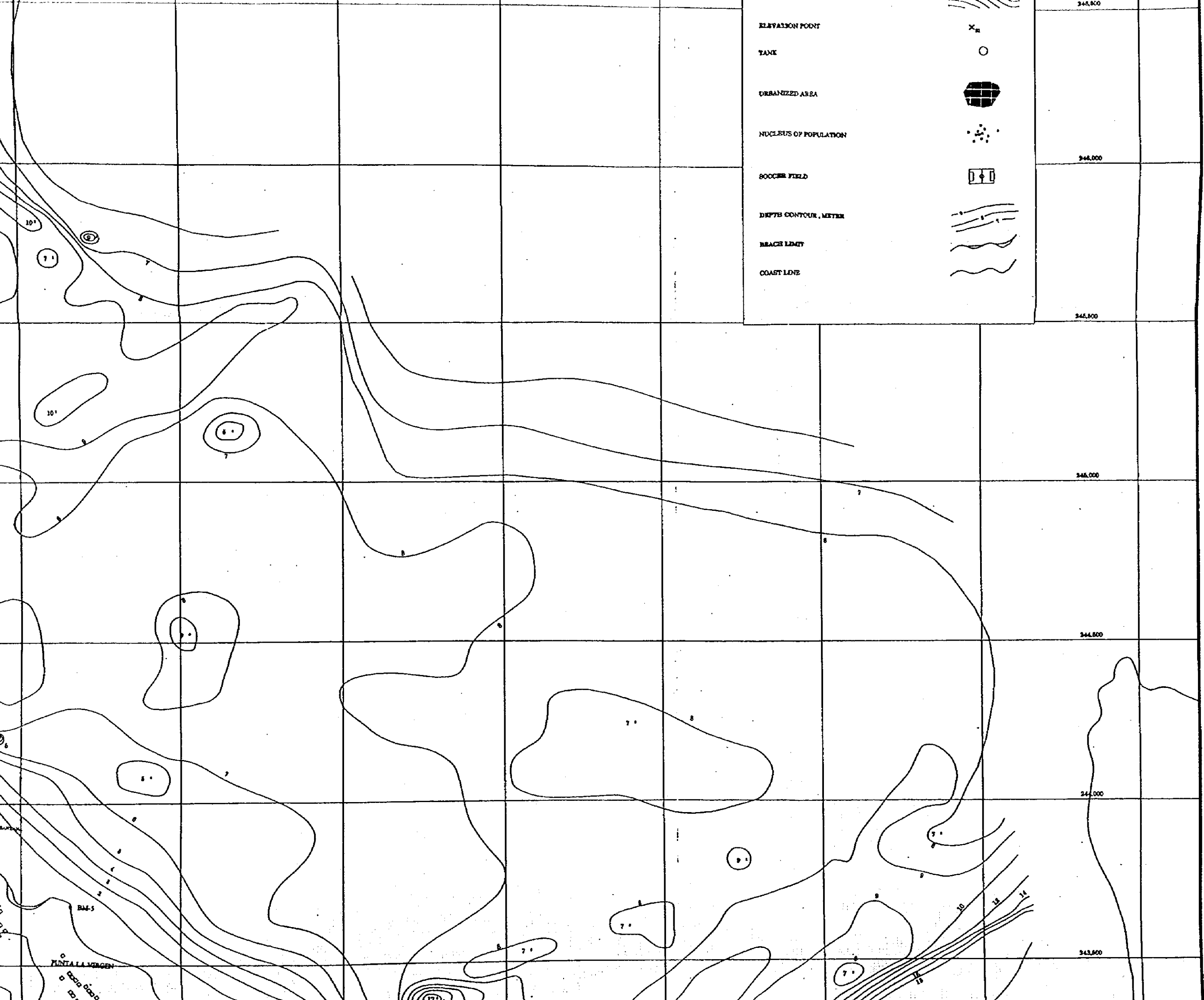
MONTANA PUERTO VIEJO O MARCENI

MONTANA PUERTO VIEJO O MARCENI

MONTANA EL COYOTE



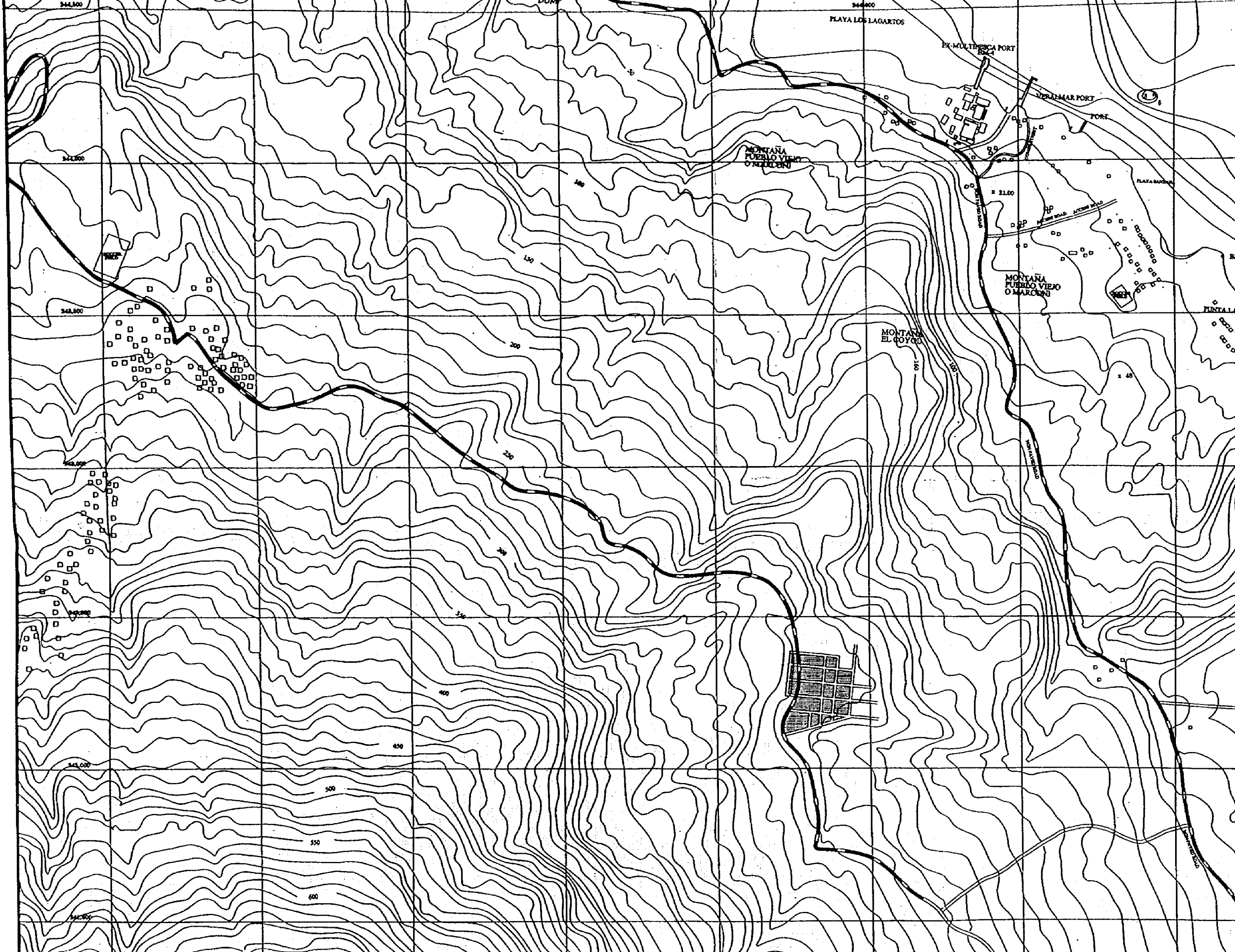
- ELEVATION
- TANK
- URBANIZED
- NUCLEUS
- SOCCER
- DEPTH
- BEACH
- COAST

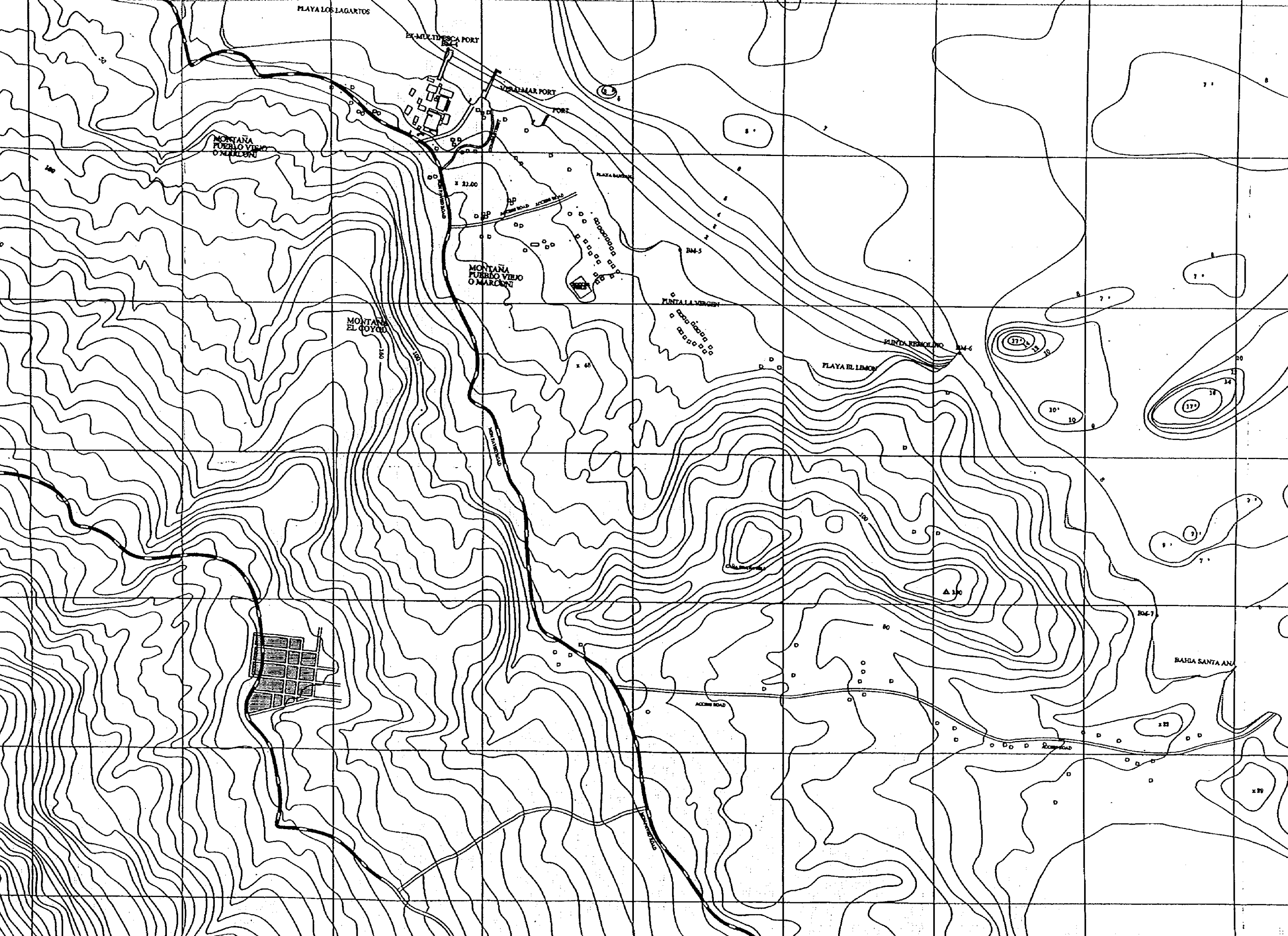


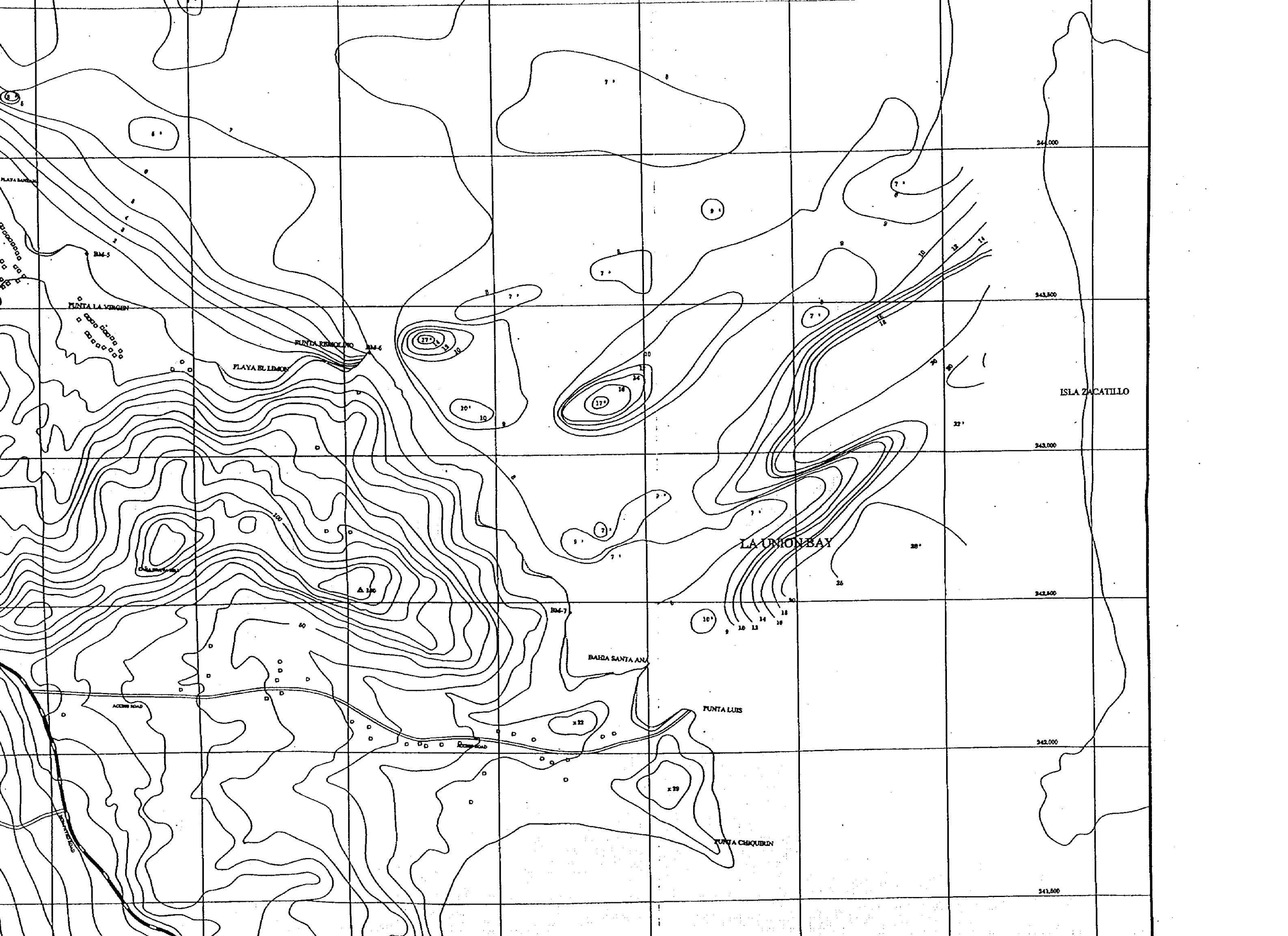
ELEVATION POINT	X _m
TANK	○
URBANIZED AREA	■
NUCLEUS OF POPULATION	•••
SOCCER FIELD	□
DEPTH CONTOUR, METER	—
BEACH LIMIT	~
COAST LINE	~~~~

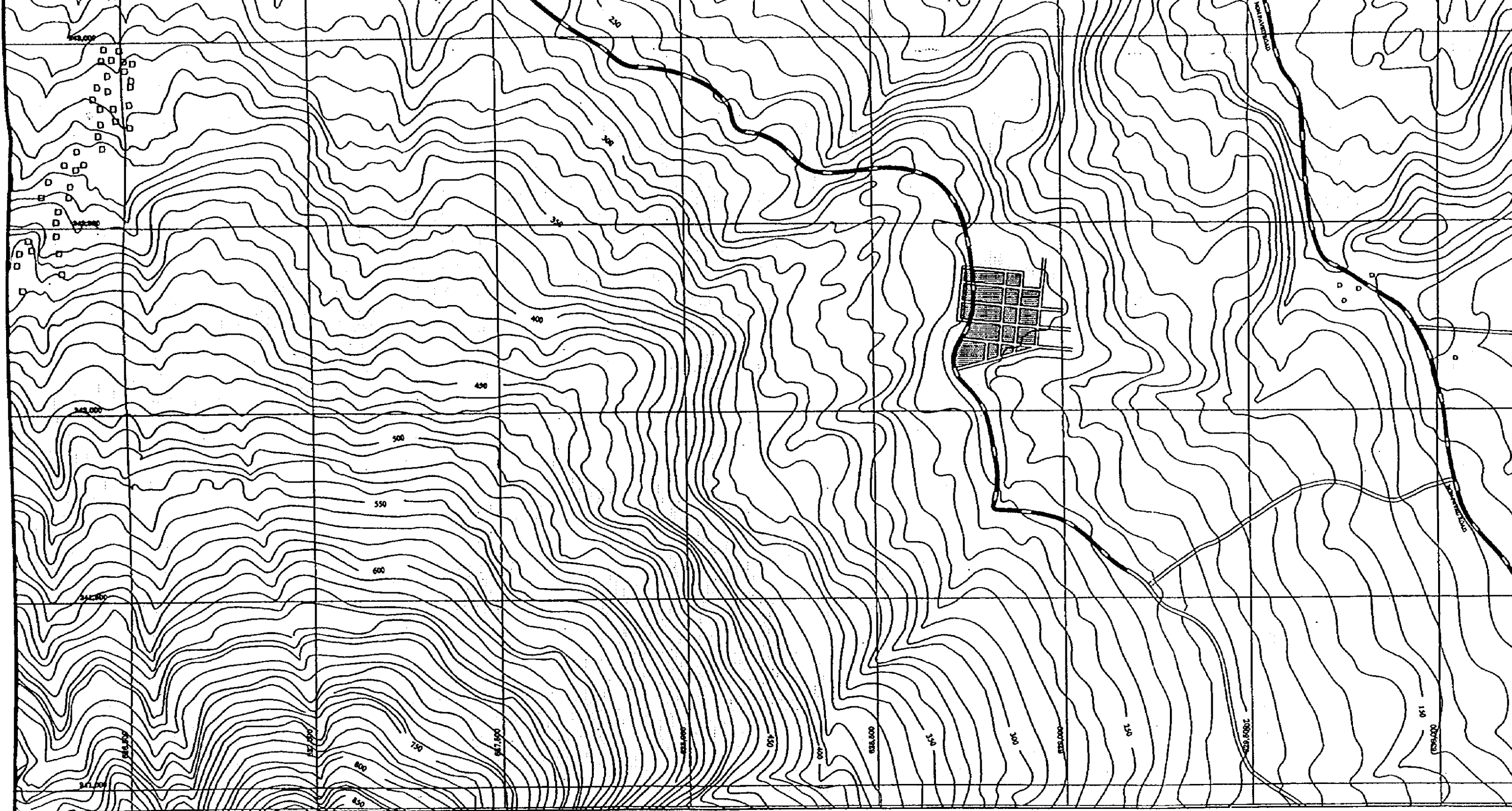
348,800	
348,000	
347,200	
346,400	
345,600	

PUNTA LA VIRGEN
 0 100 200
 0 100 200







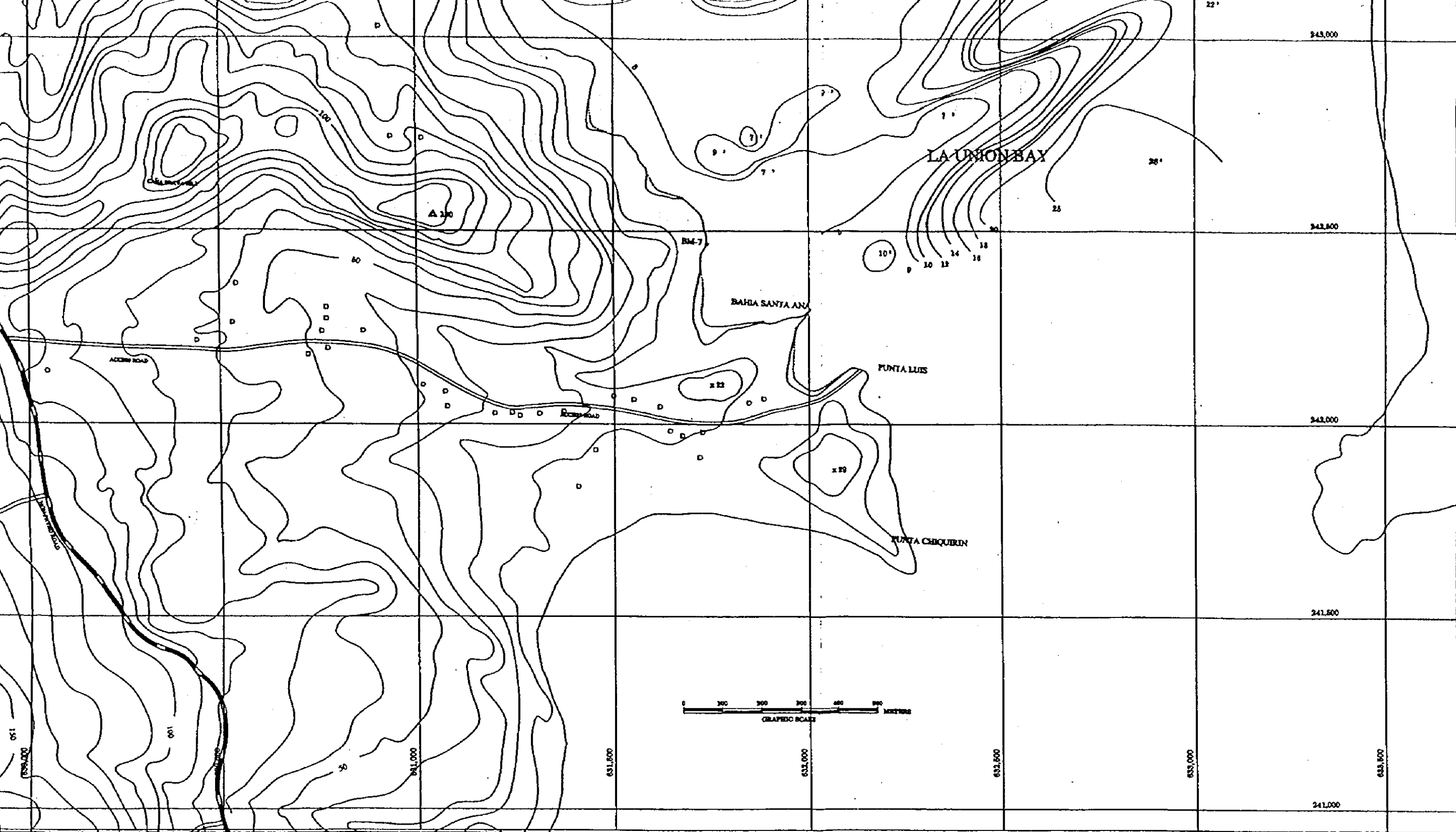


JICA STUDY TEAM
FOR
PORT REACTIVATION IN LA UNION PROVINCE
OF THE REPUBLIC OF EL SALVADOR



A STUDY TEAM
FOR
TION IN LA UNION PROVINCE
PUBLIC OF EL SALVADOR

DRAWING TITLE:
TOPOGRAPHIC MAP
OF CUTUCO AREA



DRAWING TITLE:

TOPOGRAPHIC MAP OF CUTUCO AREA

SURVEY PERIOD

DECEMBER 1997

DRAWING SCALE:

1:10000

SHEET NO.

SHEET 1 OF 1

