Where,

CFL	: The conversion factor for unskilled labor
Opportunity Cost	: Estimated agricultural workers cost Rp. 2,500 / Day
Nominal Wages	: Unskilled labor cost Rp. 4,000 / Day

5.6 COSTS OF THE PROJECT

31. The project costs must be converted from market prices into economic prices for the economic analysis. The costs arising from the implementation of this project are as follows:

5.6.1 Construction Costs

32. Construction costs are converted by multiplying the market costs by the conversion factor for construction estimated in 5.5.2. Based on the construction schedule, the annual construction costs at economic prices are shown in **Table 5.13** and summary of which is given below.

Table 5.13 Annual Construction Costs in Economic Price

(Unit: Million Rupiahs)

Year	Cost
1997	21,870
1998	45,320
1999	15,543
2000	12,408
2001	5,060
2002	16,208
Total	116,410

5.6.2 Maintenance Costs

33. Maintenance costs for the new terminal and the installed handling machinery are considered at economic prices. The maintenance costs are estimated in the following Chapter "Financial analysis" at market prices, and the standard conversion factor is applied to convert the maintenance costs at market prices into the economic prices.

5.6.3 Operation Costs

34. Operation costs consist of personnel costs, administration costs and other costs. Based on the estimation of operation costs in the following Chapter 4, the necessary operation costs for the new terminal are considered as follows:

(1) Personnel Costs

35. The personnel costs which are salary for an additional number of operators and stevedores as estimated in the following Chapter 4 are considered at economic prices. The conversion factor for skilled labor is applied to convert the personnel costs at market prices into the economic prices.

(2) Administration Costs

36. Based on the analysis of historical data, the administration costs are set at 8% of the personnel costs. The economic prices of the administration costs are calculated by multiplying the market costs by the standard conversion factor.

(3) Other Costs

37. Other costs consist of fuel, lubricant, electricity and other expenses necessary for the operation. The economic costs of other costs is calculated by multiplying the market costs by the conversion factor for consumer goods.

5.6.4 Replacement Costs for Handling Equipment

38. The additional replacement costs for handling machinery and equipment such as gantry cranes, straddle carriers and forklifts after their useful lifetimes are considered.

The economic cost of these items of equipments are considered as the same as the market costs because they are purchased at international prices.

5.6.5 Costs of the Project

39. All the costs measured at economic prices are shown in Table 5-8-1.

5.7 BENEFITS OF THE PROJECT

5.7.1 Kinds of Benefits

40. The development of the Ujung Pandang port will greatly contribute to the national economy. Considering the "With" and "Without" case, the following items are identified as major benefits of the short term development plan for the Ujung Pandang port from the viewpoint of the national economy.

(1) Savings in ships' staying costs.
(2) Savings in interest of cargo costs.
(3) Savings in cargo handling labor costs.
(4) Savings in investment costs of minimum transportation facilities.
(5) Savings in investment costs of additional inland container yard.
(6) Savings in investment costs of additional transportation facilities.
(7) Savings in investment costs of additional extension of berth.
(8) Promotion of regional economic development.
(9) Increase in employment opportunities and incomes.
(10) Reduction of cargo damage and accidents at the port.

41. It is impossible to evaluate all these benefits in monetary terms, but the following items are considered countable and the monetary benefits of theses items are calculated.

(1) Savings in ships' staying costs.
(2) Savings in interest of cargo costs.
(3) Savings in cargo handling labor costs.
(4) Savings in investment costs of minimum transportation facilities.
(5) Savings in investment costs of additional inland container yard.
(6) Savings in investment costs of additional transportation facilities.

(7) Savings in investment costs of additional extension of berth.

42. The following benefits are considered uncountable and only a qualitative analysis is undertaken.

(8) Promotion of regional economic development.
(9) Increase in employment opportunities and incomes.
(10) Reduction of cargo damage and accidents at the port.

5.7.2 Calculation of Countable Benefits

(1) Savings in ships' staying costs

43. In accordance with the implementation of the project, the total ships' staying time, (ships' waiting time for berthing and ships' mooring time for unloading/loading at the port) will be greatly decreased. The reduction of the ships' staying time under the "With" case is one of the main benefits of the project. In this study, the benefits derived from the reduction of the ships' staying costs is calculated by the following formula.

Saving in ships' staying costs	=	Difference of ships' staying time between "Without and "With" cases
	x	Ships' staying cost
	x	Percentage accruing to Indonesia

(a) Ships' Staying Time

44. Ships' staying time at the port comprises the waiting time for berthing and the mooring time for unloading/loading. As for the ships' waiting time, the total waiting time for "Without" and "With" cases is calculated using queuing simulations (Port Operation Simulation Model: POSIM) based on the estimated number of calling ships in both cases respectively. The results of the calculation are shown in **Table 5.20**

(b) Ships' Staying Costs

45. Usually ships' staying costs are estimated by compiling the depreciation, personnel expenses, fuel cost, interest and other expenses, based on the ship building prices. The fuel consumption costs for ships' staying are also estimated for each ship based on the average fuel consumption rate of vessels presently operating. Based on the interviews and the above, the future average ships' staying costs are estimated as Rp. 20,000,000/day/ship.

(c) Percentage Accruing to Indonesia

46. The benefit derived from the savings of ships' staying costs will belong to the shipping companies. Therefore, for foreign ships the benefits accrue to foreign shipowner and for Indonesian ships benefits accrue to Indonesia. However, it is now standard practice to include some of the benefits accruing to foreign shipowner in the appraisal on the understanding that in the long run this benefit will filter through to the national economy, for example, through lower freight rates. Thus, in this study, it is assumed that 50% of savings of ocean going ships' staying costs and 100% of domestic ships' accrue to the Indonesia economy. Twenty percent of total ships' staying cost will be estimated for ocean going ship and 80% of it will be estimated for domestic ship.

(d) Savings of ships' staying costs

47. Benefits derived from savings of ships' staying costs due to the implementation of this project are calculated in **Table 5.14**, a summary of which is given below.

Table 5.14 Savings of Ships' Staying Costs

(Unit: Million Rupiah)

	1998	2003	2008	2010
Accruing to Indonesia	6,683	15,171	15,831	31,113

Source : Study team estimates

(2) Savings in interest of cargo cost

48. In accordance with the implementation of the project, the total ships' staying time will be greatly decreased. According to the reduction of the ships' staying time under the "With" case, interest of cargo cost will be decrease. In this study, the benefits of savings in interest of cargo costs is calculated by the following formula.

Saving in interest of cargo costs	=	Difference of ships' berthing time between "Without and "With" cases
	x	Interest of unit cargo

49. According to the above, benefits derived from savings of interest of cargo costs due to the implementation of this project are calculated in **Table 5.15** a summary of which is given below.

Table 5.15 Savings of Interest of Cargo

(Unit: Million Rupiahs)

	1998	2003	2008	2010
Accruing to Indonesia	58	177	221	464

Source : Study team estimates

(3) Savings in cargo handling labor cost

50. In accordance with the implementation of the port, the efficiency of cargo handling capacity will be improved and the total ships' berthing time for unloading/loading at the port will be greatly decreased. According to the reduction of the ships' berthing time under the "With" case, cargo handling labor cost will be decreased. In this study, the benefits derived from the reduction of the cargo handling labor costs are calculated by the following formula.

Saving in cargo handling costs	=	Difference of ships' berthing time between "Without and "With" cases
	x	Unit labor cost

51. According to the above, ben fits derived from savings in cargo handling costs due to the implementation of this pro ect are calculated in **Table 5.16**, a summary of which is given below.

Table 5.16 Savings of Cargo Handling Labor Costs

(Unit: Million Rupiahs)

	1998	2003	2008	2010
Accruing to Indonesia	150	217	293	331

Source : Study team estimates

(4) Savings in investment costs of the minimum transportation facilities of container

52. Under the "Without" case, as described in chapter 5.3.1 of the "Without" case, the minimum transportation facilities of container will have to be purchased. This procurement cost and operation costs are one of the benefits of this project and calculated in same manner as with the "With" case. Results of this calculation are shown in **Table 5.22.**

(5) Savings in investment costs of additional inland container yard.

53. Under the "Without" case, as described in chapter 5.3.4 of the container cargo flow for the "Without" case, in 1998 the total required area of container yard will exceed the available area of container yard. Therefore additional container yard will be constructed for the excess container cargo volume in 1997. Required area of additional container yard is estimated 12.0 ha capacity of which is 128,000 TEU. This construction cost and operation cost are also benefits of this project and calculated in the same manner as with the "With" case. Results of this calculation are shown in **Table 5.22.**

(6) Savings in investment costs of additional extension of berth.

54. Under the "Without" case, in 2006 the total required berthing (unloading/loading) time for the calling vessels will exceed the available total berthing time of the berths. Therefore excess container cargo volume after the year in 2006 has to be handled at an additional berth at the port. The construction costs of this berth is also one of the

benefits of this project and calculated in the same manner as with the "With" case. Results of this calculation are shown in **Table 5.22.**

(7) Savings in investment costs of additional transportation facilities.

55. Under the "Without" case, as described in chapter 5.3.4 of the Cargo flow for the "Without" case, according to the extension of additional berth, the excess container cargo volume after the year in 2006 has to be handled and transported by additional equipments. Procurement costs and operation costs are also benefits of this project and calculated in the same manner as with the "With" case. Results of this calculation are shown in **Table** 5.22.

5.7.3 Uncountable Benefits

56. As described in Chapter 3.7.1, there are other benefits derived from the implementation of this project, however, they are difficult to appraise in monetary terms. Therefore, qualitative analyses are undertaken as follows:

(8) Promotion of Regional Economic Development

57. Without the implementation of this development project, the Ujung Pandang port will handle a limited cargo volume, and the development or expansion of export industries and services which are dependent on the Port will be stagnant. Furthermore, the limited port activity will diminish the probability of the establishment of new businesses. On the other hand, the new development project will make port-related industries, such as ZIP, more active, and the value added from those industries and the employment opportunities from them are therefore considered as economic benefits of this project.

(9) Increase in employment opportunities and incomes

58. Additional employment will arise directly from the project, both assumed employment for construction during the construction period and employment for operations after the construction. Therefore, this employment is one of the major benefits of the project.

59. Along with the increased direct employment, secondary employment will also occur based on the new demand from the expanding industries and services through the port activities. Similarly, the income of already employed local workers is also expected to rise. Thus, a rippling effect is generated by the development.

(10) Reduction of cargo damages and accidents at the port

60. Under "Without" case, it is anticipated that containerization will be stagnant and according to the increase of cargo volume, the port will be very congested. On the other hand with the implementation of the project, containerization will be improved, and by that the port capacity will not only be improved but cargo damage, accidents and pilferage at the port will be reduced, This is obviously considered to be one of the great benefits of this project.

3.7.4 Benefits of the Project

61. In converting the market prices into economic prices, benefits derived from savings in ships' costs and interest of cargo cost are considered at economic prices without any converting procedure, because they are already presented at international prices. However, benefits derived from savings in cargo handling labor cost and land transport costs are expressed in market prices, and therefore the conversion factor is applied to theses benefits for converting market prices into economic prices.

5.8 EVALUATION AND CONCLUSION

5.8.1 Calculation of the EIRR

62. Here, the lifetime of the facilities is taken as 30 years, the same as the project lifetime. The cost-benefits analysis is carried out starting in 1996 (the first year of the investment schedule) and ending in 2025 (the 30th year from the start from the operations of the new terminal in 1997). The economic internal rate of return (EIRR) is calculated by using the formula which was mentioned chapter 5.2. The calculation for the EIRR is shown in **Table 5.22** and the results of it is as follows : EIRR = 15.58%

5.8.2 Sensitivity Analyses

63. In order to estimate the variation for the EIRR, sensitivity analyses are made for three each alternative.

(1) Case - A : The construction costs increase by 10 %
(2) Case - B : The forecast benefits decreases by 10 %
(3) Case - C : The construction costs increase by 10 % and the benefits decreases by 10 %

64. The calculation for the EIRR is shown in **Table** 5.23. The results of the sensitivity analyses are shown as the follows.

Table 5.17 Results of Sensitivity analyses

Case	EIRR (%)
Base Case	15.58
Case - A	12.95
Case - B	12.69
Case - C	10.38

5.8.3 Results and Conclusion

65. From the above calculations, the EIRR of this project is in any case more than 10.3%. There are various views concerning the appropriate EIRR level used to guide the judgment as to whether a project is feasible or not. The leading view is that the project is feasible if the EIRR exceeds the opportunity cost of capital. The results of the EIRR calculation, only taking into account the seven major quantitative benefits, shows more than 10% under every probable case and other uncountable benefits are expected to derive from the implementation of this project. Therefore, this Short-term Development Project is feasible from the viewpoint of the national economy.

Table 5.18 Calculation of Container Ship Time at Ujung Pandang Port

					Without Case				With Case						Saving
	Volume of Container	Number of Container	Average Number of Container	Number of Ship	Average Waiting Time	Average Berthing Time	Total Berthing Time	Total Staying Time	Average Waiting Time	Average Berthing Time	Total Berthing Time	Total Staying Time	Difference Staying Time	Difference Staying Time	Ship Staying Cost
	TEU	Box	Box/Ship	Calls	Hours/Ship	Hours/Ship	Hours	Hours	Hours/Ship	Hours/Ship	Hours	Hours	Ship·Hours	Ship·Day	Million Rp
1995	94,000	85,000	200	430	0	25.6	11,008	11,008							
1996	119,000	99,000	210	470	0	26.6	12,502	12,502							
1997	143,000	114,000	215	530	0	27.1	14,363	14,363							
1998	165,000	127,000	220	580	1.4	27.6	16,008	16,820	0	16.0	9,253	9,253	7,567	315	5,675
1999	185,000	142,000	225	630	2.2	28.1	17,703	19,109	0	16.2	10,199	10,199	8,910	371	6,683
2000	201,000	155,000	230	670	3.6	28.6	19,162	21,545	0	16.4	11,004	11,004	10,541	439	7,906
2001	216,000	166,000	235	710	5.7	29.1	20,661	24,686	0.1	16.7	11,828	11,899	12,787	533	9,590
2002	228,000	175,000	240	730	9.0	29.6	21,608	28,203	0.2	16.9	12,333	12,479	15,725	655	11,793
2003	239,000	184,000	250	740	14.4	30.6	22,644	33,300	0.3	17.4	12,850	13,072	20,228	843	15,171
2004	254,000	195,000	260	750	24.0	31.6	23,700	41,722	0.4	17.8	13,376	13,668	28,054	1,169	21,041
2005	270,000	208,000	270	770	40.1	32.6	25,102	55,979	0.5	18.3	14,096	14,484	41,495	1,729	31,121
2006	287,000	221,000	280	790	3.5	33.6	26,544	29,309	0.7	18.8	14,833	15,350	13,959	582	10,469
2007	305,000	235,000	290	810	6.1	34.6	28,026	32,971	0.8	19.2	15,590	16,277	16,694	696	12,520
2008	324,000	249,000	300	830	10.6	35.6	29,548	38,387	1.1	19.7	16,366	17,279	21,108	879	15,831
2009	345,000	265,000	310	850	18.6	36.6	31,110	46,899	1.7	20.2	17,160	18,605	28,294	1,179	21,220
2010	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2011	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2012	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2013	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2014	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2015	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2016	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2017	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2018	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2019	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2020	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2021	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2022	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2023	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2024	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2025	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113
2026	366,000	282,000	320	880	32.4	37.6	33,088	61,600	2.2	20.7	18,180	20,116	41,484	1,729	31,113

Source : Calculated by The Study Team

Table 5.19 Economic Price of Investment Cost of Ujung Port

(Unit:Million Rupiahs)

Work	Cost of Investment in Market Prices	Foreign Portion (CIF)	Local Portion				Overall Conversion Factor	Investment Costs in Economic Prices
			Non-traded Goods	Skilled Labour	Unskilled Labour	Transfer Item		
		1.000	(SCF) 0.951	(CFC) 0.925	(CFL) 0.578	0.000		
1997								
Market Price	24,266	21,360	30	521		2,355		
Economic Price	21,870	21,360	29	482	0	0	0.901	21,870
1998								
Market Price	50,182	42,511	1,981	801	318	4,571		
Economic Price	45,320	42,511	1,884	741	184	0	0.903	45,320
1999								
Market Price	17,447	11,015	3,854	689	301	1,588		
Economic Price	15,543	11,015	3,665	689	174	0	0.891	15,543
2000								
Market Price	13,749	11,312	895	216	78	1,248		
Economic Price	12,408	11,312	851	200	45	0	0.902	12,408
2001								
Market Price	5,566	5,060	0	0	0	506		
Economic Price	5,060	5,060	0	0	0	0	0.909	5,060
2002								
Market Price	17,923	15,166	654	420	55	1,628		
Economic Price	16,208	15,166	622	388	32	0	0.904	16,208
Grand Total								
Market Price	129,133	106,424	7,414	2,647	752	11,896		
Economic Price	116,410	106,424	7,051	2,500	435	0	0.901	116,410

Source : Calculated by The Study Team

Table 5.20 Economic Price of Investment Cost of Ujung Pandang Port

(Unit:Million Rupiahs)

Work	Cost of Investment in Market Prices	Foreign Portion (CIF)	Local Portion				Overall Conversion Factor	Investment Costs in Economic Prices
			Non-traded Goods	Skilled Labour	Unskilled Labour	Transfer Item		
		1.000	(SCF) 0.951	(CFC) 0.925	(CFL) 0.578	0.000		
Extension Berth								
Market Price	21,273	13,829	3,970	1,134	567	1,773		
Economic Price	19,066	13,829	3,775	1,134	328	0	0.896	19,066
Extensin Container Yard								
Market Price	18,814	10,912	4,434	1,267	633	1,568		
Economic Price	16,667	10,912	4,217	1,172	366	0	0.886	16,667

Source : Calculated by The Study Team

Table 5.21 Calculation of Saving in Interest of Cargo Cost

	Difference Staying Time	Difference Staying Time	Average Number of Container	Ratio of Loaded Container	Cargo Volume of a Containe	Difference Time of Cargo	Unit cost of Cargo	Offer Interest Rate	Saving Interest Cargo Cost
	Ship·Day	Ship·year	Box/Ship	0.7	ton/TEU	ton·year	Rp./ton	% / year	Million Rp
1995									
1996									
1997									
1998	315	0.9	220	0.7	12.5	1,663	500,000	7.0%	58
1999	371	1.0	225	0.7	12.5	2,003	500,000	7.0%	70
2000	439	1.2	230	0.7	12.5	2,422	500,000	7.0%	85
2001	533	1.5	235	0.7	12.5	3,001	500,000	7.0%	105
2002	655	1.8	240	0.7	12.5	3,770	500,000	7.0%	132
2003	843	2.3	250	0.7	12.5	5,051	500,000	7.0%	177
2004	1,169	3.2	260	0.7	12.5	7,286	500,000	7.0%	255
2005	1,729	4.7	270	0.7	12.5	11,191	500,000	7.0%	392
2006	582	1.6	280	0.7	12.5	3,904	500,000	7.0%	137
2007	696	1.9	290	0.7	12.5	4,836	500,000	7.0%	169
2008	879	2.4	300	0.7	12.5	6,325	500,000	7.0%	221
2009	1,179	3.2	310	0.7	12.5	8,761	500,000	7.0%	307
2010	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2011	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2012	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2013	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2014	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2015	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2016	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2017	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2018	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2019	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2020	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2021	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2022	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2023	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2024	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2025	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464
2026	1,729	4.7	320	0.7	12.5	13,260	500,000	7.0%	464

Source : Calculated by The Study Team

Table 5.22 Calculation of Saving in Labor Costs

	Labour Fource			Saving
	Difference Berthing Time	Average Number of Labor	Average Labor Cost	Handling Labor Cost
	Ship·Hours	/Gang	Rp./Hour	Million Rp
1995				
1996				
1997				
1998	6,755	12	2,000	150
1999	7,504	12	2,000	167
2000	8,158	12	2,000	181
2001	8,833	12	2,000	196
2002	9,275	12	2,000	206
2003	9,794	12	2,000	217
2004	10,324	12	2,000	229
2005	11,006	12	2,000	244
2006	11,711	12	2,000	260
2007	12,436	12	2,000	276
2008	13,182	12	2,000	293
2009	13,950	12	2,000	310
2010	14,908	12	2,000	331
2011	14,908	12	2,000	331
2012	14,908	12	2,000	331
2013	14,908	12	2,000	331
2014	14,908	12	2,000	331
2015	14,908	12	2,000	331
2016	14,908	12	2,000	331
2017	14,908	12	2,000	331
2018	14,908	12	2,000	331
2019	14,908	12	2,000	331
2020	14,908	12	2,000	331
2021	14,908	12	2,000	331
2022	14,908	12	2,000	331
2023	14,908	12	2,000	331
2024	14,908	12	2,000	331
2025	14,908	12	2,000	331
2026	14,908	12	2,000	331

Source : Calculated by The Study Team

Table 5.23 Calculation of EIRR for Short Term Plan

EIRR = 15.584%

(Unit : Million Rupiahs)

	Year	Costs								Benefits (Saving Cost)								Cash Flow	Cash Flow		
		Construction and Installation			Operation Cost				Total	Save	Save	Save	Extension	Extension	Handling	Operation	Total	Benefits	Costs	Benefits	Difference
		Investment	Replacement	Sub-total	Personal	Maintenance	Operation	Sub-total		Ship Cost	Interest	Labor	Berth	C. Yard	Equipment	Cost		- Costs			
1	1997	21.870		21.870					21.870					18.667	8.450		25.117	3.247	18.922	21.731	2.809
2	1998	45.320		45.320	356	2.868	463	3.688	49.007	5.675	58	150				638	6.522	-42.485	38.883	4.882	-31.801
3	1999	15.543		15.543	356	3.538	463	4.357	19.900	6.683	70	167				638	7.558	-12.343	12.888	4.894	-7.993
4	2000	12.408		12.408	712	3.753	926	5.391	17.799	7.908	85	181				638	8.810	-8.989	9.972	4.938	-5.036
5	2001	5.060		5.060	712	3.753	926	5.391	10.451	9.590	105	196				638	10.530	79	5.066	5.104	38
6	2002	18.208		18.208	783	3.816	993	5.572	21.780	11.793	132	206				638	12.770	-9.010	9.134	5.356	-3.779
7	2003		132	132	783	3.816	993	5.572	5.704	15.171	177	217	10.000			638	26.204	20.500	2.070	9.508	7.438
8	2004			0	783	3.816	993	5.572	5.572	21.041	255	229	6.000			638	28.163	22.591	1.749	8.841	7.092
9	2005		88	88	783	3.816	993	5.572	5.660	31.121	392	244	3.000		2.150	638	37.612	31.952	1.537	10.215	8.678
10	2006			0	783	3.816	993	5.572	5.572	10.489	137	260				794	11.680	6.088	1.309	2.740	1.430
11	2007			0	783	3.816	993	5.572	5.572	12.520	169	278				794	13.760	8.188	1.133	2.797	1.665
12	2008		5.074	5.074	783	3.816	993	5.572	10.646	15.831	221	293				794	17.139	6.493	1.872	3.015	1.142
13	2009			0	783	3.816	993	5.572	5.572	21.220	307	310				794	22.631	17.059	848	3.444	2.596
14	2010		39.043	39.043	783	3.816	993	5.572	44.615	31.113	464	331			6.300	794	39.002	-5.613	5.874	5.135	-739
15	2011			0	783	3.816	993	5.572	5.572	31.113	464	331				794	32.702	27.130	895	3.725	3.090
16	2012		4.180	4.180	783	3.816	993	5.572	9.752	31.113	464	331				794	32.702	22.950	961	3.223	2.262
17	2013		25.432	25.432	783	3.816	993	5.572	31.004	31.113	464	331				794	32.702	1.698	2.843	2.788	145
18	2014		4.180	4.180	783	3.816	993	5.572	9.752	31.113	464	331				794	32.702	22.950	719	2.412	1.693
19	2015		88	88	783	3.816	993	5.572	5.660	31.113	464	331				794	32.702	27.042	361	2.087	1.726
20	2016			0	783	3.816	993	5.572	5.572	31.113	464	331				794	32.702	27.130	308	1.806	1.498
21	2017		12.650	12.650	783	3.816	993	5.572	18.222	31.113	464	331				794	32.702	14.480	870	1.562	692
22	2018		5.074	5.074	783	3.816	993	5.572	10.646	31.113	464	331			2.150	794	34.852	24.206	440	1.440	1.000
23	2019			0	783	3.816	993	5.572	5.572	31.113	464	331				794	32.702	27.130	199	1.169	970
24	2020		9.783	9.783	783	3.816	993	5.572	15.355	31.113	464	331				794	32.702	17.347	475	1.012	537
25	2021			0	783	3.816	993	5.572	5.572	31.113	464	331				794	32.702	27.130	149	875	726
26	2022		29.260	29.260	783	3.816	993	5.572	34.832	31.113	464	331				794	32.702	-2.130	807	757	-49
27	2023		3.003	3.003	783	3.816	993	5.572	8.575	31.113	464	331			6.300	794	39.002	30.427	172	781	610
28	2024		4.180	4.180	783	3.816	993	5.572	9.752	31.113	464	331				794	32.702	22.950	189	587	398
29	2025		3.741	3.741	783	3.816	993	5.572	9.313	31.113	464	331				794	32.702	23.389	140	490	351
30	2026	-45.146	4.180	-40.966	783	3.816	993	5.572	-35.394	31.113	464	331			-5.442	794	27.261	62.655	-459	354	813
	Total	71.284	150.088	221.352	21.215	109.320	27.592	158.127	379.479	697.945	9.997	8.355					793.721		117.647	117.647	0

Table 5.24 Calculation for Sensitivity Analysis

	Case-A			Case-B			Case-C		
		EIRR =	12.945%		EIRR =	12.686%		EIRR =	10.376%

	Year	Cost x 1.1	Benefits x 1.0	Cash Flow	Cost x 1.0	Benefits x 0.9	Cash Flow	Cost x 1.1	Benefits x 0.9	Cash Flow
1	1997	24,058	25,117	1,059	21,870	22,605	735	24,058	22,605	-1,452
2	1998	53,908	6,522	-47,386	49,007	5,870	-43,138	53,908	5,870	-48,038
3	1999	21,890	7,558	-14,333	19,900	6,802	-13,098	21,890	6,802	-15,088
4	2000	19,579	8,810	-10,769	17,799	7,929	-9,870	19,579	7,929	-11,650
5	2001	11,496	10,530	-966	10,451	9,477	-974	11,496	9,477	-2,019
6	2002	23,958	12,770	-11,188	21,780	11,493	-10,287	23,958	11,493	-12,465
7	2003	6,274	26,204	19,929	5,704	23,583	17,879	6,274	23,583	17,309
8	2004	6,129	28,163	22,034	5,572	25,347	19,775	6,129	25,347	19,218
9	2005	6,226	37,612	31,386	5,660	33,851	28,191	6,226	33,851	27,625
10	2006	6,129	11,660	5,531	5,572	10,494	4,922	6,129	10,494	4,365
11	2007	6,129	13,760	7,630	5,572	12,384	6,812	6,129	12,384	6,255
12	2008	11,711	17,139	5,428	10,646	15,425	4,779	11,711	15,425	3,714
13	2009	6,129	22,631	16,501	5,572	20,367	14,795	6,129	20,367	14,238
14	2010	49,077	39,002	-10,074	44,615	35,102	-9,513	49,077	35,102	-13,975
15	2011	6,129	32,702	26,573	5,572	29,432	23,860	6,129	29,432	23,303
16	2012	10,727	32,702	21,975	9,752	29,432	19,680	10,727	29,432	18,705
17	2013	34,104	32,702	-1,402	31,004	29,432	-1,572	34,104	29,432	-4,672
18	2014	10,727	32,702	21,975	9,752	29,432	19,680	10,727	29,432	18,705
19	2015	6,226	32,702	26,476	5,660	29,432	23,772	6,226	29,432	23,206
20	2016	6,129	32,702	26,573	5,572	29,432	23,860	6,129	29,432	23,303
21	2017	20,044	32,702	12,658	18,222	29,432	11,210	20,044	29,432	9,388
22	2018	11,711	34,852	23,142	10,646	31,367	20,721	11,711	31,367	19,656
23	2019	6,129	32,702	26,573	5,572	29,432	23,860	6,129	29,432	23,303
24	2020	16,891	32,702	15,812	15,355	29,432	14,077	16,891	29,432	12,541
25	2021	6,129	32,702	26,573	5,572	29,432	23,860	6,129	29,432	23,303
26	2022	38,315	32,702	-5,613	34,832	29,432	-5,400	38,315	29,432	-8,883
27	2023	9,433	39,002	29,570	8,575	35,102	26,527	9,433	35,102	25,669
28	2024	10,727	32,702	21,975	9,752	29,432	19,680	10,727	29,432	18,705
29	2025	10,244	32,702	22,458	9,313	29,432	20,119	10,244	29,432	19,188
30	2026	-38,933	27,261	66,194	-35,394	24,535	59,928	-38,933	24,535	63,468
	Total	417,426	793,721	376,295	379,479	714,349	334,870	417,426	714,349	296,923

Source : Calculated by The Study Team

6. FINANCIAL ANALYSIS

6.1 Purpose of the Financial Analysis

6.1.1 Purpose

1. The purpose of the financial analysis is to appraise the financial feasibility of the port facility development plan. The analysis focuses on the viability of the project itself and the influence on the soundness of the port management body during the project life.

6.1.2 Project

2. The project in this study is defined as development of the Specialized Container Berth of New Hatta Quay and Inland Container Terminal (not include the part of civil construction by the OECF loan: on-going project).

6.2 Methodology of the Financial Analysis

6.2.1 Viability of the project

3. The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the FIRR (financial internal rate of return). The FIRR is a discount rate that makes the cost and the revenue during the project life equal, and it is calculated using the following formula:

$$\sum_{(i=0)}^{n} \frac{Bi - Ci}{(1 + r)^i} = 0$$

Where, Bi : Revenue in the i-th year
Ci : Cost in the i-th year
r : Discount rate
n : Period of project life

4. Revenue and cost which are taken into account for the calculation of the FIRR are summarized as follows:

Revenue:	(i)	Port operating revenue
	(ii)	Residual value of the fixed assets at the end of the project
Cost:	(i)	Initial investment for the project and its re-investment)
	(ii)	Operating expense such as maintenance, repair, personnel and other cost

5. When the calculated FIRR exceeds the interest rate of the funds for the investments of the project, the project is regarded as financially feasible.

6.2.2 Financial soundness of the port management body

6. The influence on the financial soundness of the port management body is appraised based on projected financial statements regarding the project (Income Statements, Cash Flow Statements and Balance Sheets). The appraisal is generally made from the viewpoints of profitability, loan repayment capacity and operational efficiency, using the following financial indicators:

(1) Profitability

7. Rate of return on Net Fixed Assets:

(Net Operating Income / Total Fixed Assets) x 100%

8. This indicator shows the profitability of the investments, which are presented as net total fixed assets. It is preferable to keep the rate higher than the average interest rate of the funds for the investments.

(2) Operational Efficiency

9. Operating Ratio:

(Operating Expenditure / Operating Revenue) x 100%

Working Ratio:

(Operating Expenditure - Depreciation Cost) / Operating Revenue) x 100%

10. The operating ratio shows the operational efficiency of the organization as an enterprise, and the working ratio shows the efficiency of the routine operations of the port. When the calculated operating ratios are less than 70 - 75%, and the working ratios are less than 50 - 60%, the operations are considered as being efficient.

6.3 General Prerequisites of the Financial Analysis

6.3.1 Project life

11. Taking account of the conditions of the long-term loans and the service lives of the port facilities, the project life for the financial analysis is determined as 30 years.

6.3.2 Base year

12. For the estimation of expenditures and revenues analyzed quantitatively here, constant prices at 1994 are predominantly used. Neither price inflation nor increases in nominal wages are considered during the project life.

6.3.3 Cargo handling volume and number of vessels

13. The cargo handling volume and number of vessels at the projected wharf in 2010 is estimated based on the demand forecast as shown in **Appendix C-3.**

6.3.4 Port charge and revenue

14. The revenues from the port activities are calculated based on the present tariff system. However the port service charge exclude from the revenue in this project, because the wharf is constructed by the OECF loan. By the same reason, the cargo handling fee is leaved after subtracting the tariff of the conventional terminal from the tariff of exclusive container terminal such as Tg.Priok port. The revenue per year during the project life is shown in **Appendix C-3.**

6.3.5 Expenditure

(1) Cost for initial investments

15. The initial investments of the project are estimated in **Chapter** 3. These are summarized in **Appendix C-4**.

(2) Reinvestment

16. The facilities and equipments will be renewed based on their services lives. The funds for reinvestment will be financed by internal resources of Port Corporation IV.

(3) Operating expense

17. The annual operating expense for the project is assumed as follows:

a. Personnel

18. The annual personnel expense is estimated based on the required number of workers and existing pay scales as shown in **Appendix C-6**.

b. Maintenance and repair

19. The annual maintenance and repair costs for the port facilities are calculated as follows:

infrastructure, warehouse: 1% of the original construct cost handling equipment and vessel: 5% of the original construct cost

c. Other expense

20. To provide other expense such as cost for fuel and general administration, 130 % of the annual personnel costs is included to the operating expense based on the actual situation of financial statement.

d. Depreciation costs

21. The annual depreciation costs of the port facilities and equipment are calculated by the straight line method based on their service lives as shown in **Appendix C-5**. Residual values after all depreciations are estimated as zero. Also, for the calculation of FIRR, the residual values of fixed assets at the end of the project life are assumed to be revenues of the project.

(4) Tax and contribution to the government

22. Income tax ratio is assumed as 30%. Contribution to the Government is assumed as 25% of income after tax.

6.3.6 Fund raising

23. The Study Team assumes that the foreign funds necessary for the implementation of the project will be raised. A soft loan for this project is assumed to be as follows:

Loan period: 30 years, including a grace period of 10 years
Interest rate: 2.6% per annum
Repayment: fixed amount repayment of principal

24. Any cash excess will be deposited to a bank with an annual deposit interest rate of 15%. Also cash shortage will be covered by internal funds of Port Corporation IV.

6.4 Appraisal of the Projects

6.4.1 Analyzed case for FIRR appraisal

To appraise the profitability of the projects and to study the possibility of participation of the private sector, the following cases are calculated its FIRR and analized financially.

(1) Base Case (Short-term development plan project)

Cost : cost for the short-term development plan project
Revenue : increment of revenue of port service fee which is expected by execution of the project.
Project life : 30 years

In this case, the amount of investment, expenditure and revenues are calculated to take away Case 2 from Case 1.

(2) Case 1 (General project : Short-term development plan project + On-going project)

Cost : cost for the short-term development plan project and on-going project
Revenue : revenue of port service fee of the short-term development plan project and on-going project Project life : 30 years

In this case, the project is regarded such as full container terminal.

(3) Case 2 (On-going project : Part of civil construction and buildings at New Hatta Quay by OECF loan)

Cost : cost for the on-going project
Revenue : revenue of port service fee of the on-going project
Project life : 30 years

In this case, New Hatta Quay is supposed a conventional terminal which have cargo handling system by shipgear mainly.

(4) Case 3 (Base Case is excuted by the private sector)

Cost : cost for the short-term development plan project
Revenue : all revenue of cargo handling fee and Inland Container Terminal using fee
Project life : 15 years

In this case, the private sector can obtain all revenue of cargo handling fee and Inland Container Terminal using fee. And project life is determined as 15 years considering the conditions of the city bank loans.

(5) Case 4 (Equipment such as gantry crane is procured and operated by the private sector)

Cost : cost for procurement and operation of equipment
Revenue : all revenue of cargo handling fee Project life : 15 years

In this case, the private sector can obtain all revenue of cargo handling fee. And project life is determined as 15 years considering the conditions of the city bank loans.

The items of FIRR calculation on each cases are shown in **Table 6.1**.

6.4.2 Sensitivity analysis

25. Sensitivity analysis is conducted to examine the impact of unexpected future changes. The following three cases are envisioned:

Case (1): The revenue decreases by 10%
Case (2): The project cost increases by 10%
Case (3): The revenue decreases by 10% and the project cost increase by 10%

6.4.3 Results of the FIRR calculation

26. The results are shown in **Table 6.2** and the FIRR calculation and its details is shown in **Appendix C-6.**

Table 6.1 Items of Calculation of FIRR

Case	Project Period (year)	Investments			Expenditure	Revenues				Remarks
		On-going Project	Study Project							
		New Hatta Quay Civil, Buid.	Equipments Gantry cranes	Inland Container Yard Civil, Buid.	Personnel Maintenance Personnel	Ship Service	Container Handling	New Hatta Quay Yard	Inland Container Yard	
Base Case (Study Project)	30	-	○	○	○B	○B	○B	○B	○	○B=○1-○2 Handling by Gantry Cranes
Case 1 (General Project)	30	○	○	○	○1	○1	○1	○1	○1	Handling by Gantry Cranes
Case 2 (On-going Project)	30	○	-	-	○2	○2	○2	○2	-	Handling by Ship-gears
Case 3 (Privatized Project 1)	15	-	○	○	○	-	○1	-	○1	Handling by Gantry Cranes
Case 4 (Privatized Project 2)	15	-	○	-	○	-	○1	-	-	Handling by Gantry Cranes

Table 6.2 Result of the FIRR calculation

Base Case (Short-term development plan project)		
Calculation Case	FIRR	Remarks
Original	8.57	
Sensitivity Analysis (1)	6.89	Revenue 10 % Down
Sensitivity Analysis (2)	7.05	Cost 10 % Up
Sensitivity Analysis (3)	5.41	Revenue 10 % Down, Cost 10 % Up
Case 1 (General project)		
Calculation Case	FIRR	Remarks
Original	7.79	
Sensitivity Analysis (1)	6.14	Revenue 10 % Down
Sensitivity Analysis (2)	6.30	Cost 10 % Up
Sensitivity Analysis (3)	4.70	Revenue 10 % Down, Cost 10 % Up
Case 2 (On-going project)		
Calculation Case	FIRR	Remarks
Original	6.33	
Sensitivity Analysis (1)	4.71	Revenue 10 % Down
Sensitivity Analysis (2)	4.86	Cost 10 % Up
Sensitivity Analysis (3)	3.29	Revenue 10 % Down, Cost 10 % Up
Case 3 (Execution of Base Case by private sector)		
Calculation Case	FIRR	Remarks
Original	9.95	
Sensitivity Analysis (1)	7.28	Revenue 10 % Down
Sensitivity Analysis (2)	7.53	Cost 10 % Up
Sensitivity Analysis (3)	5.02	Revenue 10 % Down, Cost 10 % Up
Case 4 (Procurement and Operation of Equipment by private sector)		
Calculation Case	FIRR	Remarks
Original	13.62	
Sensitivity Analysis (1)	10.24	Revenue 10 % Down
Sensitivity Analysis (2)	10.55	Cost 10 % Up
Sensitivity Analysis (3)	7.37	Revenue 10 % Down, Cost 10 % Up

6.4.4 Appraisal

We can judge Base Case and Case 1 to be financially feasible, because the FIRR of both cases exceed the interest rate of foreign funds.

It is difficult finanncially to excute the project for the private sector, because the FIRR of Case 3 and Case 4 are both less than the interest rate of city bank loans.

6.5 Financial Soundness of the Port Management Body

Base Case and Case 1 which are judged to be feasible by FIRR analysis, are apparaised from the viewpoint of financial soundness of the implementation body. The projected financial statement for the project and financial indicators are shown in **Appendix C-10 and C-11.**

The financial indicators of the both cases almost keep the preferable levels as follows:

(1) Base Case

This case takes 5 years (2002) after starting operation to clear deficit per year and takes 7 years (2004) to clear cumlative deficit. In this case, operating ratio keeps below 75% after 2005 and keeps below 50% after 2010. And working ratio keeps below 50% after 2000 and keeps 20% after 2010.

(2) Case 1

This case goes into the black from the year of starting operation (1998), therefore this case have not cumlative deficit. In this case, operating ratio keeps below 75% after 2002 and keeps below 50% after 2010. And working ratio keeps below 40% after 2000 and keeps 20% after 2010.

6.6 Conclusion

The short-term development plan project (Base Case) which is object of this study are judged to be feasible by FIRR analysis. Feasibility of the general project (Case 1) is secured financially though its FIRR fall a little because the viability of the on-going

project low less than Base Case.

If the Base Case is excuted by the private sector which can obtain all of revenue of cargo handling fee, the FIRR of this case is 9.95% (Case 3). And if only equipment such as gantry crane is procured and operated by the private sector, the FIRR of this case is 13.62% (Case 4).

In the result mentioned above, it would be difficult for the private sector to recover the principal of the investment, because the FIRR of Case 3 and Case 4 are both less than the interest rate of the city bank loans.

It is hoped that the study project (short-term development plan) and the on-going project are executed and operated together by the public agency, Port Corporation IV, which can obtain low interest foreign funds.

However, Port Corporation IV should make efforts to secure forecast cargo volume by port sales, to improve port operation efficiency and to reduce operating expenses constantly.

7. ENVIRONMENTAL IMPACT ASSESSMENT(EIA)

1. This section describes the environmental impact assessment with the results of the environmental impact study at the two project locations in Ujung Pandang city.

7.1 OBJECTIVE OF THE STUDY

2. The objectives of this study are :

(1) To give information on the stage of project activities and to identify activities component, chiefly that is expected to cause an impact on the environment.

(2) To identify an environmental component that is estimated to be affected by an impact caused by project activities.

(3) To evaluate the volume of an environmental impact that will occur.

(4) To give recommendation to act in the environmental management to minimize negative impact caused by project activities.

3. These recommendations made in this chapter will be an possible input of making revision upon the design, supervision on implementation of physical activities, operation and maintenance.

7.1.1 Environmental impact study

4. Environmental impact study in sea port division on THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA consists of two portions as follows:

(1) Dredging and dumping of navigation channel of Ujung Pandang port

(2) Construction of inland container terminal of Ujung Pandang port

5. Environmental impact study on the activity of dredging and dumping of

navigation channel of Ujung Pandang port is obliged to complete the ANDAL study with its dredging volume, while reclamation volume of the construction of inland container terminal is not obliged to complete the ANDAL study. The word "ANDAL" stands for Environmental Impact Analysis (Analisis Dampak Linkungan) according to government regulation of Indonesia.

a. Method of the study

6. The methodology carried out are by primary data and secondary data collecting.

i) Environmental component to be analyzed

7. The environmental component that should be analyzed in this study covers:

a) Physical-chemical component, among others: climate, water quality, air quality, noise, sediment

b) Biological component that covers aquatic biology and terrestrial biology.

c) Socio-economic component that covers demography, economic activities, standard of living, land use, public facilities infrastructure, public health and community perception to the development.

ii) Data collecting method

a) Primary data

8. The primary data which were collected comprises of primary data of physical-chemical component, biological component and socio-economic component. Physical-chemical and biological primary data ware collected directly from the field, namely in taking the samples it should follow the method in sampling in line with the existing technical provisions. Socio-economic primary data are collected by direct interview with the people who live at the border of the study area.

b) Secondary data

9. Secondary data cover physical-chemical, biological and socio-economic data that

ware collected through literature study in the form of statistical data, research reports and working papers.

iii) The method in analysis of a sample, management and processing of data

10. The result of sampling was analyzed by the type of data and existing technical requirements. The results of the analysis are presented in the form of tables, figures and maps.

iv) The method of impact prediction and impact evaluation

11. Impact prediction on dredging and dumping activities in Ujung Pandang port used for estimating the environmental impacts, among others, ware built from series of consultation and discussion with experts, resources, responsible institutions and the concerned societies, supported by field investigation and the observation result.

12. The objective of impact evaluation is to get general conclusion of the environmental impacts that may occur because of implementation of the project. The approach used in evaluating the environmental impacts is rating technique that accommodated elements, showing relative differences of one criterion from another criteria using the following grade:

a. Extremely significant
b. Significant
c. Almost significant
d. Less significant

7.2 ENVIRONMENTAL IMPACT ASSESSMENT OF DREDGING OF NAVIGATION CHANNEL AND DUMPING SITE OF UJUNG PANDANG PORT

7.2.1 Present Conditions

(1) Physical-chemical component

a. Climate

13. Basic climate data (temperature, humidity and rainfall) in Ujung Pandang is described in **section 2.2.7** "Present environmental situation".

b. Air quality

14. The air quality data are primary data collected from the measuring of the air quality within the planned project's location that taken from the Losari Benteng's beach and the entrance of Hatta quay Ujung Pandang. (see **Fig. 7.2**). To measure the air quality, the observations executed by High Volume Sampler. Parameters of climate within the Losari Benteng's Beach (Benteng) and Hatta Quay constitute as follows:

	Benteng	Hatta Quay
· temperature.(°C)	26.5-31.5	26.0-33.5
· humidity.(%)	30.4-80	50.5-89.0
· wind (knot)	0.02-6.53	0.04-4.36

15. Detail results of the measuring of air quality within both locations is shown in **Appendix C-12.**

16. From the result of the measuring of the air quality, some gas contents were still under the maximum-limit of the standard; however, in some places such as the Losari Benteng's Beach and Hatta quay, the dust content has already reached the number of 0.885-1.885 mg/m^3, which means it has already exceeded the maximum-limit of the standard value.

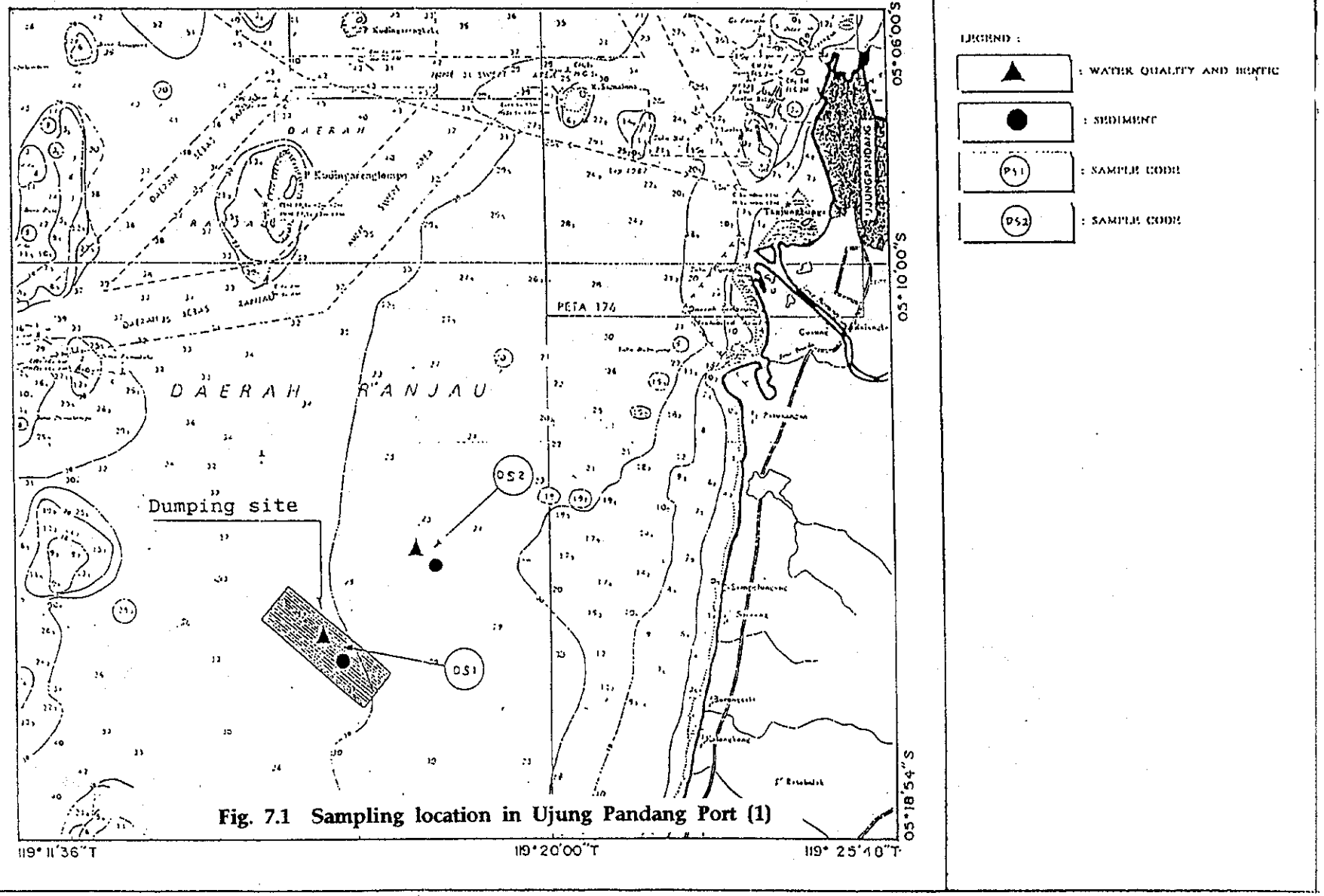

Fig. 7.1 Sampling location in Ujung Pandang Port (1)

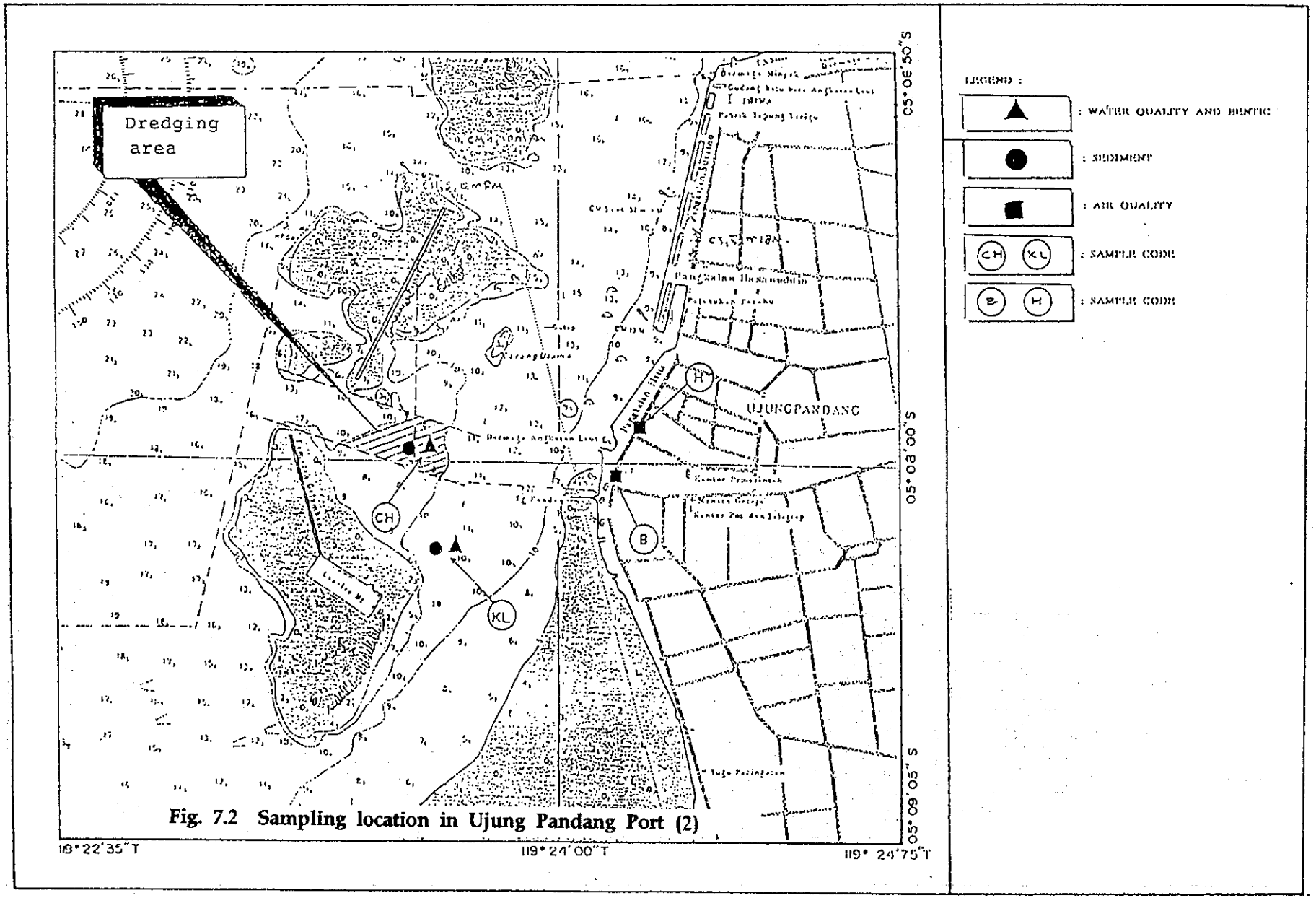

Fig. 7.2 Sampling location in Ujung Pandang Port (2)

c. Noise

17. The noise data are primary data collected from the observation of the level of noise within the project's location. The noise level in Losari Benteng's Beach was between 60-70 dBA, and in Hatta Quay was between 57-71 dBA.

18. It is estimated that the noise in both two observation stations were more affected by the vehicle-traffic noise.

d. Sea water quality and sediment

19. The sea water quality data are primary data collected by measuring the sea water within 2 locations of the project's activity (**see Appendix C-13 to 17**); the navigation channel and dumping site. Generally, the sea water quality of both locations is not much different, although the sea water quality within the dumping site tends to be better than the water within the basin and navigation channel.

20. As the 2 samples analyzed in the laboratory of Lymnology Laboratory of the Bogor Institute of Agriculture, the result showed that some parameters of the water have already exceeded the maximum-limit of the standard allowed for the sea biota. Those parameters, which have already exceeded the standard, among others, are the solid suspension, COD, nickel, phenol, oil-grease, lead, selenium and cadmium. The sea water quality condition is much influenced by the dynamics of the ecosystem. Since the water in the Ujung Pandang port can be characterized as a semi-closed ecosystem, all those influences cause the water circulation move relatively slow. That is one reason why rehabilitation and neutralization of the sea water quality inside this location goes on slowly compared with other locations. Besides, it is also found that higher possibility of heavy metal accumulation and other fusion of chemical compound exit in the port basin. That caused the sea water quality in this location tends to be worse than in the dumping site.

21. The dumping site is an open and dynamic ecosystem compared with the navigation channel. Its characteristics make the sea water to circulate swiftly and a better dilution and neutralization to the heavy metal component, as well as other fusion of chemical components. The sea water quality tends to be better at high tides than the low tide inside the basin and navigation channel. Since the water flow is more dynamic

during the high tides, the diffusion of oxygen and the dilution of heavy metal (including other fusion of chemical compounds), may be higher. At the dumping site, some parameter like lead,cadmium and nickel tends to get worse when they were collected from seabed nearer. However, other parameters have not shown any significant pattern in the vertical column. That is because the dumping site has good water circulation so that the water mass will mix.

22. In general, both locations show adequate conditions that ranged from medium to bad level, especially for some parameters of heavy metal.

(2) Biological component (water biota)

23. The observation on water biota was performed at 3 points inside the project's location;

- The dumping site
- Navigation channel
- Port's basin

Table **Appendix C-18 to 25** show specific diversity and its density of water biota.

a. Plankton

24. Plankton is a kind of fine organic that floats in the waters, and is easily affected by environmental alternation. That makes the plankton to be a good indicator for the environment changes. The affluence of plankton is still high inside the 3 location samples, at the port's basin navigation channel and dumping site, which ranges between 28,947 ind/l - 146,285 ind/l.

25. The diversity of species and individual is not too high, but dominated by one certain species *Chaerto ceros* sp.. The Shannon's diversity and variety index value ranges from low to medium. The value indicated in the water environment is classified as medium category as far as plankton is concerned. The plankton population inside the port's basin is considered better than the other two points.

b. Benthos

26. Benthos is a kind of fine biota that lives in the seabed. Viewing the benthic manner of consuming food, benthos is classified as a filter feeder. This characteristic makes benthos a suitable indicator against the substrate condition.

27. Benthos population, in basin and navigation channel, is not of high density which ranges between 16-24 ind/m2 with variety of species between 3-6 species. The diversity index of benthic ranges from small to medium, but it was found that no certain species dominated. The diversity of species due to lack of number of species-type can be found in the observation points. The condition indicates that the seabed environment just causes less support for the living of benthos. It is thought, that the alteration of the environment or under water disturbance is one reason why the species of benthos in the substrata is good.

c. Mangroves

28. Mangrove is found at the northern part of Ujung Pandang City. There are 2 species of mangrove in this area namely, *Avicennia* sp. which is the most dominating species, and some *Rhizophora* sp. exist. The mangrove community is classified as medium dense and covers an area of about 2 ha. Some part of the mangrove area has been already damaged by human impact such as cutting mangrove forests for coastal fish pond.

d. Coral

29. The observation on coral is done in Dayang-dayangan, Samalona and Kudinggareng Lompo Islands. The Dayang-dayangan island is located about 17km southwestward of the dumping site, Samalona island is located about 18km northeastward of the dumping site, and Kudinggareng Lompo island is located about 13km northward of the dumping site.

30. In general, the coral within the Dayang-dayangan island has a good condition with the cover value of 60-80%. The structure of the coral's community is dominated by soft coral, about 40%, while the remaining is a massive coral with species like *Acropora* sp., *Porites* sp., *Goniopora* sp. and *Fauia* sp..

31. The coral condition in the Samolona island is more-less the same with the coral in the Dayang-dayangan island. There is about 40-70% of live coral (cover value) in the area, which is dominated by the species of table-coral like *Seriotopora* sp., *Acropora* sp. and *Porites* sp..

32. The coral condition in Kudinggareng island is not as good as in that in the Samalona island. There is only about 30-60% of live coral (cover value) in this area dominated by these 3 species *Porites* sp., *Goniopora* sp. and *Acropora* sp..

33. The coral condition in both Kayanggan and Lae-Lae island is quite the same, with about 30-60% of live coral (cover value). Dominating species in these two areas are, among others, *Porites* sp., *Favia* sp. and *Acropora* sp..

(3) Socio-economic component

a. Socio-economy

34. The location of socio-economic,cultural, and public health case study was administrated in Ujung Pandang and its subdistrict area where the dredging activity of Ujung Pandang port navigation channel is located. The survey location comprises of Butung sub district, Mampu sub district, Lae-lae sub district and Burogadeng sub district. The number of households which become the target of population from the four sub districts is more or less 1000 households.

35. The respondent's origin in this area can be mentioned, 72% of population constitutes local citizens and 28% China ethnic descent citizens. Business activities which are available in trade area are, 52% of department store, 20% of clothing store, 10% of jewelry store, 10% of food store, 8% of pharmacies. The duration of respondent residents in the location is 73% of who have lived have for 10 to 20 years, 21% has lived for 20 to 30 years, and 6% has lived for more than 40 years. The respondent's education is 42% of respondent has graduated from senior high school, 23% has graduated from basic schooling, 12% graduated from Academy/University, 12% graduated from junior high school, and 11% could not pass their basic schooling. The main occupation of respondents are 39% of businessman/merchant, 21% of fisherman, 12% of white collar workers, 4% skilled workers, 3% agricultural workers, 3% unskilled worker, and 28% of others. The respondent's earnings could be mentioned, 27% have

the income level of 100,000 to 140,000 Rp, 24% have the income level of more than 1,000,000 Rp, 11% have 500,000 to 1,000,000 Rp, 8% of 140,000 to 200,000 Rp, 6% of 200,000 to 250,000 Rp, 5% of 250,000 to 300,000 Rp, 5% of 300,000 to 500,000 Rp and 4 % have the income level of less than 100,000 Rp.

b. Housing condition

36. The housing status in this area as follows: 91% own their own houses, 5% rented houses, 3% free of using the house and 1% share other person's house.

37. The distance between the location of the respondents house to the project location which is the dredging site: 65% live at a distance of about 900 to 1,000m, the rest of 35% for more than 1,000 m from the project site.

38. The source of drinking water: 68% is supplied by the water supply enterprise (PDAM), 31% from wells and 1% from water pumps; for the quality of water: 62% respondents gave good points, and 38% gave fair points.

39. For the waste-discharge: 69% respondents mentioned that it was done by special person who is paid to do the job, 15% dumped the waste the sea/river, 12% throw it away in the house-yard, 2 % burned it and 2 % take the waste to the Public Waste Incineration (TPU) plant.

40. The level of house cleanliness: 75% is categorized as ordinary,16% is categorized as good and 9% left is categorized in poor condition.

41. For the use of house-yard: 84% just left for a spare space empty, 7% is used for planting, 2% is used for home-manufactured, 1% is rented or contracted.

42. In general, respondents have some objections to the environment such as: 25% high dense population, 19% bad condition of social facilities, 18% for noise, 14% the work place is far from their homes, 13% lack of the market, 12% dirty environment and 6% a cool relation among the neighborhood.

c. People's perception to the project.

43. The respondents opinion on the activity plan is encouraging that 95% of the respondents show good response, even with note that they will agree as long as the project will give an advantage/benefit to the society like open new job opportunities, stimulating business activities, and improving the physical condition of the area. only 5% against the plan, because they thought that the plan will cause trouble to the people such as disturbing the sea transportation activities to the tourism location.

d. The public health

44. The terms of the public health condition is studied by observing diseases that commonly harm the people in the project location. From the results of the interview survey, it is found that 44% of respondents said cough problems, 15% diarrhea, 8% typhus, 4% malaria, 1% tuberculosis, 2% cholera, 2% dysentery, 24% others. The people's habit treatment has shown good conditions where about 75% go to hospital for their treatment, 18% go to the Center of Society Health (Puskesmas), 2% go to the Center of the Society Services (Posyandu), only 1% perform their own treatment, and 4% others.

e. Society security

45. For the time being, the term of the Society Security in this area is found to be relatively good, where about 45% of people said secure conditions of their neighborhood, 28% mentioned fair condition, 17% relatively secure, and only 4% mentioned unsecure condition in the society.

7.2.2 The prediction of impact activities to the environment

(1) Physical-Chemical Component

a. The Impact Against Sea Water Quality by Dredging Activity

46. It is predicted that the dredging activity will cause negative impacts to the sea-water quality within the dredging location and the surrounding area.

47. The outcome of impact is because the dredging activity will cause the dredged mud taken from the seabed. That will increase the load of suspended solid and the level of turbidity, and then the sun-rays will be blocked which will reduce the sun radiation coefficient in the water. The increase of turbidity, suspended solids and dissolved solid has already been found in the Ujung Pandang port navigation channel. Beside the changes in the physical characteristic of water quality within the dredging location, the dredging activity will also affect the chemical characteristics of the water quality, which source is from the sediment-chemistry-element, within the dredging location. Moreover, the analysis result shows that the sediment-chemistry-content is cadmium 0.85-1.40 μg/g, plumbum 71.60-87.65 μg/g, mercury 0.02-0.036 μg/g.

48. The level of impact of the dredging activity against sea-water quality is classified as a very significant impact level.

b. The Impact Against Sea Water Quality by Transportation of Dreged material Activity

49. The impact of transporting dredged material comes from the dredged location to the dumping site is estimated to cause negative impact against sea-water quality. The impact of transporting the dredged material comes from the oil and material spilling out over the water surface, which will decrease the sea water quality. The existence of oil film on the waters' surface causes trouble to dissolved oxygen in the water since this oil film will disturb the photosynthesis of the waters' biota. Sun-rays will be blocked by this layer that causes the reduction of the sun radiation intensity in the water as the result of refraction and reflection.

50. However, the existence of current pattern along the transportation path will help spreading over the oil floating. The impact of dredging activity against sea-water quality is classified as a very significant impact level.

c. The Impact Against Sea-Water Quality by the Activity of Dumping Dredged Material

51. With a planned dumping area 30 meters of the sea water depth, it is predicted that the dumping activity will cause negative impact against sea-water quality. Dumped material is likely a waste of port. As the analysis result described, the sediment taken

from the Ujung Pandang port navigation channel contents heavy metal's parameter constitutes cadmium, plumbum and mercury, are found. The impact of the dredging activity against sea water quality is the increase of turbidity, suspended solid, dissolved solids and the chemical characteristics of the sea water quality (cadmium, plumbum and mercury). Sea-water quality within the dumping contents heavy metals constitute: Turbidity of 1.00-8.50 NTU, suspended solid of 282-470 mg/l, cadmium of 0.032-0.049 mg/l, plumbum of 0.186-0.309 mg/l, and mercury under 0.00001 mg/l. The change in physical and chemical characteristics of the sea-water quality spread over an adequate range of affected area. The other thing is that the element of sedimentation of that pollutant will take quite a long period.

52. Viewing the hydrodynamic configuration pattern, which will cause derivative impact against the waters biota, the impact is classified as a very significant impact level.

(2) Biological component

a. Impacts Prediction to Water Biota by Dredging Activity

i) Plankton and Benthic

53. Dredging activities, in view of its impacts against the environment, is a likely physical characteristic. The lifting up of soil mass to the water surface, which first passes through the waters' column, will increase the turbidity in the subtract.

54. Viewing the process of impact, the impact against sea biota (benthic, plankton, and fish) can be classified into 2 (two) types -the direct impact and indirect impact. Physical disturbances, the direct impact, will exist during the operation of dredged equipment and will affect the increasing of turbidity. On the sea water column, direct physical collision is commonly happens against benthic living inside the "subtract". In addition, metabolism disturbance happens against benthic and plankton. Besides, the increase of turbidity will block the rays penetrating through from within the waters' pond, which will reduce the photosynthesis rate of the phytoplankton.

55. Indirect impact is the derivative impact resulting from the change of environment that causes the outcome of poison gas from the "subtract", cause trouble to the

photosynthesis process because of turbidity, and reduce the oxygen content. All those will disturb the waters biota's existence that most affects plankton, then benthic and fish. Usually this activity impact has temporary characteristics and just occurs during a relatively short period, which gives chance for the nature to rehabilitate the environment condition. However, when the volume of water's biota affected by the impact is quite large, the impact will broaden, even it will still occur in a relatively short period. The sudden changes could significantly disturb the balance of ecology.

ii) Nekton

56. The impact of the dredging activity against benthic population is estimated to have local characteristics. Since the level of disturbance against plankton will not spread too far, whereas fish itself has high capability of mobilization, it is estimated the impact will not be so large. The outcome of impact might result to move the fish-haul around the dredging location. The group of fish will try to avoid the increasing turbidity and the lack of food (plankton) occurred by keeping away from the location. However, since the periods of impact only take on in a temporary time, nature will have a chance to recover. The impact is classified as very significant.

iii) Live Coral

57. The impacts of the activity that would endanger the live coral are turbidity and the increase of dissolved particles in the sea water content. The solid particle will cover "coral polyp" so that it would disturb the metabolism, cut off the photosynthesis rate of the *Zooxanthella* which result in the death of coral. Growth disturbance, even death, of the coral, is considered a problem. The growth of coral goes on slowly that it would take a long period of time for them to recover, about decades or years of time. Because the activity has a high intensity and tends to give accumulative impact, the impact is classified as almost a significant impact level.

b. Impact Prediction by the Activity of Transporting the Dredged Material

58. The activity of transporting the dredged material, which is not in line with the standard operational procedure, would only affect the plankton and benthic as it is disturbs the physical characteristic of water such as turbidity. Why plankton and benthic is affected by this physical disturbance is because of their pelagic characteristic

make them floating in the sea water. Since the level of disturbance such as stress is minimum, and not causing death, the impact is classified as less significant.

c. Impact Prediction by the Activity of Dumping Dredged Material

i) Plankton and Benthic

59. The activity of dumping dredged material to the dumping site will cause negative impact against plankton and benthic. Dredged material is the particle that would disturb the plankton in two ways if it is dissolved in the waters' pond. The first is because of the high level of turbidity that would block the sun radiation capability that is an important aspect for the photosynthesis process of the phytoplankton. The second, it would disturb the plankton's metabolism because of fine-particle densely dissolved in the water. Disturbances against the photosynthesis rate will affect the structure of community and food-chain. The productivity decrease, and this will increase the competition between the species.

60. Disturbances against benthic are limited to dumping site area where sedimentation process of the particle exist that will cover the surface of substrata. Turbidity around the surface of substrata will disturb benthic' metabolism. Since benthic is a filter feeder, if the particle around the benthic is too dense, the particle will plug up the benthic' metabolism sense such as the respiration and absorption; Moreover, the substrata covers the layer where the benthic first live will cause the death of the benthic.

61. Estimating the number of plankton and benthic affected by this activity, the impact is classified as a very significant impact level.

ii) Nekton

62. The impact of dumping the dredged material into the dumping site against the fish's community (nekton) has only a local characteristic. Viewing that the disturbance against is far-ranging, whereas the fish has a high capability of mobilization, the death of fish will be low. However, turbidity disturbance might be the factor in disturbing the fish's community, because the fish will avoid living in the location because of the turbidity and lack of food consumption (plankton). Because of this impact, the location for fish-haul will be moved from the area near/around the dumping site.

63. This impact has only a temporary characteristic, and not causing death to fish, and just cause a low level of stress. Viewing the impact characteristic, the impact is classified as almost a significant impact level.

iii) Live coral

64. The impact of dumping the dredged material against the coral's ecosystem is equal to the impact caused by the dredging activity. Parameter of impact that makes problems is the turbidity factor.

65. High dense concentration of particle in the waters will cover the coral' polyp so it disturbs its metabolism that could cause the coral's death. Besides, the high level of turbidity will disturb the photosynthesis of the *Zooxantella*, which is a species of algae that "symbioses" with coral.

66. *Zooxantella* plays an important role for the photosynthesis process in changing the organic and nutrient enzymes from the nature to the source of energy for the coral living.

7.2.3 Environmental management and mitigation

67. **Table 7.1** indicated the environmental management plan for the activity dredging and dumping of navigation channel in Ujung Pandang Port.

68. In order to mitigate those environmental impacts as described in previous sections following mitigation were determined:

(1) Selection of the type of dredger

69. A dredging fleet consisting of grab dredger, hopper barges with bottom doors, pusher or tug boats, and anchor boats should be selected instead of cutter suction pump dredger or drag suction dredger which will suck sea bottom materials together with sea water and discharge the dredged soil with a large volume of turbid sea water will cause serious negative environmental impact, while the grab dredger fleet will excavate sea bottom with grab as a lump of soil and dumping activities also by a mass of soil which will make much less mixture of soil with sea water thus cause much less turbidity of

sea water.

(2) Methodology of dredging works

70. In order to minimize the turbid water by dredging activity following special attention should be given on the dredging activities:

a. The overflow of the dredged soil on the top hopper should be strictly prohibited. This situation might occur due to overloading of dredged soil on the hopper barge.
b. The bottom doors of hopper barge should be confirmed to be closed firmly during transportation plying between dredging and dumping sites regardless of the hopper is full or empty so that the leakage of the dredged soil will be avoided.
c. The bottom doors of hopper barge should also be inspected periodically throughout the dredging work period to avoid the malfunction of the doors and leakage of soil through unexpected gap of doors.
d. It will be required to interrupt the dredging activities during spring tide current to avoid the proliferation of turbid water.

(3) Selection of dumping site

71. The proposed dumping site is located at 15 km south-east side of Ujung Pandang Port at latitude 5° 16′ and longitude 119° 16′ where following advantages on environmental mitigation were considered:

a. The proposed dumping site is selected to keep distance from those Islands such as Dayang-dayangan, Samalona, Kudinggareng and others where a large community of live coral is existing, while at the proposed dumping site with water depth deeper than -30 m, coral and other benthos are existing in less numbers.
b. The movement of dumping soil or seabed soil at sea bottom level is small since the influence of wave action and current velocity are small.

(4) Dumping activities

72. In order to avoid a proliferation of dumped soil on the seabed the dumping area should be strictly kept in proper position. This will also help to avoid mis-dumping or short trip dumping. For this purpose, following countermeasures should be arranged:

a. The dumping site should be clearly indicated with marker buoys and lights if needed.
b. Each dumping activity should be monitored by a third party deployed either on the working boat or on-shore observation station.

(5) Other mitigation measures

a. A treatment of waste oil should be done properly by using incinerator or other collection and segregation system to avoid the casting thereof to the sea. Prior to commencing the dredging marine works a confirmation on the oil treatment procedure and preparation of the facilities concerned should be demanded of the contractor. A preparation of oil fence (s) on the deck of the working boats should also be confirmed and demanded of the contractor.
b. A garbage collection and sewerage treatment should also performed by the contractor of the dredging works.
c. A monitoring should be carried out periodically to control the mitigation measures properly. The scope of monitoring should cover not only the dredging and dumping works but also following observations for proper control of the works:
    i) Oceanographical observations on: current, tide, wave (height, direction, period), water temperature
    ii) Water depth survey of dumping area
    iii) Seawater quality
    iv) Meteorological observations on: wind, weather, precipitation
d. Silt curtain should be prepared at the ready position either for dredging or dumping activities.
e. An investigation on the discharging source (s) of heavy metal and toxic matters, which were found out by Study Team in the sediments of proposed navigation channel area, should be done and stoppage of discharging thereof immediately.

73. By means of the above measures, the predicted environmental impact on the seawater and biological components such as coral, plankton and other benthos and also on the socio-economic components are anticipated to be mitigated.

Table 7.1 Environmental management plan dredging and dumping of navigation channel in Ujung Pandang Port

NO.	ENVIRONMENTAL SUB COMPONENT WOULD BE AFFECTED	THE AIM OF ENVIRONMENTAL MANAGEMENT	ENVIRONMENTAL MANAGEMENT PLAN	LOCATION OF ENVIRONMENTAL MANAGEMENT	PERIOD OF ENVIRONMENTAL MANAGEMENT	ENVIRONMENTAL MANAGEMENT INSTITUTION			FUNDING AGENCY FOR ENVIRONMENTAL MANAGEMENT
						EXCUTOR	SUPERVISOR	ADDRESS OF REPORT	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
1.	SEA WATER QUALITY	- To protect the sea water quality in north part of Dayang-Dayangan island; south part of Kedungareng Lompo island and South part of Samalona island.	- To secure the dumping activity just on the recommended location.	- North part of Dayang-Dayangan island, South part of Kedungareng Lompo and South part of Samalona island.	- During the dumping activity periode.	- Contractor of Dumping activity.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Government of South Sulawesi.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Office of Ministry of Communication.	- PT.(Persero) Pelabuhan Indonesia IV.
		- To protect the sea water quality adjacent the limit of harbour area.	- To make sure that the dredging activity in line with the Dredging procedure.	- Surrounding the breakwater South part of Lae-Lae island and east part of Kedungareng island.	- During the dumping activity periode.	- Contractor of Dumping activity.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Government of South Sulawesi.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Office of Ministry of Communication.	- PT.(Persero) Pelabuhan Indonesia IV.
		- To protect the sea water quality in the lane of dredging material transporation.	- To assume that dredging material transportation in line with the transpor-tation procedure.	- Along the lane of dredging material transportation.	- During the activity of dreging material transportation.	- Contractor of Dumping activity.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Government of South Sulawesi.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Office of Ministry of Communication. - Board of Environmental Impact Protection (Bapedal).	- PT.(Persero) Pelabuhan Indonesia IV.
2.	BIOLOGY	- To protect the life coral., plankton, benthic, and fish.	- To assume that dredging activity in line with the procedure.	- Surrounding the breakwater South part of Lae-Lae island and east part of Kedungareng island. - North part of Dayang-Dayangan island, South part of Kedungareng Lompo and South part of Samalona island. - Along the lane of dredging material transportation.	- During the dumping & dredging activity.	- Contractor of Dumping activity.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Government of South Sulawesi.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Office of Ministry of Communication. - Board of Environmental Impact Protection (Bapedal).	- PT.(Persero) Pelabuhan Indonesia IV.
3.	SOCIO - ECONOMIC CULTURAL	To maintain : - Social positive perception. - Increasing social income. - Security. - Social healt.	- To make sure that the dredging activity in line with the Dredging procedure.	Island of : - Lae-Lae. - Dayang-Dayangan. - Kedungareng Lompo. - Samalona. - Kayangan. - and fish cathing area around that island.	- During the dumping & dredging activity.	- Contractor of Dumping activity.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Government of South Sulawesi.	- PT. (Persero) Pelabuhan Indonesia IV. - Regional Office of Ministry of Communication. - Board of Environmental Impact Protection (Bapedal).	- PT.(Persero) Pelabuhan Indonesia IV.

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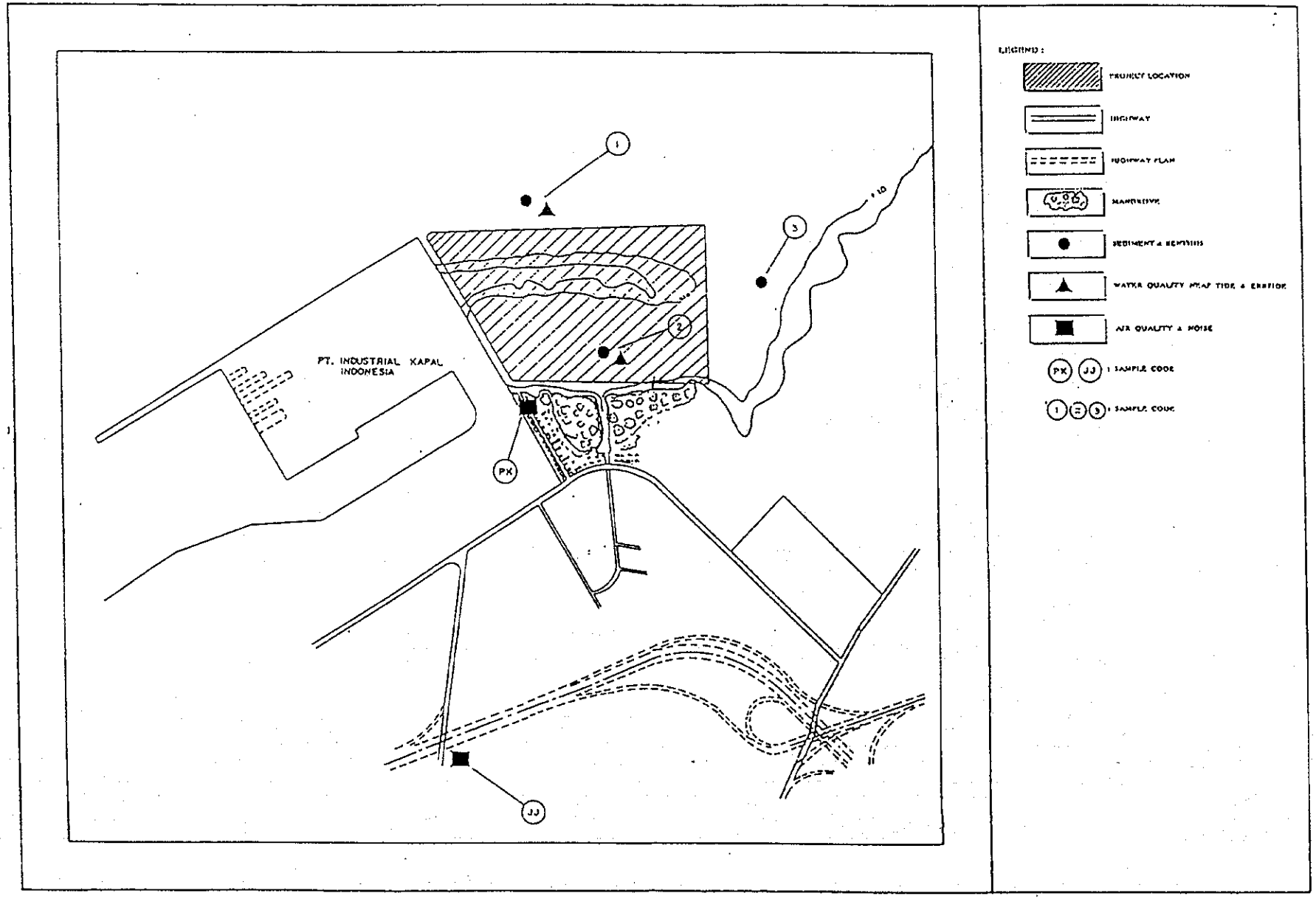


Fig. 7.3 Sampling location at proposed inland container terminal

7.3 ENVIRONMENTAL IMPACT ASSESSMENT OF INLAND CONTAINER TERMINAL OF UJUNG PANDANG PORT

7.3.1 Physical-chemical components

(1) Water quality

74. Two water three sediment sampling inside and outside of reclamation area has been excluded. (see **Fig.7.3**)

75. Laboratory testy results made by Bogor Institute of Agriculture, show many parameter on that locations were exceeding the standard value as shown in **Appendix C-28, C-29.**

76. The whole result indicated that sea water quality is not suitable for the water biota of fishery.

7.3.2 Biological component

(1) Plankton

77. Plankton is a micro-organism which its movement most affectedly sea water hydrodynamic. There are two kinds of plankton i.e. photoplnkton and zooplankton. (see **Appendix C-27**)

78. The affluence of plankton ranges between 7208 - 55968 ind/l, with variety of species between 4-7 species and the diversity index range between o.30 - 1.61.

79. That condition indicates the plankton ecosystem is not in a stable condition. The ecological stress affects the plankton diversity, the species of *Chaetocheros* sp. is found dominant.

(2) Benthos

80. Benthos is a kind of fine biota that live in the sea bed. Regarding the benthic manner of consumer food, benthos is classified as a filter feeder. Its characteristic makes

benthos to be a good indicator for the substrata ecology condition.

81. Benthos population in that area ranges between 496-1040 ind/m^2 and that means the benthos ecosystem is in good condition.

82. The variety of benthos species between 4-11 species and the diversity index ranges between 0.92-2.19. **(see Appendix C-26)**

(3) Mangrove

83. Mangrove is found in the proposed inland container terminal area. There are 2 species of mangrove in this area namely, *Avicennia officinalis*. and representative species of mangrove *Rhizophora* sp. are existing. The mangrove community is in the moderate level, situated on the area of about 2 ha. Some parts of mangrove community seems to be dwarf condition, the damage was due to human impacts such as: cutting for fuel wood, conversion of the mangrove areas to fish ponds.

7.3.3 Socio-economic component

(1) Socio-economic

84. The location of the population study is in the Kelurahan Kaluku Bdao, Kecamatan Tallo, in Ujung Pandang where the nearest location to be proposed the project site and will get the impact through the project activity.

85. The family heads in the study area around 1000 meter far from the project site, origin of the population consists of 99% local people and 1% others.

86. Duration of stay are 45% between 2-10 years, 17% more than 20 years, 14% around 1 year, 13% between 10-14 years and 11% between 16-19years.

87. Background education of respondents are 44% elementary school graduate, 33% have not finished the elementary school, 16% senior high school graduate, 4% junior high school graduate, 2% no formal education and 1% academy/university graduate.

88. Major job of respondents are: 27% merchant,20% office employee, 6% farmer, 9%

labor, 4% fishery, 1% farmer labor, 1% skilled labor and 32% others.

89. Mostly income of respondents are: 29% around Rp.100.000-140,000, 28% lower than 100.000, 22% around 140.000-200,000, 9% around 250,000-300,000.

(2) Socio-cultural condition

90. The condition of socio-cultural habit in daily life of the community surrounding the inland container terminal project can be seen from the social activity that is commonly conducted, such as the activity of neighborhood security system, the activity of neighborhood youth association, the activity of voluntary labor service, water sewage and drainage cleaning.

(3) Housing condition

91. Location where the housing are: 81% owned by the community, 17% rental and 2% live with their family.

92. The situation of the land are: 34% certificated, 26% are uncertificated, 16% government land, 14% free from using the land, 10% inheritance land.

93. The cleanliness condition of the house such as: yard, toilet, bath room and drainage, generally are fair (57%), 34% bad and 9% good,

94. The source of drinking water are: supplied by local water company (98%) and 2% water pump. The quality of water are: generally the respondents gave good point and 1% bad.

95. The water disposal system are: dumping the waste to their yard, 32% the away to the beach, waste to in cineration place and 13% they burn it.

96. The land used (the year) are: 31% for the guided, 23% for small shop, 9% breed chicane, 8% home manufacture, 4% for rental and 25%others.

97. In general the respondents (97%) are satisfied to live in the neighborhood and 3% unsatisfied.

(4) The perception of the project plan

98. In general the respondent don't know about the inland container terminal project plan.

99. Generally the respondent's opinion to the project are: 70% agree with; the reason that 20% are the recognize the government program, 21% if they are not harmless, 10% respect the opportunity to get job, 6% develop their community, 5% business opportunity, 5% get more income 2% agree with reason if the project make a compromise with the community and 1% have an opportunity to develop their village and 2% do not know about the project. For the respondents that do not know about the project : 13% said that the activity will acquit their house, 7% they will lose their house, 5% said the reason the inheritance land, 3% said the reason very hard to get a good lot, 2% said the reason to be disorder.

(5) Public health

100. The status of the public health in the project location can be figured out by 10 types of illness which frequently found. Regarding the secondary data of the Kaluku Badoa health Center in 1994, skin diseases are the major illnesses.

101. The pattern of seeking medical help covers: community center, practicing physician, hospital and traditional treatment.

102. The number of health service facilities are: 1 community health center (Puskemas), 1 supporting community health center (Puskesmas pembantu), 1 drugstore/pharmacy, 4 practicing doctor, 1 private clinic, 1 company clinic and 25 primary health care units.

103. The total personnel are: 1 general practitioner, 1 dentist, 2 midwife, 2 sanitarians, 2 midwife nurse, 3 nurses, 1 pharmacy assistant, 4 workers and 1 trained nurse class c (PKC).

7.3.4 The predicted impact, management effort and consideration

(1) Pre-construction phase

a. Socio-economic component: Social unrest

- Giving information and clarification to the community regarding the objective of the project and the amount of compensation.

- Channeling the community to the local government and P.T. Pelabuhan Indonesia IV, in order to get mutual benefit in deciding the amount of compensation.

(2) Construction phase

a. Physical and chemical component

i) Air quality

- Construction a washing basin/pond for trucks or other vehicles located near the outlet gate of the project location, in order to keep the vehicles clean from dust or mud.
- Keeping the trucks covered to avoid the materials carried spill along the rout.

ii) Noise

- Limiting the vehicles speed entering the project location.
- Applying rules and regulations stipulated by the traffic and transportation office to any vehicles and heavy equipment used, in order to fulfil the standard requirement.

iii) Sea water quality

- Applying revetment along the coastal line to avoid sea water pollution during reclamation of inland container terminal and access road.

b. Biological component: Sea water biota and mangrove

- Removing fishes and shrimp larvae from the mangrove area where will be reclaimed, then applying transplant of mangrove seedlings or plant the mangrove seeds in front of proposed container terminal.
- Minimizing the turbidity rate by means of operating the heavy equipments deficiently and effectively.
- Avoiding turbidity spreading.

(3) Service and maintenance phase

a. Socio - economic component: Traffic congestion

- Traffic congestion could be avoided by cooperation with the local government of city of Ujung Pandang in Planning the transportation route from and to Soekarno Hatta quay.

b. Chemico - Physical component: Sea water quality

- Constructing a setting pond in inland container terminal which is located before the sea water outlet of the waste water sewage system/
- Constructing oil trap equipments and waste lubricants pond in inland container terminal.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

8.1.1 Micro Forecast of Container Cargo

1. The container cargo throughput at the year 2003 is estimated at 239,000 TEU (5.6 times over the 1993 figure), among which international container cargo amounts to 72,000 TEU and domestic container cargo 167,000 TEU.

8.1.2 Short-Term Development Plan

2. On the basis of the Master Plan and the cargo forecast for the year 2003, the following facilities and equipment will be required for accepting container ships and handling containers.

Short-Term Development Plan

1. New Hatta Quay	-Power supply	
	-Terminal control building	
	-Yard fence	
	-Information and control system	
2. Inland Container Terminal	-Yard reclamation	: 8.5 ha
	-CFS sheds	: 9,000 m^2
	-Open yard storage	: 2.7 ha
	-Office building	: 1 bld.
	-Work shop	: 1 bld.
	-Utilities	: 1 set
3. Access Entrance	-Road embankment and pavement	
	-Gate	
	-Bridge (Box culvert)	
	-Utilities	

4. Connecting Toll Road	-Road embankment and pavement -Fence and utilities	
5. Access Channel	-Navigation aid -Dredging and disposal	
6. Equipment and Information System	-Quay gantry crane	: 3 unit
	-Rubber t'd gantry crane	: 9 unit
	-Forklift (7 ton)	: 7 unit
	-(3.5 ton)	: 9 unit
	-Reachstacker (45ton)	: 2 unit
	-Tractor head	:27 unit
	-Chassis	:54 unit
	-Generator (150KVA)	: 1 unit
	-(400KVA)	: 2 unit
	-Computer & software	:10 unit

3. Preparations for project implementation, such as basic/detail design will continue until 1997. Following this period, construction works and installation of the container handling equipment will begin as required till 2003.

4. Project cost is estimated based on the basic design of the major facilities and handling equipment. Total construction cost including infrastructure, superstructure, and equipment of both the port and inland terminals amounts to 129,125 million Rp. (Foreign portion: 106,412 million Rp., Local portion: 22,713 million Rp.) including physical contingency and engineering fee.

5. Environmental impact assessment (EIA) was carried out for the two works as follows:

a) Dredging and dumping in access channel of Uj. Pandang Port
b) Construction of inland container terminal for Uj. Pandang Port

According to the assessment, both works are expected to cause impacts to some environmental components around the project site to some extent. Therefore careful countermeasure to avoid significant impacts should be employed for the project

implementation and operation.

6. Economic evaluation of the short-term development plan for the container terminal at Uj. Pandang Port was executed by the internal rate of return (IRR) though cost/benefit analysis. Economic benefit is mainly accrued from the saving in ships' port staying cost and interest of cargo cost, etc. Calculated IRR for the container terminal including the inland terminal is 15.6% under a 30 year project life. This figure exceeds the national and international benchmark and the project can be considered to be economically feasible.

7. In order to confirm the viability of the project, Financial Internal Rate of Return (FIRR) is calculated under assumed fund raising schemes. If the terminal executing agency can raise the low interest loans, not only the study project (short-term development plan) but also the general project including the on going project can be regarded as financially feasible.
If equipment such as gantry crane is procured and operated by the private sector, it would be difficult for the private sector to recover the principal of the investment considering the interest of the city bank loans.

8.2 RECOMMENDATIONS

8. In addition to the recommendations proposed in chapter 5 of Part 1, the following items are recommended for effective and efficient container terminal construction and operation.

9. Since Sulawesi has no railway facilities, road is the major arterial transport facility. In line with the progress of the container terminal, Uj. Pandang port, highways under planning to connect the Port and Uj. Pandang city with its hinterland should be developed without delay.

10. In line with increase of international container ship calls, it is suggested that a new berth allocation system like 'window system' instead of 'first come, first served' system, be studied to keep container ship sailing on schedule.

11. It is suggested that the establishment of a new sub division should be examined to operate the specialized container terminal including the inland terminal, in order to

raise efficiency and high quality service in terminal operation.

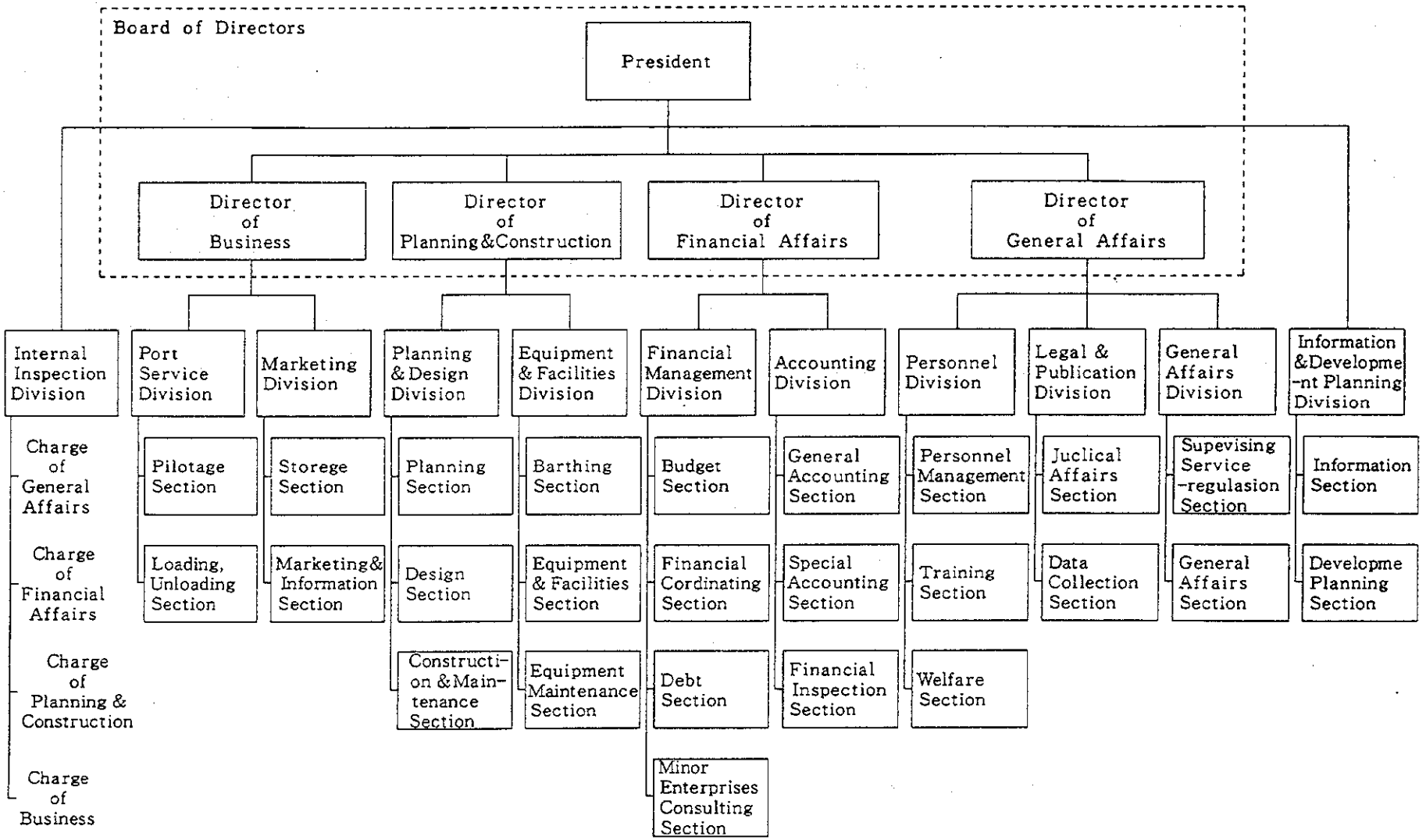
12. To obtain more safety of navigation around the port water area, special navigation traffic rules should be examined with the development of the new entrance channel and tanker docking facilities of PERTAMINA.

13. When dredging the access channel is carried out, a dredging fleet consisted of grab dredger along with hopper barges with bottom doors should be selected instead of cutter suction pump dredger or drug suction dredger. Further, reclamation works should be started after revetments are completed.

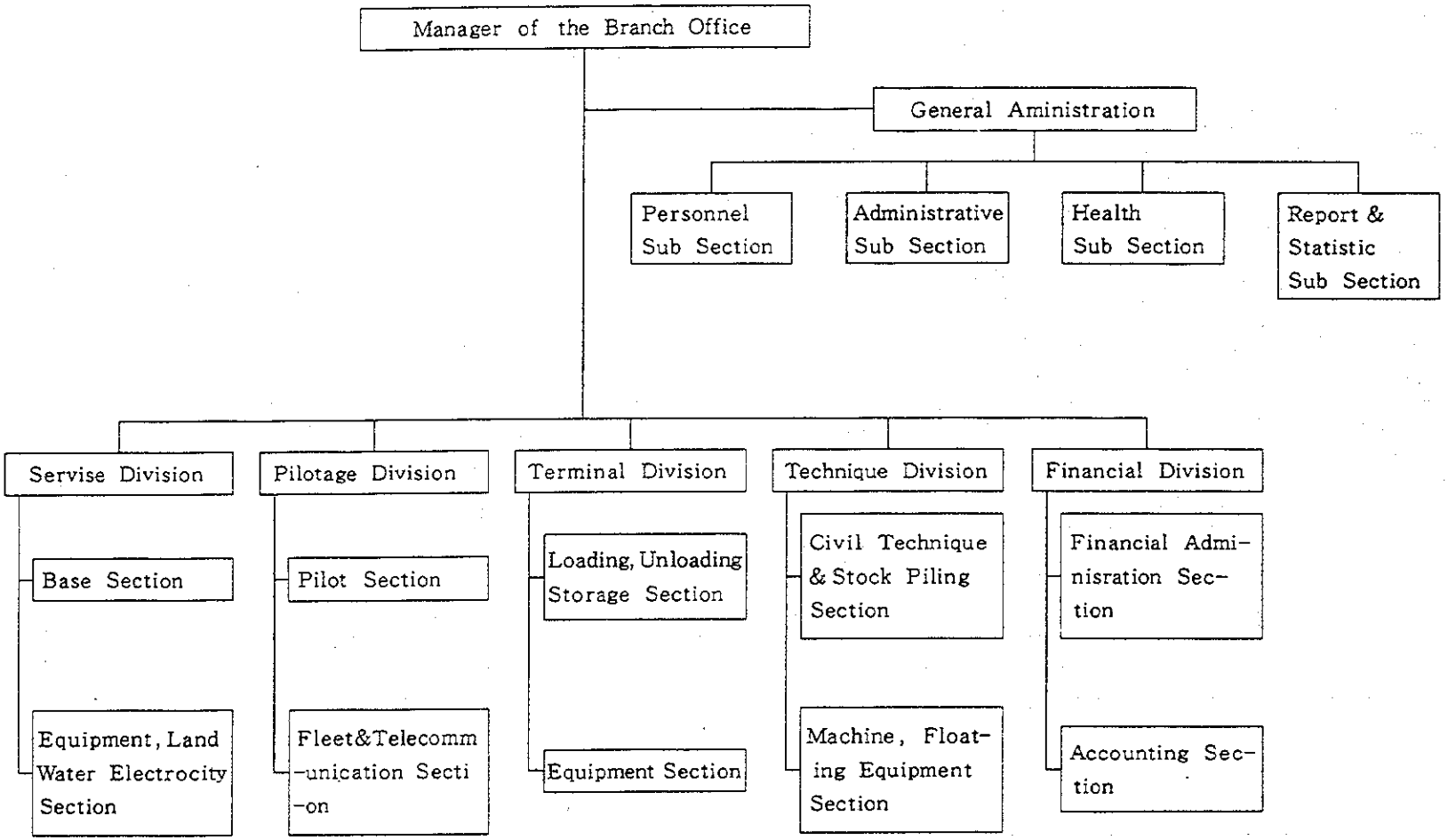
14. The container terminal at Uj. Pandng port will be still in the cradle stage in 2003. It is hoped that the study project (short-term development plan) and the on-going project are executed and operated together by the public agency, Port Corporation IV, which can obtain low interest foreign loans.

APPENDIX A

Appendix A-1 Organization Chart of Port Corporation Head Office



Appendix A-2 Organization Chart of Ujung Pandang Branch Office



Appendix A-3 Financial Statements of Port Corporation IV

<PROFIT AND LOSS STATEMENT>	1987	1988	1989	1990	1991	1992	1993
Operating Revenue	16,082	18,765	20,343	23,198	28,902	33,904	39,908
Operating Expenses	16,355	16,534	16,667	18,145	20,154	23,957	24,446
Personnel Expenses	5,500	5,629	5,751	6,374	6,969	7,367	8,139
Material Expenses	1,261	1,475	1,668	1,862	2,601	3,105	3,892
Maintenance Expenses	2,276	1,980	1,905	2,183	2,446	3,033	2,918
Depreciation Costs	3,655	4,229	4,489	5,077	5,693	6,816	5,146
Other Administration Costs	3,663	3,221	2,854	2,649	2,445	3,636	4,351
Net Operating Income	-273	2,231	3,676	5,053	8,748	9,947	15,462
Non Operating Revenue	1,454	927	587	2,191	3,427	5,033	4,537
Non Operating Expenses	3,046	2,253	2,567	3,783	5,897	6,399	6,355
Net Income Before Tax	-1,865	905	1,696	3,461	6,278	8,581	13,644
Income Tax				563	354	3,475	4,383
Net Income After Tax	-1,865	905	1,696	2,898	5,924	5,106	9,261
<BALANCE SHEET>							
Current Assets	9,768	10,634	14,042	20,570	30,301	43,714	41,928
Cash & Deposit	5,861	6,693	9,372	15,879	24,156	31,734	30,028
Other Current Assets	3,907	3,941	4,670	4,691	6,145	11,980	11,900
Fixed Assets	77,373	82,304	80,406	86,711	86,887	321,386	350,467
Depreciable Assets	91,269	100,388	102,773	113,673	118,497	321,736	355,908
Accumulated Depreciation	-13,896	-18,084	-22,367	-26,962	-31,610	-350	-5,441
Fixed Assets in Construction	2,470	571	6,503	7,565	17,947	30,161	14,956
Other Assets	5,602	6,183	6,120	5,402	4,643	5,174	6,362
Total Assets	95,213	99,692	107,071	120,248	139,778	400,435	413,713
Current Liabilities	4,932	3,624	3,719	4,733	5,064	18,016	10,040
Fixed Liabilities	5,478	5,133	7,062	13,692	22,477	43,706	55,991
Capital and Reserves	86,668	90,030	94,594	98,925	106,313	333,607	338,421
Statutory Capital	40,000	40,000	40,000	40,000	40,000	318,000	318,000
Attachment of Governmental Capital	35,005	40,360	44,021	47,474	53,237	15,231	15,663
Others	11,663	9,670	10,573	11,451	13,076	376	4,758
Profit/Loss	-1,865	905	1,696	2,898	5,924	5,106	9,261
<Financial Indicators>							
Operating Ratio	101.7%	88.1%	81.9%	78.2%	69.7%	70.7%	61.3%
Working Ratio	79.0%	65.6%	59.9%	56.3%	50.0%	50.6%	48.4%
Current Ratio	198.1%	293.4%	377.6%	434.6%	598.4%	242.6%	417.6%
Personnel Cost / Operating Expenses	33.6%	34.0%	34.5%	35.1%	34.6%	30.8%	33.3%
Number of Personnel	1,730	1,686	1,625	1,565	1,494	1,508	1,471
Personnel Cost per Person	3.18	3.34	3.54	4.07	4.66	4.89	5.53

Source : Port Corporation IV

Appendix A-4 Profit and Loss Statements by Service type of Port Corporation IV (1993)

Unit: Rp Mn

Items	Revenue	Cost	Profit/Loss
Anchoring	2,163	337	1,826
Mooring	2,745	1,027	1,718
Quay	3,445	1,279	2,166
Pilotage	4,932	1,833	3,099
Towing	3,996	2,644	1,352
Warehouse	528	708	-180
Open Yard	458	485	-27
Equipment	1,195	1,011	184
Cargo handling	2,130	1,698	432
Water Supply	3,228	1,856	1,372
Lease	1,587	544	1,043
Special Port	3,690	92	3,598
Harbour Permit	6,948	1,337	5,611
Container Terminal	2,862	637	2,225
Other Revenue	5,184	-	5,184
Other Cost		20,342	-20,342
Total	45,091	35,830	9,261

Source : Port Corporation IV

APPENDIX B

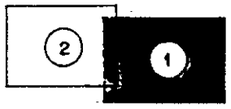
THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORT AND CONNECTING RAIL WAYS IN THE REPUBLIC INDONESIA

LEGEND

- Building
- Contour
- Tidal Observation
- Current Observation
- Boring Location
- Ground Height / Seabed

POINT	EASTING (m)	NORTHING (m)	HEIGHT (m)
W.11	433,798.190	9,432,807.469	3.121

W.11 FROM PERUM PELABUHAN IV UJUNGPANDANG



Title.

TOPOGRAPHIC & HYDROGRAPHIC MAP OF UJUNGPANDANG (1)

SCALE 1:4000
(REDUCTION COPY, ORIGINAL 1:2000)

Items	Name	Date
Drawn by	Mamet	07 - DEC - 94
Checked by	H.H.Unang AM	09 - DEC - 94
Approved by	M.Ikehara	10 - DEC - 94

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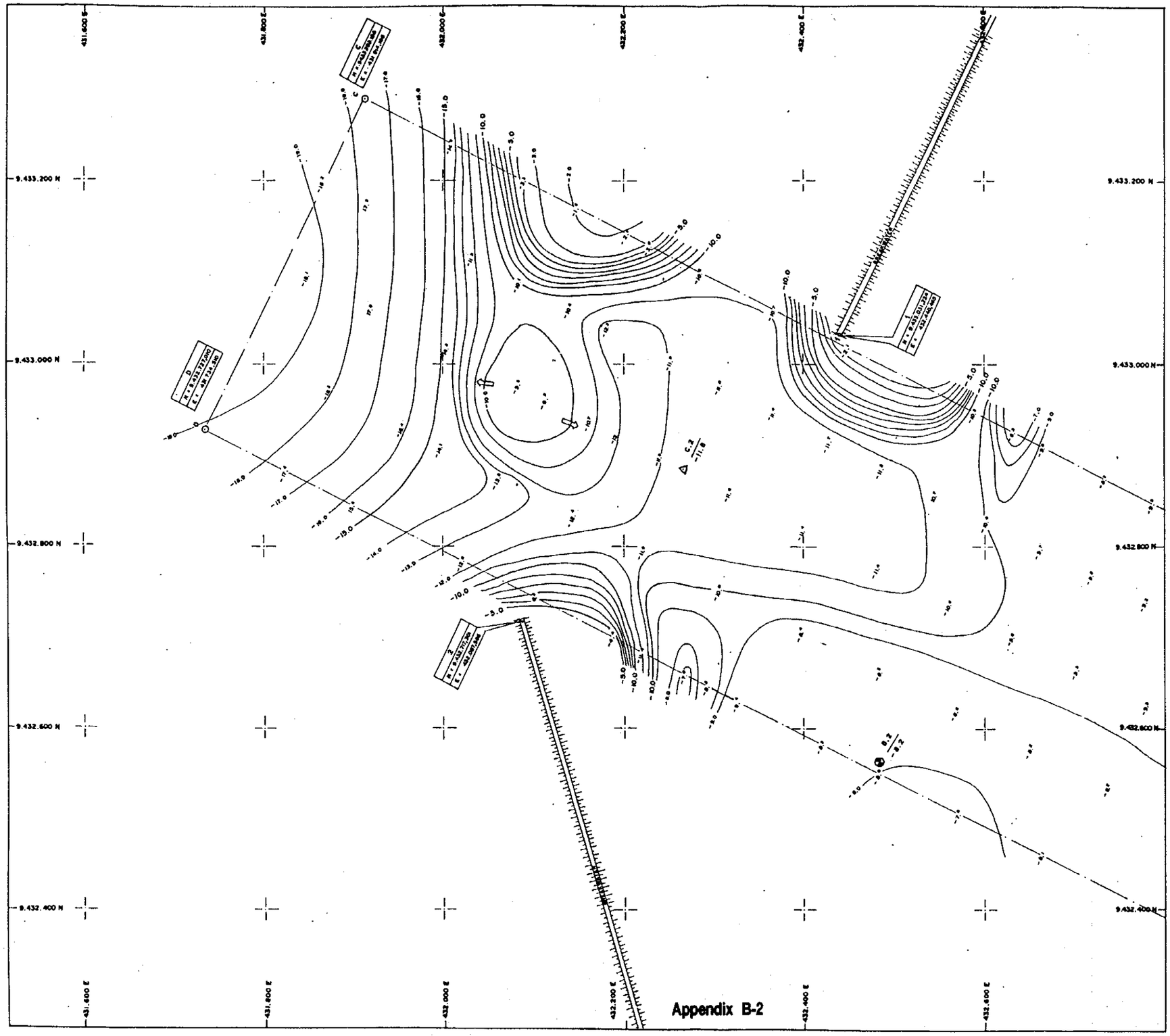
Appendix B-1



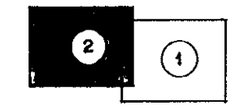
THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORT AND CONNECTING RAIL WAYS IN THE REPUBLIC INDONESIA

LEGEND

- Building
- Contour
- Tidal Observation
- Current Observation
- Boring Location
- 3.87 / -8.5 Ground Height / Seabed

POINT	EASTING (m)	NORTHING (m)	HEIGHT (m)
W.11	433,798.190	9,432,807.469	3.121

W.11 FROM PERUM PELABUHAN IV UJUNGPANDANG



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TOPOGRAPHIC & HYDROGRAPHIC MAP OF UJUNGPANDANG (2)

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(REDUCTION COPY, ORIGINAL 1:2000)

Items	Name	Date
Drawn by	Memar	07-DEC-94
Checked by	Ir.H.Uneng AM	09-DEC-94
Approved by	M.Ikehara	10-DEC-94

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Appendix B-2