4.3 Evaluations

4.3.1 Viability of the Project

90. The FIRR of this project is 23.09 %, as shown in Table 4-4-1. This rate exceeds the weighted average interest rate of funds during the project life.

4.3.2 Financial Soundness of the Management Body

91. The projected financial statements and financial indicators (Rate of return on net fixed assets, Debt service coverage ratio, Operating ratio and Working ratio) of Case 1 and 2 are shown in Table 4-4-5 and 4-4-6, respectively.

(1) Profitability

92. The rate of return on net fixed assets exceeds the average interest rate of funds (2.55 %) after completing the construction of port facilities.

(2) Loan Repayment Capacity

93. Throughout the project life, the debt service coverage ratio exceeds 1.0. There will be no problem with the repayment of the long-term loans using the annual operating revenues. Even if the fund which is usually used in ENP's project is assumed, this indicator exceeds 1.0.

(3) Operational Efficiency

94. Both the operating ratio and the working ratio maintain positive levels and even in Case 2, all financial indicators is shown good levels. (See Table 4-4-6)

4.3.3 Sensitivity Analysis

95. A sensitivity analysis is made for the following three cases:
Case A : revenue decreases by 10 %
Case B : construction cost increases by 10 %
Case C : revenue decrease by 10 % and construction cost increases by 10%

The FIRR of each case is as follows.

	Base Case	Case A	Case B	Case C
FIRR	23.09 %	21.13 %	20.65 %	18.83 %

In each case, the rate exceeds the weighted average interest rate of funds (2.55%), which is also the floor limit during the project life.

4.3.4 Conclusive Remarks

96. Judging from the above analysis, this project can be regarded as financially feasible. However, to achieve the project without hindrance, following matters should be implemented.

97. Implementation body should maintain its efforts to secure sufficient cargo volume to improve cargo handling efficiency and to reduce operating expenses constantly.

98. The financial analysis is calculated on the assumption of interest rate of fund abroad by 3% or 8% per annum. Normally, the treasury of an aid-receiving country tends to refinance the foreign assistance with added interest. Although the financial analysis shows the estimated future account can accommodate an interest higher than that assumed, with the view to ensuring the implementing body's cash-flow, the treasury should make efforts to provide the refinancing with as low interest as possible.

99. Bearing in mind that ENP will undertake the task of the planned port development and some of the resources including thse for renewal of equipment during the project term are expected to be borne by ENP's own reserve, it is required to foster ENP's financial position. In this sense ENP's unprescribed financial contribution to the central government should be abolished in favor of a more transparent levying measure such as fixed amount or fixed rate prescribed in a law(4.2 of PART I). Fostering of ENP's finacial position will also be achieved by tariff restructuring. In this context, adjustment between commodities including narrowing spreads between discount rate and ordinary rate may be the only applicable means for restructuring.

Table 4-4-1 FIRR Calculation

<Basic Case> (Unit : Thousand Lps.)

Year	Revenue (1)	Cost(2) Investment	Expense	Total	(1)-(2)	Present Value in 1993 Revenue	Cost	Difference
1996		5,547		5,547	-5,547	0	5,547	-5,547
1997		37,661		37,661	-37,661	0	30,596	-30,596
1998		71,378		71,378	-71,378	0	47,111	-47,111
1999		173,903		173,903	-173,903	0	93,248	-93,248
2000	80,818		10,247	10,247	70,571	35,206	4,464	30,742
2001	83,436		10,247	10,247	73,189	29,528	3,626	25,902
2002	86,063		10,247	10,247	75,816	24,744	2,946	21,798
2003	88,786		10,247	10,247	78,539	20,739	2,394	18,345
2004	91,589		10,247	10,247	81,342	17,380	1,945	15,436
2005	94,421		10,247	10,247	84,174	14,557	1,580	12,977
2006	97,499		10,247	10,247	87,252	12,212	1,283	10,928
2007	100,665	34,706	10,247	44,953	55,712	10,243	4,574	5,669
2008	103,853	45,000	10,247	55,247	48,606	8,585	4,567	4,018
2009	103,853		10,247	10,247	93,606	6,975	688	6,286
2010	103,853		10,247	10,247	93,606	5,666	559	5,107
2011	103,853		10,247	10,247	93,606	4,603	454	4,149
2012	103,853		10,247	10,247	93,606	3,740	369	3,371
2013	103,853		10,247	10,247	93,606	3,038	300	2,738
2014	103,853	45,000	10,247	55,247	48,606	2,468	1,313	1,155
2015	103,853	34,706	10,247	44,953	58,900	2,005	868	1,137
2016	103,853		10,247	10,247	93,606	1,629	161	1,468
2017	103,853		10,247	10,247	93,606	1,324	131	1,193
2018	103,853		10,247	10,247	93,606	1,075	106	969
2019	103,853		10,247	10,247	93,606	874	86	787
2020	103,853		10,247	10,247	93,606	710	70	640
2021	103,853		10,247	10,247	93,606	577	57	520
2022	103,853		10,247	10,247	93,606	468	46	422
2023	103,853	79,706	10,247	89,953	13,900	381	330	51
2024	103,853		10,247	10,247	93,606	309	31	279
2025	103,853	-77,030	10,247	-66,783	170,636	251	-162	413
Total	2,592,631	450,577	266,422	716,999	1,875,632	209,287	209,287	0

EIRR= 0.2309007

Table 4-4-5 Financial Statement [85%: foreign fund (3%), 15%: internal resources]

Income Statement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Revenue	0	0	0	0	80,043	82,477	84,898	87,394	89,963	92,529	95,322	98,157	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008
Operating Expenditure	0	0	0	0	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528
Personnel					5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925
Maintenance					3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328
Administration					474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474
Depreciation	0	0	0	0	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301
Net Operating Income	0	0	0	0	55,515	57,949	60,370	62,866	65,435	68,001	70,794	73,639	76,480	76,480	76,480	76,480	76,480	76,480	76,430	76,480	76,430	76,480	76,430	76,480	76,430	76,480	76,430	75,480	76,480	76,480
Non-operating Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others																														
Non-operating Expenditure	166	1,296	3,438	8,655	8,655	8,655	8,655	8,655	8,655	8,655	8,646	8,582	8,410	7,977	7,544	7,111	6,679	6,246	5,813	5,381	4,948	4,515	4,082	3,650	3,217	2,784	2,351	1,919	1,486	1,053
Interest on Long-term Loans	166	1,296	3,438	8,655	8,655	8,655	8,655	8,655	8,655	8,655	8,646	8,582	8,410	7,977	7,544	7,111	6,679	6,246	5,813	5,381	4,948	4,515	4,082	3,650	3,217	2,784	2,351	1,919	1,486	1,053
Others																														
Net Income	-166	-1,296	-3,438	-8,655	46,860	49,294	51,715	54,211	56,780	59,346	62,148	65,058	68,070	68,503	68,936	69,369	69,801	70,234	70,567	71,100	71,532	71,965	72,398	72,831	73,263	73,696	74,129	74,561	74,994	75,427
Accumulated Earnings	-166	-1,463	-4,900	-13,555	33,306	82,600	134,315	188,527	245,307	304,654	366,802	431,859	499,930	568,433	637,369	706,738	776,539	846,773	917,440	988,540	1,060,072	1,132,037	1,204,435	1,277,265	1,350,529	1,424,225	1,498,353	1,572,915	1,647,909	1,723,336

Cash Flow

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Cash Beginning	0	-998	-7,944	-22,088	-56,828	4,833	68,928	135,445	204,457	276,038	350,186	426,857	504,555	546,447	570,327	639,639	709,384	779,562	850,173	921,215	947,692	984,351	1,056,692	1,129,466	1,202,673	1,276,313	1,350,385	1,424,891	1,499,829	1,575,199
Cash Inflow	4,715	32,012	60,671	147,818	70,316	72,750	75,171	77,667	80,236	82,802	85,595	88,440	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281
Net Operating Income	0	0	0	0	55,515	57,949	60,370	62,866	65,435	68,001	70,794	73,639	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,430	76,480	76,480	76,480	76,430	76,480	76,430	75,480	76,480	76,480
Depreciation	0	0	0	0	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301	14,301
Long-term Loans	4,715	32,012	60,671	147,818		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash Outflow	5,713	38,957	74,816	182,558	8,655	8,655	8,655	8,655	8,655	8,655	8,924	10,742	49,389	67,401	21,969	21,536	21,103	20,670	20,238	54,305	54,522	18,940	18,507	18,074	17,641	17,209	16,776	16,343	15,910	15,478
Investment	5,547	37,661	71,378	173,903									35,250	45,000						45,000	35,250									
Payment for Long-term Loans	0	0	0	0	0	0	0	0	0	0	277	2,160	5,729	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424	14,424
Interest on Long-term Loans	166	1,296	3,438	8,655	8,655	8,655	8,655	8,655	8,655	8,655	8,646	8,582	8,410	7,977	7,544	7,111	6,679	6,246	5,813	5,381	4,948	4,515	4,082	3,650	3,217	2,784	2,351	1,919	1,486	1,053
Other Non-operating Expenditure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Inflow - Outflow	-998	-6,945	-14,144	-34,740	61,661	64,095	66,516	69,012	71,581	74,147	76,671	77,698	41,892	23,880	69,312	69,745	70,178	70,611	71,043	26,976	36,759	72,341	72,774	73,207	73,640	74,072	74,505	74,938	75,371	75,803
Cash Ending	-998	-7,944	-22,088	-56,828	4,833	68,928	135,445	204,457	276,038	350,186	426,857	504,555	546,447	570,327	639,639	709,384	779,562	850,173	921,215	947,692	984,351	1,056,692	1,129,466	1,202,673	1,276,313	1,350,385	1,424,891	1,499,829	1,575,199	1,651,003
Cash Excess	0	0	0	0	4,833	68,928	135,445	204,457	276,038	350,186	426,857	504,555	546,447	570,327	639,639	709,384	779,562	850,173	921,215	947,692	984,351	1,056,692	1,129,466	1,202,673	1,276,313	1,350,385	1,424,891	1,499,829	1,575,199	1,651,003
Cash Shortage	-998	-7,944	-22,088	-56,828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Balance Sheet

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Current Assets	0	0	0	0	4,833	68,928	135,445	204,457	276,038	350,186	426,857	504,555	546,447	570,327	639,639	709,384	779,562	850,173	921,215	947,692	984,351	1,056,692	1,129,466	1,202,673	1,276,313	1,350,385	1,424,891	1,499,829	1,575,199	1,651,003
Cash & Deposit	0	0	0	0	4,833	68,928	135,445	204,457	276,038	350,186	426,857	504,555	546,447	570,327	639,639	709,384	779,562	850,173	921,215	947,692	984,351	1,056,692	1,129,466	1,202,673	1,276,313	1,350,385	1,424,891	1,499,829	1,575,199	1,651,003
Other Current Assets																														
Fixed Assets	5,547	43,208	114,586	288,489	273,688	258,887	244,086	229,286	214,485	199,684	184,883	170,082	190,531	220,730	205,929	191,129	176,328	161,527	146,725	176,925	197,374	182,573	167,772	152,972	138,171	123,370	108,569	93,768	78,967	64,166
Depreciable Assets	5,547	43,208	114,586	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489
Accumulated Depreciation	0	0	0	0	14,801	29,602	44,403	59,203	74,004	88,805	103,606	118,407	97,958	67,759	82,560	97,360	112,161	126,962	141,763	111,564	91,115	105,916	120,717	135,517	150,318	165,119	179,920	194,721	209,522	224,323
Total Assets	5,547	43,208	114,586	288,489	278,521	327,816	379,531	433,743	490,523	549,870	611,740	674,637	736,978	791,057	845,569	900,513	955,890	1,011,699	1,067,942	1,124,617	1,181,725	1,239,265	1,297,239	1,355,645	1,414,484	1,473,755	1,533,460	1,593,597	1,654,166	1,715,169
Liabilities	5,713	44,671	119,486	302,044	245,216	245,216	245,216	245,216	245,216	245,216	244,938	242,778	237,049	222,624	208,200	193,775	179,351	164,926	150,502	136,077	121,653	107,229	92,804	78,380	63,955	49,531	35,106	20,682	6,257	-8,167
Current Liabilities(Cross subsidy)	998	7,944	22,088	56,828	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Liabilities(Long-term Loans)	4,715	36,727	97,398	245,216	245,216	245,216	245,216	245,216	245,216	245,216	244,938	242,778	237,049	222,624	208,200	193,775	179,351	164,926	150,502	136,077	121,653	107,229	92,804	78,380	63,955	49,531	35,106	20,682	6,257	-8,167
Capital																														
Accumulated Earnings	-166	-1,463	-4,900	-13,555	33,306	82,600	134,315	188,527	245,307	304,654	366,802	431,859	499,930	568,433	637,369	706,738	776,539	846,773	917,440	988,540	1,060,072	1,132,037	1,204,435	1,277,265	1,350,529	1,424,225	1,498,353	1,572,915	1,647,909	1,723,336
Total Liabilities & Capital	5,547	43,208	114,586	288,489	278,521	327,816	379,531	433,743	490,523	549,870	611,740	674,637	736,978	791,057	845,569	900,513	955,890	1,011,699	1,067,942	1,124,617	1,181,725	1,239,265	1,297,239	1,355,645	1,414,484	1,473,755	1,533,460	1,593,597	1,654,166	1,715,169
	0	0	0	0	-0	0	0	0	0	0	0	0	-0	0	0	0	0	0	0	0	-0	-0	0	0	0	0	0	0	0	0

Financial Indicators	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Rate of Return on Net Fixed Assets (%)	0	0	0	0	20.28	22.38	24.73	27.42	30.51	34.05	38.29	43.30	40.14	34.65	37.14	40.02	43.37	47.35	52.12	43.23	38.75	41.89	45.59	50.00	55.35	61.99	70.44	81.56	95.85	119.19
Debt Service Coverage Ratio	0	0	0	0	8.12	8.41	8.69	8.97	9.27	9.57	9.59	8.23	6.46	4.07	4.16	4.24	4.33	4.42	4.51	4.61	4.71	4.82	4.93	5.05	5.17	5.30	5.44	5.59	5.74	5.90
Operating Ratio (%)					30.64	29.74	28.89	28.07	27.26	26.51	25.73	24.99	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28
Working Ratio (%)					12.15	11.79	11.46	11.13	10.81	10.51	10.20	9.91	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63

Table 4-4-6 Financial Statement [100%: foreign fund (8%)]

Income Statement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Revenue	0	0	0	0	80,043	82,477	84,898	87,394	89,963	92,529	95,322	98,167	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008	101,008
Operating Expenditure	0	0	0	0	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528	24,528
Personnel					5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925	5,925
Maintenance					3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328	3,328
Administration					474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474
Depreciation	0	0	0	0	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801
Net Operating Income	0	0	0	0	55,515	57,949	60,370	62,866	65,435	68,001	70,794	73,639	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480
Non-operating Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others																														
Non-operating Expenditure	444	3,457	9,167	23,079	23,079	23,050	22,819	22,208	20,669	19,131	17,592	16,054	14,515	12,976	11,438	9,899	8,360	6,822	5,283	3,745	2,236	927	0	0	0	0	0	0	0	0
Interest on Long-term Loans	444	3,457	9,167	23,079	23,079	23,050	22,819	22,208	20,669	19,131	17,592	16,054	14,515	12,976	11,438	9,899	8,360	6,822	5,283	3,745	2,236	927	0	0	0	0	0	0	0	0
Others																														
Net Income	-444	-3,457	-9,167	-23,079	32,436	34,900	37,551	40,658	44,766	48,870	53,202	57,586	61,965	63,504	65,042	66,581	68,120	69,658	71,197	72,735	74,244	75,553	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480
Accumulated Earnings	-444	-3,900	-13,067	-36,146	-3,710	31,189	68,740	109,398	154,164	203,035	256,237	313,822	375,787	439,291	504,334	570,915	639,034	708,692	779,889	852,625	926,869	1,002,422	1,078,902	1,155,382	1,231,862	1,308,342	1,384,823	1,461,303	1,537,783	1,614,263

Cash Flow

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Cash Beginning	0	-444	-3,900	-13,067	-36,146	11,090	60,421	109,893	157,712	198,047	242,485	291,255	344,409	366,693	380,765	441,376	503,525	567,213	632,439	699,204	722,508	757,441	831,442	911,130	1,002,411	1,093,592	1,184,973	1,276,254	1,367,535	1,458,816
Cash Inflow	5,547	37,661	71,378	173,903	70,316	72,750	75,171	77,667	80,236	82,892	85,595	88,440	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281	91,281
Net Operating Income	0	0	0	0	55,515	57,949	60,370	62,866	65,435	68,001	70,794	73,639	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480	76,480
Depreciation	0	0	0	0	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801	14,801
Long-term Loans	5,547	37,661	71,378	173,903		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash Outflow	5,991	41,118	80,545	196,982	23,079	23,419	25,700	29,847	39,902	38,363	36,825	35,286	68,998	77,209	30,670	29,132	27,593	26,054	24,516	67,977	56,348	17,280	11,594	0	0	0	0	0	0	0
Investiment	5,547	37,661	71,378	173,903									35,250	45,000						45,000	35,250									
Payment for Long-term Loans	0	0	0	0	0	370	2,881	7,639	19,233	19,233	19,233	19,233	19,233	19,233	19,233	19,233	19,233	19,233	19,233	19,233	18,863	16,352	11,594	0	0	0	0	0	0	0
Interest on Long-term Loans	444	3,457	9,167	23,079	23,079	23,050	22,819	22,208	20,669	19,131	17,592	16,054	14,515	12,976	11,438	9,899	8,360	6,822	5,283	3,745	2,236	927	0	0	0	0	0	0	0	0
Other Non-operating Expenditure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Inflow - Outflow	-444	-3,457	-9,167	-23,079	47,237	49,331	49,471	47,820	40,334	44,439	48,770	53,154	22,283	14,072	60,611	62,149	63,688	65,227	66,765	23,304	34,933	74,001	79,687	91,281	91,281	91,281	91,281	91,281	91,281	91,281
Cash Ending	-444	-3,900	-13,067	-36,146	11,090	60,421	109,893	157,712	198,047	242,485	291,255	344,409	366,693	380,765	441,376	503,525	567,213	632,439	699,204	722,508	757,441	831,442	911,130	1,002,411	1,093,592	1,184,973	1,276,254	1,367,535	1,458,816	1,550,097
Cash Excess	0	0	0	0	11,090	60,421	109,893	157,712	198,047	242,485	291,255	344,409	366,693	380,765	441,376	503,525	567,213	632,439	699,204	722,508	757,441	831,442	911,130	1,002,411	1,093,592	1,184,973	1,276,254	1,367,535	1,458,816	1,550,097
Cash Shortage	-444	-3,900	-13,067	-36,146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Balance Sheet

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Current Assets	0	0	0	0	11,090	60,421	109,893	157,712	198,047	242,485	291,255	344,409	366,693	380,765	441,376	503,525	567,213	632,439	699,204	722,508	757,441	831,442	911,130	1,002,411	1,093,592	1,184,973	1,276,254	1,367,535	1,458,816	1,550,097
Cash & Deposit	0	0	0	0	11,090	60,421	109,893	157,712	198,047	242,485	291,255	344,409	366,693	380,765	441,376	503,525	567,213	632,439	699,204	722,508	757,441	831,442	911,130	1,002,411	1,093,592	1,184,973	1,276,254	1,367,535	1,458,816	1,550,097
Other Current Assets																														
Fixed Assets	5,547	43,208	114,586	288,489	273,688	258,887	244,086	229,286	214,485	199,684	184,883	170,082	190,531	220,730	205,929	191,129	176,328	161,527	146,726	176,925	137,374	182,573	167,772	152,972	138,171	123,370	108,569	93,768	78,967	64,166
Depreciable Assets	5,547	43,208	114,586	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489	288,489
Accumulated Depreciation	0	0	0	0	14,801	29,602	44,403	59,203	74,004	88,805	103,606	118,407	97,958	67,759	82,560	97,360	112,161	126,962	141,763	111,564	151,115	105,916	120,717	135,517	150,318	165,119	179,920	194,721	209,522	224,323
Total Assets	5,547	43,208	114,586	288,489	284,779	319,308	353,979	386,998	412,531	442,169	476,138	514,491	557,224	601,495	647,305	694,653	743,540	793,966	845,930	899,433	954,815	1,014,015	1,078,902	1,155,382	1,231,862	1,308,342	1,384,823	1,461,303	1,537,783	1,614,263
Liabilities	5,991	47,108	127,653	324,635	288,489	288,119	285,239	277,600	258,367	239,134	219,902	200,669	181,437	162,204	142,971	123,739	104,506	85,274	66,041	46,808	27,946	11,594	0	0	0	0	0	0	0	0
Current Liabilities(Cross subsid)	444	3,900	13,067	36,146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Liabilities(Long-term Loans)	5,547	43,208	114,586	288,489	288,489	288,119	285,239	277,600	258,367	239,134	219,902	200,669	181,437	162,204	142,971	123,739	104,506	85,274	66,041	46,808	27,946	11,594	0	0	0	0	0	0	0	0
Capital																														
Accumulated Earnings	-444	-3,900	-13,067	-36,146	-3,710	31,189	68,740	109,398	154,164	203,035	256,237	313,822	375,787	439,291	504,334	570,915	639,034	708,692	779,889	852,625	926,869	1,002,422	1,078,902	1,155,382	1,231,862	1,308,342	1,384,823	1,461,303	1,537,783	1,614,263
Total Liabilities & Capital	5,547	43,208	114,586	288,489	284,779	319,308	353,979	386,998	412,531	442,169	476,138	514,491	557,224	601,495	647,305	694,653	743,540	793,966	845,930	899,433	954,815	1,014,015	1,078,902	1,155,382	1,231,862	1,308,342	1,384,823	1,461,303	1,537,783	1,614,263
	0	0	0	0	-0	0	0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Financial Indicators	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Rate of Return on Net Fixed Assets (%)	0	0	0	0	20.28	22.38	24.73	27.42	30.51	34.05	38.29	43.30	40.14	34.65	37.14	40.02	43.37	47.35	52.12	43.23	38.75	41.39	45.59	50.00	55.35	61.99	70.44	81.56	96.35	119.19
Debt Service Coverage Ratio	0	0	0	0	3.05	3.11	2.92	2.60	2.01	2.16	2.32	2.51	2.70	2.83	2.98	3.13	3.31	3.50	3.72	3.97	4.33	5.28	7.87							
Operating Ratio (%)					30.64	29.74	28.89	28.07	27.26	26.51	25.73	24.99	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28	24.28
Working Ratio (%)					12.15	11.79	11.46	11.13	10.81	10.51	10.20	9.91	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63

Chapter 5 Environmental Impact Assessment

5.1 Qualitative Evaluation of Selected Environmental Constituents (CEs)

100. There is very little environmental data available for the Study. The only data available is on water quality. Therefore, qualitative evaluation can be applied for almost all environmental constituents based on the Team's observations as well as various experiences in developed countries including Japan. Only impact of water quality is evaluated quantitatively.

101. Here, unit cargo terminal, by-pass road and domestic terminal are chosen as a set of objective projects and environmental impact is assessed only for these projects. More consideration is required when other projects are planned and implemented. For example, dry bulk terminal requires another environmental impact assessment. The possible constituents to be checked for the dry bulk terminal are; dust and noise caused by operation, water quality caused by accidental spill and leakage and so on.

102. Environmental problems in Honduras are in their early stage. When the situation is rather good, problems are only identified when visible damage occurs. A typical example is a natural hazard triggered by environmental deterioration such as a flood caused by deforestoration (as issue which currently attracts keen attention in Honduras). The invisible environmental deterioration has garnered little possible debate so far. This is mainly because the environmental situation in Honduras is pretty good thanks to the lack of large scale industrial compounds which act as large pollution sources.

103. Environmental features in the port of Cortes are described in Section 2.8 of PART I, through the various field studies, however, it is noted that water quality sometimes shows anomalies. As for the source of these anomalies, it is commonly known among the local people that the pollution comes from river discharges as well as waste water from households. The port facilities as well as port activities have contributed to the pollution of the Bay only to a limited extent and the contribution of the port will remain at the current limited level.

[Bottom material]

104. Although no data on sea bottom material quality exists, there is no contamination expected. Deterioration of the bottom sediment is usually a long process. Contaminated waste water discharged into the bay over a long span of time carries various substances which settle and accumulate on the bottom and become potential sources of water quality deterioration like DO (dissolved Oxygen), COD(Chemical Oxygen Demand) and sometimes toxic materials. However, there are no or a very limited number of factories/mines which may generate toxic materials around the bay and along the basin

of the rivers which discharge into the bay. Therefore, there is no accumulation of toxic substances expected in the bottom sediment of the Bay of Cortes. Even if the bottom sediment is stirred up, there is no fear of contamination or deterioration to the environment by the bottom sediment.

[Eco system]

105. As for the impact on benthos by the dredging as well as reclamation works, there is no serious problem foreseen. When ENP conducted large dredging and reclamation works in 1988 and 1989, there was no complaints concerning environmental deterioration. Every year, Texaco has been conducting dredging work (some 150 - 200 thousand cubic meters), however, no environmental problems have so far materialized. This is backed up by the fact that fishing in the bay, especially in the area near the port facilities including the reclaimed area, is very rare, according to interviews with local fishermen. Therefore, impact of dredging/reclamation works on benthic organs is expected to be minimal and no countermeasure is so far required.

[Current and waves]

106. The sea conditions in the Bay of Cortes are generally mild. There is no strong current reported in the bay and waves in the Bay are small thanks to the sheltering effects of the Punta de Caballos. So far, there has been no significant damage to the land area of the Bay of Cortes caused by sea phenomenon. The new land area is expanded southerly a few hundred meters with the unchanged direction of water front line and the reclaimed land is covered by rubble mound slope which dissipates wave energy and lower wave reflection. So, coastal phenomenon in the Bay will not change by the unit cargo terminal and no adverse effect, such as shore erosion and sedimentation is expected. As for the domestic terminal, the lay-out should be carefully planned so as not to hinder the current from the Lagua de Alvarado. If the structure obstructs the smooth flow, the result may be disastrous, depending on the volume and velocity of the flow. Construction of a well planned training wall could avoid the risk and ensure safe operation at the terminal.

[Air quality]

107. At present, dust is the only item of air quality which is observed during the grain as well as fertilizer operation. Grain and fertilizer are the items which are planned to be transferred to the exclusive dry bulk terminal. Thus, the environmental burden of the project will decrease comparing with the present condition. Port traffic may also have an impact on air quality in terms of NOX and SOX. At the moment, no data for NOX nor SOX is available, however, by observation no pollution by NOX and SOX is noticed. In future, the volume of port traffic increases as well as the amount of cargo handling equipment which acts as additional burden on the environment. However, a considerable volume of dry bulk cargoes would be transferred to the dry bulk terminal

and be transported by conveyer system which lessens the environmental burden. Thus, it appears that a air quality in the port will remain at its current level. The traffic volume outside the port increases as well, however, by-pass road will divide the traffic volume which results in the leveling of the air quality. In total, air quality is expected to continue at almost the same level in the future.

[Noise and Vibration]

108. Works of heavy construction machines and trucks and trailers are the possible sources of noise and vibration produced during the construction period.

109. Among heavy construction machines, the main possible sources of noise and vibration are driving piles. Many RC piles are planned to be used, however, ENP has experience in using the Water Jet Pile Driving Method which has no noise or vibration problem.

110. Construction site is remote from the residential area and thus noise produced by heavy construction machines as well as trucks and trailers inside the port causes no serious problem.

111. The volume of transportation is expected to dramatically increase and the total level of noise will increase. However, the project includes construction of the by-pass road which bears about half of the port traffic. Thus, the noise is dispersed to the level of less than present and no significant problem is foreseen.

5.2 Quantitative Evaluation

5.2.1 Methodologies for EIA

112. The environmental index for EIA to be further examined quantatively is water quality, especially turbidity. There are several methods for EIA, in terms of the depth of the study, to examine the environmental effects by a certain project or activity. The most appropriate method should be chosen based on the magnitude of the expected impact and the present condition of the environment (The magnitude of impact does not have absolute range, but is judged based on the situation of the proposed area and existing environmental burdens. The evaluation of the present environmental conditions is classified as significance of human concern which would be judged on the situation of pollution or on the situation of conservation of natural and social environment).

113. In Honduras, general diagnosis of the present environment is good and no conserved environmental item exists in the Bay of Cortes. Thus, the significance of

human concern is thought to be small. Magnitude of impact by the project is later examined, however, it is foreseen to be rather small. There are no environmental standards which could be utilized as environmental targets, nor sufficient accumulation of environmental data in Honduras. Therefore, in general, applicable method to Honduras is rather limited and the method applied hereunder is rather simple. After these examinations are conducted, then gradually a more detailed and complicated method should be evolved with the accumulation of data as well as experience.

114. The method applied in this report is schematically drawn in the subsequent figure.

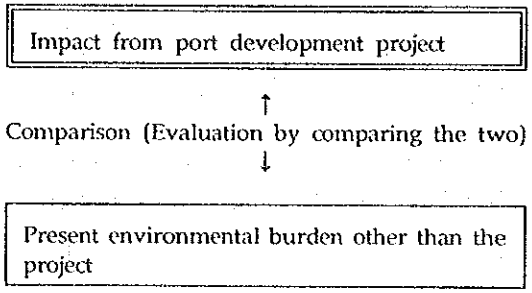

Fig. 5-2-1 Method A; Impact Grasping Method

The method tries to determine the magnitude of impacts by the port development project on the present environment in and around the port, in comparison with impacts from other causes. If the impact from the port development project is determined to be small, then impacts of port development project would not be further examined, and no mitigatory countermeasures are needed.

5.2.2 Environmental Impact on Water Quality

5.2.2.1 Water Quality in the Bay

115. Water quality is the item which should be thoroughly examined because the project includes dredging and reclamation work. During the work, water quality, especially turbidity worsens. The question is by how much and how widespread will the effect be. Then, if the environmental deterioration is very severe, what are the possible countermeasures.

116. While it can be said that the water quality in the Bay of Cortes is, in general, good, low transparency is often observed in shallow water areas. From the field survey results, the transparency in shallow water is less than 2m while the deeper water shows

better figures. Even under calm weather, the color of the water remains turbid along the coast line and a brown belt zone of some hundred meters wide is formulated. There is no comprehensive data of measurement on transparency in the bay, however, observation from on board indicates that in the said brown belt zone the transparency is no better than 2.5m which is adopted in Japan as one of the water quality standards for fishing environment. The project includes dredging as well as reclamation works which add new environmental burdens on the water quality. Therefore, turbidity should be further examined.

5.2.2.2 Turbidity

117. There are two major causes of turbidity in the Bay, excluding dredging and reclamation; inflow of external turbid water and stirring-up of bottom sediment. There are several sources of turbid water inflow into the Bay of Cortes. The main inflow comes from the Laguna de Alvarado. There are some other inflows; Rio Mar and the creek at the Wharf N0.2. In particular, the situation of Laguna de Alvarado is the worse in terms of water quality and turbidity.

118. As for the stirring-up of bottom sediment, Table 5-3-1 lists the examples of settling velocity as well as critical stirring velocity of fine sediment particles (the velocity is obtained by applying Stokes' equation). This indicates that small particles are easily stirred up and very difficult to settle down. Therefore, the bottom sediment constituted of small particles would increase the likelihood of turbidity.

Table 5-3-1

d(1/1,000mm)	Vs(cm/sec)	Vc(cm/sec)
1	0.00008	0.001
5	0.00193	0.029
74	0.42338	6.314

d : diameter of sediment particle
Vs: settling velocity
Vc: critical velocity for stirring

119. The results of soil sampling test show that the bottom sediment in the bay of Cortes is almost exclusively constituted of sand and the proportion of fine particles (smaller than 75 micro meters) is, at largest, 20%, except a few samples where the proportion of fine particles exceeds 80%. Fine particles, especially in the muddy portion

(diameter less than 5 micro meter) are easily stirred up by wave action and hard to settle down to the bottom. This is the cause of the perpetual brown belt zone observed along the coast line in the bay. The muddy portion will be ionized and several particles stick together formulating flocks which eventually promote settlement.

i. Turbidity by dredging work

120. Among the construction works of new unit cargo terminal, dredging and reclamation are the most critical. The dredging method to be taken is cutter suction type pumping dredger and this method may cause additional turbidity, especially around the cutter, when cutting the earth. However, additional turbidity caused by cutter tends to settle down much sooner than the turbidity made by wave action and brought from Laguna de Alvarado because the turbidity is made of rather large particles comparing with the turbid caused by the latter.

121. Fick-Iwai equation gives the concentration of SS (Suspended Substances; mg/l) at a given point as a function of distance from the source. Through this equation, turbidity is roughly obtained and the impact of the dredging as well as reclamation work could be predicted. After some calculation, 140 mg/l(ppm) is obtained at the source center (at the cutter), 14 mg/l (ppm) at a point 10 m and 4.4 mg/l(ppm) at a point 100m and 1.4 mg/l (ppm) from the source.

122. This result indicates that although SS burden by dredging work would be considerably high around the cutter, the burden decreases according to the distance from the center. At the distance of 100m from the center, there is a little burden and at 1000m, practically no burden to the environment, compared with the back-ground turbidity.

ii. Turbidity by reclamation work

123. Reclamation is another major cause of turbidity. Dredged sand is directly sent through a pipe-line system and discharged into the reclamation site. This type of work produces one of the highest concentrations of turbidity because the earth is loosened to mud and discharged into the water.

124. After the discharge of dredged earth, the mud layer of high turbid concentration disperse along the bottom. At the surface and middle layer, settling effect appears and the turbidity diminishes very early. Turbidity disperses with tidal current flow. An experiment in Japan indicates that at a few hundred meters from the discharging point, the turbidity remains at around 10ppm even at the bottom.

125. From Table 5-3-1, time required for a particle to settle down to the bottom (-5m)

is calculated as follows;

d(1/1,000mm)	Vs(cm/sec)	Tc(hour)
1	0.00008	1,736
5	0.00193	72
74	0.42338	0.33

126. All silt portion would settle down to the sea bed in three days, however, muddy portion remains suspended for a very long period of time. From the soil test result, it is known that the bottom material in the Bay is constituted of a sandy portion and thus the turbidity caused by muddy portion is limited. Another thing to be mentioned is that there is no large scale permanent flow in the Bay and the turbidity caused by the reclamation work would remain in the narrow strip along the coast line where the background water is already low in transparency. The turbidity will be limited compared with the background turbidity which is observed without the construction work. Furthermore, during the day time, wind prevails landwardly and thus contributes to prevent further dispersion of turbidity. Therefore, the environmental impact by reclamation work would be minimal.

iii. Possible mitigatory measures

127. A useful countermeasure to minimize the turbidity is to arrange the method and the order of civil works. One of the measures is to slow down the speed of dredging which is useful both for dredging and reclamation.

128. The enclosing structure of the reclaimed area would be another effective measure in order to confine the turbidity generated by discharging. A sluice should be made on the landward side and excess water overflow the sluice. Thus, less turbid water at the upper layer should flow out to the open sea. Through this measure, the SS burden on the surrounding water could be further lessened. An example of reclamation work in Japan which adopts enclosed dumping pond with sluice for discharging excess water indicates that in the Port of Cortes project SS concentration of the excess water should be much smaller than 12 ppm and the environmental impact would be minimal.

5.3 Other Environmental Issues

129. Adverse effects of the project on other items are expected to be minimal. The unit cargo terminal is constructed on the reclaimed land and by-pass road is planned in the fringe area of the free trade zone where no particular activity takes place. Therefore, no relocation of local inhabitants is needed and separation of local community will not

occur.

130. There are neither historical and prehistoric spots nor cultural assets in/around the port and, thus, no impact is foreseen. As mentioned already, commercial fishing in the Bay is practically nil and there is no impact by the project.

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