Chapter XXI Financial Analysis

21.1 Purpose and Methodology

21.1.1 Purpose

Purpose of the financial analysis is to examine the viability of the project in the short-term plan and the financial soundness of the terminal management entity during the project life.

21.1.2 Methodology

Figure 21.1.1 shows a flowchart of the financial analysis.

(1) Viability of the Project

The viability of the project is evaluated by the Financial Internal Rate of Return (FIRR). The FIRR is a discount rate in which net present values of cash inflow and outflow during the project life are considered equal. It is obtained from the following formula:

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

n : Project life

R_i : Cash inflow in the *i* th year

C_i : Cash outflow in the *i* th year

r : Discount rate

Here, the cash inflow and the cash outflow in this analysis consist of the following items.

Cash inflow : Increase of operating revenue by the project

Cash outflow : (i) Initial and renewal investment costs for the project

(ii) Increase of maintenance, repair, personnel and administration costs by the project

Following revenue and costs are excluded from the calculation of FIRR.

Revenue : Fund management income

Cost : Depreciation, repayment of the principal and interest on loan

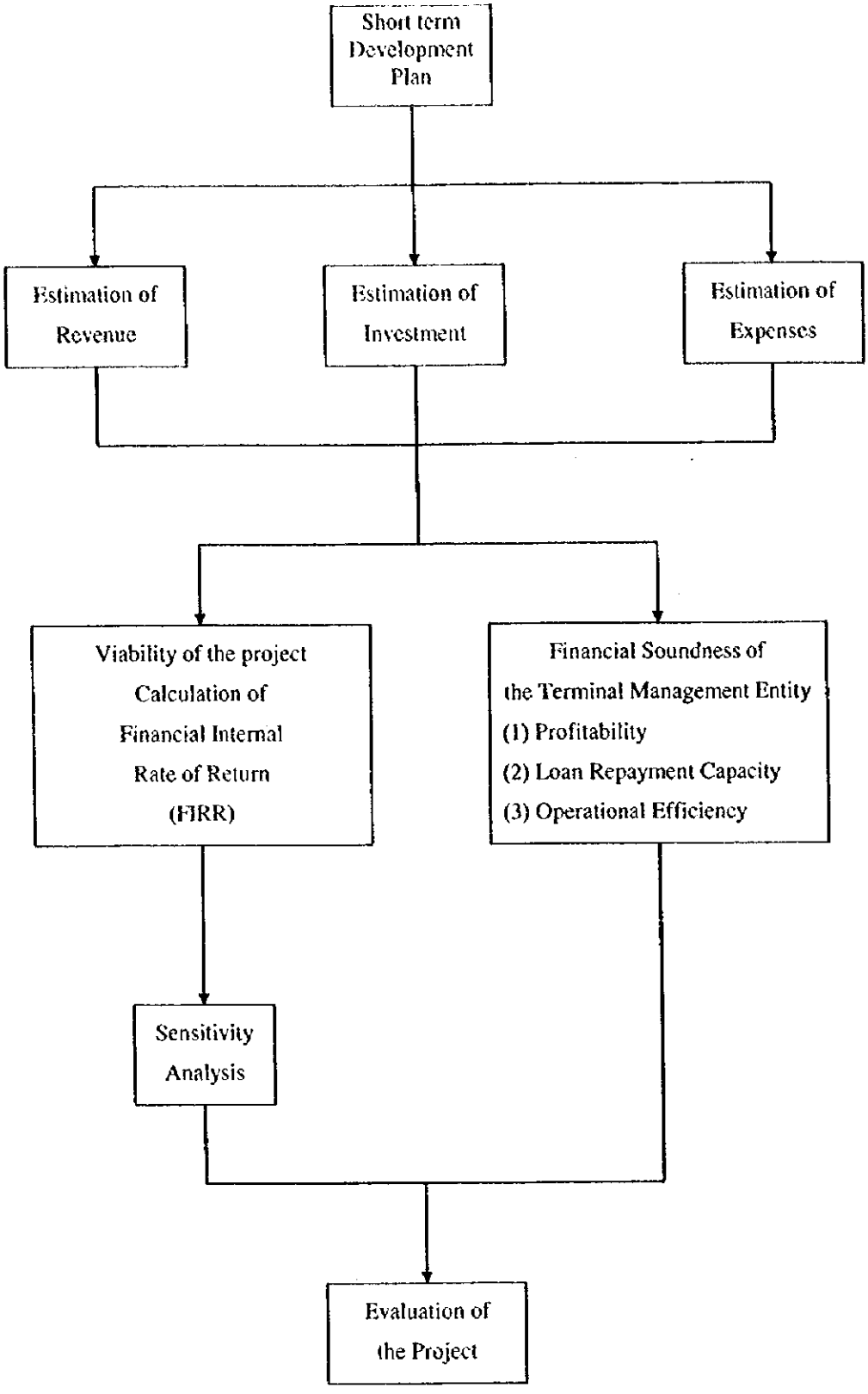

Figure 21.1.1 Flowchart of the Financial Analysis

When FIRR exceeds the weighted average interest rate of the total funds for investments of the project, the project is regarded as financially feasible.

(2) Financial Soundness of the Terminal Management Entity

Financial soundness of the terminal management entity is appraised with its projected financial statements (income statement, cash flow statement and balance sheet). The appraisal is made from the viewpoints of profitability, loan repayment capacity and operational efficiency, using the following ratios:

1) Profitability

$$\text{Rate of return on net fixed assets} = \frac{\text{Net operating income}}{\text{Total Fixed Assets}} \times 100\%$$

Rate of return on net fixed assets is related to operating fixed assets. It is necessary to keep the rate above the average interest rate of the funds for investment.

2) Loan Repayment Capacity

$$\text{Debt service coverage ratio} = \frac{\text{Net operating income before depreciation}}{\text{Repayment of principal and interest on long term loan}}$$

Debt service coverage ratio shows whether the operating income can cover the repayment of principal and interest on long term loans. The ratio must be higher than 1.0.

3) Operational Efficiency

$$\text{Operating ratio} = \frac{\text{Operating expenses}}{\text{Operating revenue}} \times 100\%$$

Operating ratio shows the percentage of port revenue that is consumed by operating expenses. It must be less than 75%.

$$\text{Working ratio} = \frac{\text{Operating expenses - Depreciation}}{\text{Operating revenue}} \times 100\%$$

Working ratio shows the efficiency of the routine operations of the port. It must be less than 60%.

21.2 Prerequisites of the Financial Analysis for the Project

21.2.1 Scope of the Financial Analysis

Scope of this financial analysis is as follows:

(1) All the construction work of the new container terminal including offshore container berth, access bridge, Victoria dock CY, container handling equipment, control office and gates.

(2) Dredging of basin, approach channel and navigation buoys

(3) Road improvement in dock area

(4) Cotton Depot CY and container handling equipment

(5) Timber Pond South CY and container handling equipment

21.2.2 Project Life

Project life is 30 years from the beginning of the project. It includes eight years of detailed design and construction work of the above mentioned port facilities.

21.2.3 Base Year

All costs, expenditure and revenues are indicated in prices as of 1997, when the price survey was conducted. Neither inflation nor an increase in nominal wages are considered during the project life.

21.2.4 Fund Raising

Fund raising is divided into two kinds, foreign and domestic funds. In the projects, all costs of foreign procurement are assumed to be raised by foreign funds (soft loan) and the domestic procurement costs are assumed to be raised by domestic funds in principle. The required money for domestic funds is financed by the nationalized banks. Conditions of loans are as follows:

(1) Foreign Funds

Loan period : 30 years, including a grace period of 10 years

Interest rate : 1.8 %

Repayment : Fixed amount repayment of principal

These are OECF's in 1998. Its upper limit of finance is the total amount of foreign procurement or 85% of the total project, whichever is higher.

(2) Domestic Funds

Loan period : 10 years

Interest rate : 14% (prime lending rate)

Repayment : Fixed amount repayment of principal

(3) Weighted Average Interest Rate

3.63% (1.8%*0.85+14%*0.15)

21.2.5 Cargo Handling Volume

The number of containers to be handled in the new container terminal and Ballard Pier will reach the upper limit (one million TEUs) in 2008.

Table 21.2.1 Projected Numbers of Containers

	Import	Export	Total
20' (Boxes)	194,541	194,541	389,082
40' (Boxes)	152,729	152,730	305,459
TEU	499,999	500,001	1,000,000
Loaded	374,999	460,001	835,000
Factory	213,750	290,201	503,950
CFS	112,500	110,000	222,500
RCD	48,750	59,800	108,550
Empty	125,000	40,000	165,000
RCD	16,250	5,200	21,450
CFS	108,750	34,800	143,550
Total	499,999	500,001	1,000,000

Annual container traffic at the new container terminal is assumed to be 830,000TEUs.

It is assumed that operation of the new container terminal will start in May 2007. Therefore the throughput in 2007 is assumed to be 553,333 TEUs.

Large size vessels can not enter into the Indira Dock due to the restriction of the lock system. It is expected that even feeder vessels will become bigger. In the future, the Indira Dock will be used for small container vessels and Ballard Pier will be used for container vessels that can not enter into the Indira Dock. In case of "Without-the-Project" case, the number of containers handled in the Port of Mumbai is assumed to decrease to 264,000 TEUs in 2007.

Projected throughputs are summarized as follows.

Year	Total traffic	Incremental traffic
2007	553,333 TEUs	490,666 TEUs
2008 and afterwards	830,000 TEUs	736,000 TEUs

21.2.6 Revenues

Calculation of revenues from port activities is based on the present and revised tariff system and future cargo handling volume. In this financial analysis, both incremental traffic and total traffic are considered respectively. Charges obtained from the operation of the new container terminal are as follows:

(1) Charges from Vessels (Table 21.2.2)

1) Port due	US$ 0.17 per GRT
2) Fees for pilotage and towage	US$ 0.24 per GRT
3) Berth hire charge	US$ 0.14 per GRT

Incremental revenues from container vessels are the difference between "With-the-project" case and "Without-the-project" case. In "Without-the-project" case, it is assumed that the average size of calling vessels is 17,000 GRT (Loading capacity is 800TEUs) and the number of calling container vessels is 339. In "With-the-project" case, the average size of vessels is 35,000 GRT (Loading capacity is 2500TEUs) and the number of calling container vessels is 423.

In case of the total traffic, 351 container vessels (83% of the "With-the-project" case) are assumed to use the new container berth.

(2) Container handling and movement fee (Table 21.2.3)

Port of Mumbai does not adopt a tariff system consistent with closed container terminal system, therefore the following tariff is used.

Per TEU	Loaded	Empty
1) From ship to CY or vice versa	Rs.2,600	Rs.2,100
2) From CY to truck or vice versa	Rs.400	Rs.400

(3) Stuffing/destuffing charge (Table 21.2.3)

20 feet	Rs. 600
40 feet	Rs. 1,200

(4) Container Storage Fee

Free time of import (export) containers is seven days following the date of discharging (prior to the date of loading). It is assumed that all the import (export) containers are received by consignees (loaded into vessels) within seven days. Therefore container storage charges or demurrage are not considered.

(5) Wharfage (Table 21.2.4 and Table 21.2.5)

1) Export (Factory stuffed container)

20 feet	Rs.1,000 per unit
40 feet	Rs.2,000 per unit

2) Export (CFS stuffed)

Average wharfage on containerized cargo in 1996 is Rs.64 per ton. It is assumed that the average weights of cargoes are 13 tons (in 20 foot container) and 26 tons (40 foot container).

20 feet	Rs.832 per unit
40 feet	Rs.1,664 per unit

3) Import (Factory/CFS destuffed)

Average wharfage on containerized cargo in 1996 is Rs.105 per ton. It is assumed that the average weights of cargoes are 13 tons (in 20 foot container) and 26 tons (40 foot container).

Table 21.2.2 Charges from Container Vessels

	Total traffic		With-the-project		Without-the-project	
	UNIT	Per Vessel	UNIT	Per Vessel	UNIT	Per Vessel
GRT		35,000		35,000		17,000
Port Due (US$)	0.17	5,950	0.17	5,950	0.17	2,890
Berth Hire (US$)	0.14	4,900	0.14	4,900	0.14	2,380
Pilotage & Towage (US$)	0.24	8,400	0.24	8,400	0.24	4,080
Mooring Fee (US$)		92.0		92.0		52.2
Total per Vessel (US$)		19,342		19,342		9,402
Number of Calling Vessels		351		423		339
Total a year (US$)		6,789,042		8,181,666		3,187,346
Total (Rs.)	35.1	238,295,374	35.1	287,176,477	35.1	111,875,838
				Incremental Revenue		175,300,639

Table 21.2.3 Charges from Container Handling

	Total traffic		Incremental traffic	
	Unit	Sub-Total	Unit	Sub-Total
From ship to CY (Loaded)	2,600	809,248,382	2,600	717,598,565
From ship to CY (Empty)	2,100	217,874,564	2,100	193,199,614
From CY to ship (Loaded)	2,600	992,681,985	2,600	880,257,761
From CY to ship (Empty)	2,100	69,720,139	2,100	61,824,124
Sub-Total (Rs.)		2,089,525,071		1,852,880,063
Charges from Container Movement				
From CY to truck or vice versa	400	332,000,000	400	294,400,000
Cargoes stuffing and destuffing	600	110,804,998	600	98,255,998
Total (Rs.)		2,532,330,068		2,245,536,060

Table 21.2.4 Wharfage (Total traffic)

	Charge (Rs.)	Number	Unit	Sub total
Export (Factory Stuffed)	1,000	240,866	TEUs	240,866,482
Export (From ICD by rail) 20'	1,300	27,795	Boxes	36,133,624
Export (From ICD by rail) 40'	1,950	21,839	Boxes	42,586,057
Export (Stuffed at CFSs)	832	91,300	TEUs	75,961,752
Import (To ICD by rail) 20'	1,300	22,659	Boxes	29,456,641
Import (To ICD by rail) 40'	1,950	17,803	Boxes	34,716,756
Import (To Factory)	1,365	177,412	TEUs	242,167,578
Import (Destuffed at CFSs)	1,365	93,375	TEUs	127,456,620
Total (Only New Terminal)				829,345,510

Table 21.2.5 Wharfage (Incremental traffic)

	Charge (Rs.)	Number	Unit	Sub total
Export (Factory Stuffed)	1,000	213,588	TEUs	213,587,627
Export (From ICD by rail) 20'	1,300	24,647	Boxes	32,041,382
Export (From ICD by rail) 40'	1,950	19,366	Boxes	37,763,058
Export (Stuffed at CFSs)	832	80,960	TEUs	67,358,855
Import (To ICD by rail) 20'	1,300	20,093	Boxes	26,120,588
Import (To ICD by rail) 40'	1,950	15,787	Boxes	30,784,978
Import (To Factory)	1,365	157,320	TEUs	214,741,371
Import (Destuffed at CFSs)	1,365	82,800	TEUs	113,021,774
Total (Only New Terminal)				735,419,633

20 feet	Rs.1,365 per unit
40 feet	Rs.2,730 per unit
4) To/from ICD by rail	
20 feet	Rs.1,300 per unit
40 feet	Rs.1,950 per unit

(6) Grand total of the revenues

	Total traffic	Incremental traffic
Charges from container vessels	Rs.238,295,374	Rs.175,300,639
Charges from container handling	Rs.2,532,330,068	Rs.2,245,536,060
Wharfage	Rs.829,345,510	Rs.735,419,633
Grand total of the revenues	Rs.3,599,970,952	Rs.3,156,256,332

21.2.7 Expenses

(1) Investment in capital assets

Investment cost is shown in chapter 18.2. According to the construction schedule, investment will be done. (Table 21.2.5) The procurement cost of container handling equipment includes import duty (38.76%). Container handling equipment will be replaced after service life with internal fund. Service lives are as follows:

Quay side gantry crane, RTG	: 15 years
Vehicles, trailers, fork lift truck, top lift truck	: 10 years

The annual depreciation of the container handling equipment is calculated by the straight line method. In this analysis, residual values at the end of the project life are not considered because selling of cargo handling equipment on that occasion is actually difficult due to the obsoleteness.

(2) Dredging cost

Place : Approach channel and basin in front of the new berths (See Figure 18.1.1)

Capital dredging is done according to the investment schedule.

The following maintenance dredging cost is included in the maintenance cost.

Table 21.2.6 Scheduled Investment of the Project

(unit : Rs. 1,000)

	Civil Work & Others	New Container Terminal			Cotton Depot	Timber South	Investment Total
		Quay side gantry	RTG	Tractor and Chassis	Reach Stacker	Reach Stacker	
1999	0						0
2000	289,324						289,324
2001	1,395,996						1,395,996
2002	2,576,222						2,576,222
2003	2,931,362	333,379	231,654	218,516	58,453	58,453	3,831,817
2004	2,761,127	333,379	231,654	218,516			3,544,676
2005	2,262,763	333,379	231,654	218,516			3,046,312
2006	2,746,135	333,379	231,654	218,516			3,529,684
2007	1,295,530	181,843	126,357	119,188			1,722,918
2008	72,331						72,331
2009							0
2010							0
2011							0
2012							0
2013				218,516	58,453	58,453	335,422
2014				218,516			218,516
2015				218,516			218,516
2016				218,516			218,516
2017				119,188			119,188
2018		333,379	231,654				565,033
2019		333,379	231,654				565,033
2020		333,379	231,654				565,033
2021		333,379	231,654				565,033
2022		181,843	126,357				308,200
2023				218,516	58,453	58,453	335,422
2024				218,516			218,516
2025				218,516			218,516
2026				218,516			218,516
2027				119,188			119,188
2028							0
2029							0
Total	16,330,790	3,030,714	2,105,949	2,979,761	175,358	175,358	24,797,931

Approach channel	Rs.124,131,000	
Basin	Rs.40,245,975	
Total	Rs.164,376,975	(See Case 4 in Table 13.3.20)

(3) Maintenance and repair cost (Table 21.2.6)

Annual maintenance costs for the port facilities are calculated as follows:

Infrastructure : 1% of the construction cost

Equipment : 4% of the procurement cost

(4) Personnel and administration cost

Estimation of annual personnel cost is based on the required number of employees and future average pay scales. The future average pay scale is assumed to be 20 % higher than the current average pay scales of MBPT considering the future raise and welfare costs.

Administration cost (material cost) is assumed as 25% of total personnel cost considering increase of administrative cost and modernized management system in the target year.

Assumed numbers of personnel at the New container terminal and new CFSs are as follows:

[Container Terminal]		
1) Administration Personnel	24	
2) Loading/unloading division		
- Operation planner	24	(12 persons*2 shifts)
- Quay side gantry crane operator	36	(6 cranes*2 persons*3 shifts)
- RTG operator	90	(15 RTGs*2 persons*3 shifts)
- Yard tractor driver	54	(6 cranes*3 trailers*3 shifts)
- Lasher	144	(6 cranes*8 persons*3 shifts)
- Tally clerk	18	(6 cranes*1 person*3 shifts)
3) Yard Control division		
- Yard controller	24	(12 persons*2 shifts)
4) Gate Operation division		
- Gate clerk	48	(16 gates*3 shifts)

Table 21.2.7 Maintenance Cost

(unit : Rs.1,000)

Facilities	Construction or Procurement Cost	Ratio	Maintenence Cost	2005	2006	2007	2008-
Container Berth	8,046,100	1%	80,461				80,461
Victoria CY	1,083,643	1%	10,836				10,836
Container Handling Equipment	3,561,586	4%	142,463				142,463
Navigation Buoy	30,015	1%	300				300
Road Improvement	673,740	1%	6,737				6,737
Cotton Depot	613,602	1%	6,136		6,136	6,136	6,136
Container Handling Equipment	58,453	4%	2,338		2,338	2,338	2,338
Timber Pond South Depot	117,143	1%	1,171	1,171	1,171	1,171	1,171
Container Handling Equipment	58,453	4%	2,338	2,338	2,338	2,338	2,338
Total				3,510	11,984	11,984	252,782

5) Documentation division		
- Export section	18	(9 persons*2 shifts)
- Import section	18	(9 persons*2 shifts)
6) Maintenance division		
- Mechanic/engineer	48	(16 persons*3 shifts)
7) Gate security division		
- Security Guard	48	(16 gates*3 shifts)
Total	594	
[Cotton Depot]		
1) Export division	14	(7 persons*2 shifts)
2) Import division	18	(9 persons*2 shifts)
3) Operating division	60	(30 persons*2 shifts)
4) Gate security division	6	(3persons*2 shifts)
Total	98	
[Timber Pond South Depot]		
1) Export division	14	(7 persons*2 shifts)
2) Import division	18	(9 persons*2 shifts)
3) Operating division	60	(30 persons*2 shifts)
4) Gate security division	6	(3persons*2 shifts)
Total	98	
Grand total of personnel	790	
Personnel cost per capita per annum	Rs.120,000	
	(considering future raise and welfare cost)	
Administration cost per capita per annum	Rs.30,000 (25% of personnel cost)	
Total cost of personnel and administration	Rs.118,500,000	

Table 21.2.8 Projected Expenses

(unit : Rs. 1,000)

	Maintenance Cost	Maintenance Dredging	Personnel Cost	Expenses Total
1999				0
2000				0
2001				0
2002				0
2003				0
2004				0
2005	3,510			3,510
2006	11,984			11,984
2007	11,984	164,377	118,500	294,861
2008	252,782	164,377	118,500	535,659
2009	252,782	164,377	118,500	535,659
2010	252,782	164,377	118,500	535,659
2011	252,782	164,377	118,500	535,659
2012	252,782	164,377	118,500	535,659
2013	252,782	164,377	118,500	535,659
2014	252,782	164,377	118,500	535,659
2015	252,782	164,377	118,500	535,659
2016	252,782	164,377	118,500	535,659
2017	252,782	164,377	118,500	535,659
2018	252,782	164,377	118,500	535,659
2019	252,782	164,377	118,500	535,659
2020	252,782	164,377	118,500	535,659
2021	252,782	164,377	118,500	535,659
2022	252,782	164,377	118,500	535,659
2023	252,782	164,377	118,500	535,659
2024	252,782	164,377	118,500	535,659
2025	252,782	164,377	118,500	535,659
2026	252,782	164,377	118,500	535,659
2027	252,782	164,377	118,500	535,659
2028	252,782	164,377	118,500	535,659
2029	252,782	164,377	118,500	535,659
Total	5,588,682	3,780,671	2,725,500	12,094,853

21.3 Evaluation of the Project

21.3.1 Viability of the Project

(1) Calculation of FIRR

The calculation results of FIRR are as follows:

Total traffic	10.23%	(Table 21.3.1)
Incremental traffic	8.51%	(Table 21.3.2)

In both cases, FIRRs exceed the weighted average interest rate of the funds. (3.63%)

(2) Sensitivity Analysis

Sensitivity analysis is conducted to examine the impact of unexpected future changes. (For example, cargo volume, construction cost, inflation or exchange rate)

The following cases are envisioned.

Case 1 : Revenue decreases by 10%

Case 2 : Investment cost increases by 10%

Case 3 : Revenue down 10% and investment cost up 10%

The results of the sensitivity analysis are as follows:

	Case 1	Case 2	Case 3
Total traffic	8.85%	9.17%	7.83%
Incremental traffic	7.16%	7.50%	6.18%

In all the cases, FIRR exceeds the weighted average interest rate of the funds (3.63%).

(3) Evaluation

Judging from the above results of analysis, this project is regarded as financially feasible under the assumptions in chapter 21.2.

Table 21.3.1 FIRR Calculation (Total Traffic)

(unit : Rs.1,000)

Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value		
		Investment	Expenses	Total		Revenue	Cost	Difference
2000	0	289,324	0	289,324	-289,324	0	289,324	-289,324
2001	0	1,395,996	0	1,395,996	-1,395,996	0	1,266,416	-1,266,416
2002	0	2,576,222	0	2,576,222	-2,576,222	0	2,120,156	-2,120,156
2003	0	3,831,817	0	3,831,817	-3,831,817	0	2,860,760	-2,860,760
2004	0	3,544,676	0	3,544,676	-3,544,676	0	2,400,742	-2,400,742
2005	0	3,046,312	3,510	3,049,822	-3,049,822	0	1,873,853	-1,873,853
2006	0	3,529,684	11,984	3,541,668	-3,541,668	0	1,974,064	-1,974,064
2007	2,411,981	1,722,918	294,861	2,017,779	394,202	1,219,605	1,020,279	199,326
2008	3,599,971	72,331	535,659	607,990	2,991,981	1,651,341	278,891	1,372,450
2009	3,599,971	0	535,659	535,659	3,064,312	1,498,059	222,904	1,275,155
2010	3,599,971	0	535,659	535,659	3,064,312	1,359,005	202,214	1,156,792
2011	3,599,971	0	535,659	535,659	3,064,312	1,232,859	183,444	1,049,415
2012	3,599,971	0	535,659	535,659	3,064,312	1,118,422	166,416	952,006
2013	3,599,971	335,422	535,659	871,081	2,728,890	1,014,607	245,503	769,104
2014	3,599,971	218,516	535,659	754,175	2,845,796	920,429	192,825	727,604
2015	3,599,971	218,516	535,659	754,175	2,845,796	834,992	174,927	660,065
2016	3,599,971	218,516	535,659	754,175	2,845,796	757,486	158,689	598,796
2017	3,599,971	119,188	535,659	654,847	2,945,124	687,174	124,999	562,175
2018	3,599,971	565,033	535,659	1,100,692	2,499,279	623,389	190,601	432,787
2019	3,599,971	565,033	535,659	1,100,692	2,499,279	565,524	172,909	392,615
2020	3,599,971	565,033	535,659	1,100,692	2,499,279	513,031	156,859	356,171
2021	3,599,971	565,033	535,659	1,100,692	2,499,279	465,410	142,299	323,111
2022	3,599,971	308,200	535,659	843,859	2,756,112	422,209	98,969	323,240
2023	3,599,971	335,422	535,659	871,081	2,728,890	383,019	92,679	290,340
2024	3,599,971	218,516	535,659	754,175	2,845,796	347,466	72,792	274,674
2025	3,599,971	218,516	535,659	754,175	2,845,796	315,213	66,036	249,178
2026	3,599,971	218,516	535,659	754,175	2,845,796	285,954	59,906	226,048
2027	3,599,971	119,188	535,659	654,847	2,945,124	259,411	47,188	212,224
2028	3,599,971	0	535,659	535,659	3,064,312	235,332	35,016	200,316
2029	3,599,971	0	535,659	535,659	3,064,312	213,488	31,766	181,722
Total	81,611,341	24,797,931	12,094,853	36,892,784	44,718,558	16,923,426	16,923,426	-0

FIRR= 10.23%

Table 21.3.2 FIRR Calculation (Incremental Traffic)

(unit : Rs.1,000)

Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value		
		Investment	Expenses	Total		Revenue	Cost	Difference
2000	0	289,324	0	289,324	-289,324	0	289,324	-289,324
2001	0	1,395,996	0	1,395,996	-1,395,996	0	1,286,501	-1,286,501
2002	0	2,576,222	0	2,576,222	-2,576,222	0	2,187,940	-2,187,940
2003	0	3,831,817	0	3,831,817	-3,831,817	0	2,999,045	-2,999,045
2004	0	3,544,676	0	3,544,676	-3,544,676	0	2,556,706	-2,556,706
2005	0	3,046,312	3,510	3,049,822	-3,049,822	0	2,027,238	-2,027,238
2006	0	3,529,684	11,984	3,541,668	-3,541,668	0	2,169,523	-2,169,523
2007	2,114,692	1,722,918	294,861	2,017,779	96,913	1,193,794	1,139,085	54,710
2008	3,156,256	72,331	535,659	607,990	2,548,266	1,642,029	316,304	1,325,725
2009	3,156,256	0	535,659	535,659	2,620,597	1,513,237	256,817	1,256,420
2010	3,156,256	0	535,659	535,659	2,620,597	1,394,546	236,673	1,157,873
2011	3,156,256	0	535,659	535,659	2,620,597	1,285,165	218,110	1,067,055
2012	3,156,256	0	535,659	535,659	2,620,597	1,184,364	201,002	983,361
2013	3,156,256	335,422	535,659	871,081	2,285,176	1,091,468	301,229	790,239
2014	3,156,256	218,516	535,659	754,175	2,402,081	1,005,859	240,346	765,513
2015	3,156,256	218,516	535,659	754,175	2,402,081	926,965	221,495	705,470
2016	3,156,256	218,516	535,659	754,175	2,402,081	854,259	204,122	650,137
2017	3,156,256	119,188	535,659	654,847	2,501,409	787,255	163,336	623,918
2018	3,156,256	565,033	535,659	1,100,692	2,055,564	725,507	253,008	472,498
2019	3,156,256	565,033	535,659	1,100,692	2,055,564	668,602	233,164	435,438
2020	3,156,256	565,033	535,659	1,100,692	2,055,564	616,160	214,876	401,284
2021	3,156,256	565,033	535,659	1,100,692	2,055,564	567,832	198,022	369,810
2022	3,156,256	308,200	535,659	843,859	2,312,397	523,294	139,908	383,386
2023	3,156,256	335,422	535,659	871,081	2,285,176	482,249	133,094	349,156
2024	3,156,256	218,516	535,659	754,175	2,402,081	444,424	106,194	338,231
2025	3,156,256	218,516	535,659	754,175	2,402,081	409,566	97,864	311,702
2026	3,156,256	218,516	535,659	754,175	2,402,081	377,442	90,188	287,253
2027	3,156,256	119,188	535,659	654,847	2,501,409	347,837	72,168	275,669
2028	3,156,256	0	535,659	535,659	2,620,597	320,555	54,402	266,152
2029	3,156,256	0	535,659	535,659	2,620,597	295,412	50,135	245,277
Total	71,552,331	24,797,931	12,094,853	36,892,784	34,659,547	18,657,820	18,657,820	0

FIRR= 8.51%

21.3.2 Financial Soundness of the Terminal Management Entity

The projected financial statements and financial indicators (the rate of return on net fixed assets, debt coverage ratio, operating ratio and working ratio of the terminal management body) with regard to the short-term plan of the MBP are summarized in Table 21.3.3 (Total traffic) and Table 21.3.4 (Incremental traffic).

(1) Profitability

The rate of return on net fixed assets exceeds the weighted average interest rate of funds from 2007, the beginning of the operation.

(2) Loan Repayment Capacity

Throughout the project life, the debt service coverage ratio exceeds 1.0. This means that there will be no difficulty in repaying long-term loans from the annual operating revenues.

(3) Operational Efficiency

Both the operating and working ratios maintain favorable levels. It shows that the operation will be efficient.

21.3.3 Conclusion

Judging from the above analysis, the base case projects are regarded as financially feasible. However, the terminal operator should make continuous efforts to secure forecast cargo volume, to improve cargo handling efficiency and to reduce operating expenses, especially personnel cost.

Concerning the financial soundness of MBPT, it is necessary that MBPT will keep the same number of workers or staff in the future. If MBPT does so, it can keep good performance since the volume of projected cargo (not only containerized cargo but break bulk and liquid bulk cargo) will increase in 2007 or 2017.

Table 21.3.3Financial Statements
Total traffic

Income Statement (Unit Rs.1,000)

Year	2000	2001	2002	2003	2004	2005
Operating Revenue	0	0	0	0	0	0
Operating Expenses	0	0	0	0	68,288	134,247
Personnel & Administration	0	0	0	0	0	0
Maintenance	0	0	0	0	0	3,510
Maintenance Dredging	0	0	0	0	0	0
Depreciation	0	0	0	0	68,288	130,737
Net Operating Income	0	0	0	0	-68,288	-134,247
Interest on Long-term Loans	0	5,208	30,336	76,708	145,680	209,485
Net Surplus	0	-5,208	-30,336	-76,708	-213,969	-343,732
Accumulated Earnings	0	-5,208	-35,544	-112,251	-326,220	-669,952

Cash Flow

Year	2000	2001	2002	2003	2004	2005
Cash Beginning	0	0	-5,208	-35,544	-112,251	-257,932
Cash Inflow	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,042,802
Net Operating Income	0	0	0	0	-68,288	-134,247
Depreciation	0	0	0	0	68,288	130,737
Long-term Loans	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,046,312
Cash Outflow	289,324	1,401,204	2,606,558	3,908,524	3,690,357	3,255,797
Investment	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,046,312
Repayment of principal	0	0	0	0	0	0
Interest on Long-term Loans	0	5,208	30,336	76,708	145,680	209,485
Cash Balance	0	-5,208	-30,336	-76,707	-145,681	-212,995
Cash Ending	0	-5,208	-35,544	-112,251	-257,932	-470,926

Balance Sheet

Year	2000	2001	2002	2003	2004	2005
Current Assets	0	0	0	0	0	0
Cash & Deposit	0	0	0	0	0	0
Fixed Assets	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322
Total Assets	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322
Liabilities	289,324	1,690,528	4,297,086	8,205,610	11,895,967	15,155,273
Short-term Loans	0	5,208	35,544	112,251	257,932	470,926
Long-term Loans	289,324	1,685,320	4,261,542	8,093,359	11,638,035	14,684,347
Net Worth	0	-5,208	-35,544	-112,251	-326,220	-669,952
Total Liabilities & Net Worth	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322

Financial Indicators	2000	2001	2002	2003	2004	2005
Rate of Return Fixed Assets						
Debt Service Coverage Ratio						
Operating Ratio						
Working Ratio						

Table 21.3.3Financial Statements
Total traffic

Income Statement (Unit Rs.1,000)

Year	2006	2007	2008	2009	2010	2011
Operating Revenue	0	2,411,981	3,599,971	3,599,971	3,599,971	3,599,971
Operating Expenses	234,425	807,067	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	0	118,500	118,500	118,500	118,500	118,500
Maintenance	11,984	11,984	252,782	252,782	252,782	252,782
Maintenance Dredging	0	164,377	164,377	164,377	164,377	164,377
Depreciation	222,442	512,207	544,672	544,672	544,672	544,672
Net Operating Income	-234,425	1,604,913	2,519,640	2,519,640	2,519,640	2,519,640
Interest on Long-term Loans	421,236	616,228	668,098	623,833	575,619	527,145
Net Surplus	-655,661	988,685	1,851,542	1,895,807	1,944,021	1,992,495
Accumulated Earnings	-1,325,613	-336,928	1,514,614	3,410,421	5,354,441	7,346,936

Cash Flow

Year	2006	2007	2008	2009	2010	2011
Cash Beginning	-470,926	-1,049,440	165,603	2,219,601	4,317,864	6,449,875
Cash Inflow	3,517,700	3,840,038	3,136,643	3,064,312	3,064,312	3,064,312
Net Operating Income	-234,425	1,604,913	2,519,640	2,519,640	2,519,640	2,519,640
Depreciation	222,442	512,207	544,672	544,672	544,672	544,672
Long-term Loans	3,529,684	1,722,918	72,331	0	0	0
Cash Outflow	4,096,214	2,624,995	1,082,645	966,049	932,301	953,626
Investment	3,529,684	1,722,918	72,331	0	0	0
Repayment of principal	145,294	285,849	342,216	342,216	356,682	426,482
Interest on Long-term Loans	421,236	616,228	668,098	623,833	575,619	527,145
Cash Balance	-578,514	1,215,043	2,053,998	2,098,263	2,132,011	2,110,685
Cash Ending	-1,049,440	165,603	2,219,601	4,317,864	6,449,875	8,560,560

Balance Sheet

Year	2006	2007	2008	2009	2010	2011
Current Assets	0	165,603	2,219,601	4,317,864	6,449,875	8,560,560
Cash & Deposit	0	165,603	2,219,601	4,317,864	6,449,875	8,560,560
Fixed Assets	17,792,564	19,003,276	18,530,935	17,986,263	17,441,591	16,896,918
Total Assets	17,792,564	19,168,878	20,750,536	22,304,127	23,891,465	25,457,479
Liabilities	19,118,177	19,505,806	19,235,922	18,893,706	18,537,024	18,110,543
Short-term Loans	1,049,440	0	0	0	0	0
Long-term Loans	18,068,737	19,505,806	19,235,922	18,893,706	18,537,024	18,110,543
Net Worth	-1,325,613	-336,928	1,514,614	3,410,421	5,354,441	7,346,936
Total Liabilities & Net Worth	17,792,564	19,168,878	20,750,536	22,304,127	23,891,465	25,457,479

Financial Indicators	2006	2007	2008	2009	2010	2011
Rate of Return Fixed Assets		8.4%	13.6%	14.0%	14.4%	14.9%
Debt Service Coverage Ratio		2.35	3.03	3.17	3.29	3.21
Operating Ratio		33.5%	30.0%	30.0%	30.0%	30.0%
Working Ratio		12.2%	14.9%	14.9%	14.9%	14.9%

Table 21.3.3Financial Statements
Total traffic

Income Statement (Unit Rs.1,000)

Year	2012	2013	2014	2015	2016	2017
Operating Revenue	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Interest on Long-term Loans	477,414	425,365	369,867	311,179	271,397	249,382
Net Surplus	2,042,226	2,094,275	2,149,773	2,208,461	2,248,242	2,270,257
Accumulated Earnings	9,389,162	11,483,437	13,633,210	15,841,671	18,089,914	20,360,171

Cash Flow

Year	2012	2013	2014	2015	2016	2017
Cash Beginning	8,560,560	10,592,165	12,148,807	13,700,619	15,231,450	16,841,149
Cash Inflow	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,032,707	1,507,670	1,512,500	1,533,481	1,454,613	1,250,677
Investment	0	335,422	218,516	218,516	218,516	119,188
Repayment of principal	555,293	746,884	924,117	1,003,786	964,699	882,106
Interest on Long-term Loans	477,414	425,365	369,867	311,179	271,397	249,382
Cash Balance	2,031,605	1,556,642	1,551,811	1,530,831	1,609,699	1,813,635
Cash Ending	10,592,165	12,148,807	13,700,619	15,231,450	16,841,149	18,654,784

Balance Sheet

Year	2012	2013	2014	2015	2016	2017
Current Assets	10,592,165	12,148,807	13,700,619	15,231,450	16,841,149	18,654,784
Cash & Deposit	10,592,165	12,148,807	13,700,619	15,231,450	16,841,149	18,654,784
Fixed Assets	16,352,246	16,142,996	15,816,840	15,490,684	15,164,529	14,739,045
Total Assets	26,944,412	28,291,803	29,517,459	30,722,134	32,005,678	33,393,829
Liabilities	17,555,250	16,808,366	15,884,249	14,880,463	13,915,764	13,033,658
Short-term Loans	0	0	0	0	0	0
Long-term Loans	17,555,250	16,808,366	15,884,249	14,880,463	13,915,764	13,033,658
Net Worth	9,389,162	11,483,437	13,633,210	15,841,671	18,089,914	20,360,171
Total Liabilities & Net Worth	26,944,412	28,291,803	29,517,459	30,722,134	32,005,678	33,393,829

Financial Indicators	2012	2013	2014	2015	2016	2017
Rate of Return Fixed Assets	15.4%	15.6%	15.9%	16.3%	16.6%	17.1%
Debt Service Coverage Ratio	2.97	2.61	2.37	2.33	2.48	2.71
Operating Ratio	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Working Ratio	14.9%	14.9%	14.9%	14.9%	14.9%	14.9%

Table 21.3.3Financial Statements
Total traffic

Income Statement (Unit Rs.1,000)

Year	2018	2019	2020	2021	2022	2023
Operating Revenue	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Interest on Long-term Loans	234,215	219,306	204,397	189,489	174,580	159,671
Net Surplus	2,285,425	2,300,333	2,315,242	2,330,151	2,345,060	2,359,969
Accumulated Earnings	22,645,596	24,945,929	27,261,171	29,591,323	31,936,383	34,296,352

Cash Flow

Year	2018	2019	2020	2021	2022	2023
Cash Beginning	18,654,784	20,094,108	21,548,341	23,017,483	24,501,533	26,257,326
Cash Inflow	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,624,988	1,610,079	1,595,170	1,580,261	1,308,519	1,320,832
Investment	565,033	565,033	565,033	565,033	308,200	335,422
Repayment of principal	825,740	825,740	825,740	825,740	825,740	825,740
Interest on Long-term Loans	234,215	219,306	204,397	189,489	174,580	159,671
Cash Balance	1,439,324	1,454,233	1,469,142	1,484,051	1,755,793	1,743,480
Cash Ending	20,094,108	21,548,341	23,017,483	24,501,533	26,257,326	28,000,806

Balance Sheet

Year	2018	2019	2020	2021	2022	2023
Current Assets	20,094,108	21,548,341	23,017,483	24,501,533	26,257,326	28,000,806
Cash & Deposit	20,094,108	21,548,341	23,017,483	24,501,533	26,257,326	28,000,806
Fixed Assets	14,759,406	14,779,767	14,800,128	14,820,489	14,584,016	14,374,766
Total Assets	34,853,514	36,328,108	37,817,610	39,322,022	40,841,342	42,375,572
Liabilities	12,207,918	11,382,179	10,556,439	9,730,699	8,904,960	8,079,220
Short-term Loans	0	0	0	0	0	0
Long-term Loans	12,207,918	11,382,179	10,556,439	9,730,699	8,904,960	8,079,220
Net Worth	22,645,596	24,945,929	27,261,171	29,591,323	31,936,383	34,296,352
Total Liabilities & Net Worth	34,853,514	36,328,108	37,817,610	39,322,022	40,841,342	42,375,572

Financial Indicators	2018	2019	2020	2021	2022	2023
Rate of Return Fixed Assets	17.1%	17.0%	17.0%	17.0%	17.3%	17.5%
Debt Service Coverage Ratio	2.89	2.93	2.97	3.02	3.06	3.11
Operating Ratio	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Working Ratio	14.9%	14.9%	14.9%	14.9%	14.9%	14.9%

Table 21.3.3Financial Statements
Total traffic

Income Statement (Unit Rs.1,000)

Year	2024	2025	2026	2027	2028	2029
Operating Revenue	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971	3,599,971
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Interest on Long-term Loans	144,762	129,853	114,944	100,035	85,126	70,218
Net Surplus	2,374,878	2,389,787	2,404,696	2,419,604	2,434,513	2,449,422
Accumulated Earnings	36,671,229	39,061,016	41,465,712	43,885,316	46,319,830	48,769,252

Cash Flow

Year	2024	2025	2026	2027	2028	2029
Cash Beginning	28,000,806	29,876,100	31,766,302	33,671,414	35,690,763	37,844,209
Cash Inflow	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312	3,064,312
Net Operating Income	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640	2,519,640
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,189,018	1,174,109	1,159,200	1,044,963	910,866	895,957
Investment	218,516	218,516	218,516	119,188	0	0
Repayment of principal	825,740	825,740	825,740	825,740	825,740	825,740
Interest on Long-term Loans	144,762	129,853	114,944	100,035	85,126	70,218
Cash Balance	1,875,294	1,890,203	1,905,112	2,019,349	2,153,446	2,168,355
Cash Ending	29,876,100	31,766,302	33,671,414	35,690,763	37,844,209	40,012,563

Balance Sheet

Year	2024	2025	2026	2027	2028	2029
Current Assets	29,876,100	31,766,302	33,671,414	35,690,763	37,844,209	40,012,563
Cash & Deposit	29,876,100	31,766,302	33,671,414	35,690,763	37,844,209	40,012,563
Fixed Assets	14,048,610	13,722,454	13,396,299	12,970,815	12,426,143	11,881,471
Total Assets	43,924,710	45,488,757	47,067,713	48,661,578	50,270,351	51,894,034
Liabilities	7,253,480	6,427,741	5,602,001	4,776,261	3,950,522	3,124,782
Short-term Loans	0	0	0	0	0	0
Long-term Loans	7,253,480	6,427,741	5,602,001	4,776,261	3,950,522	3,124,782
Net Worth	36,671,229	39,061,016	41,465,712	43,885,316	46,319,830	48,769,252
Total Liabilities & Net Worth	43,924,710	45,488,757	47,067,713	48,661,578	50,270,351	51,894,034

Financial Indicators	2024	2025	2026	2027	2028	2029
Rate of Return Fixed Assets	17.9%	18.4%	18.8%	19.4%	20.3%	21.2%
Debt Service Coverage Ratio	3.16	3.21	3.26	3.31	3.36	3.42
Operating Ratio	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Working Ratio	14.9%	14.9%	14.9%	14.9%	14.9%	14.9%

Table 21.3.4Financial Statements
Incremental traffic

Income Statement (Unit Rs.1,000)

Year	2000	2001	2002	2003	2004	2005
Operating Revenue	0	0	0	0	0	0
Operating Expenses	0	0	0	0	68,288	134,247
Personnel & Administration	0	0	0	0	0	0
Maintenance	0	0	0	0	0	3,510
Maintenance Dredging	0	0	0	0	0	0
Depreciation	0	0	0	0	68,288	130,737
Net Operating Income	0	0	0	0	-68,288	-134,247
Interest on Long-term Loans	0	5,208	30,336	76,708	145,680	209,485
Net Surplus	0	-5,208	-30,336	-76,708	-213,969	-343,732
Accumulated Earnings	0	-5,208	-35,544	-112,251	-326,220	-669,952

Cash Flow

Year	2000	2001	2002	2003	2004	2005
Cash Beginning	0	0	-5,208	-35,544	-112,251	-257,932
Cash Inflow	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,042,802
Net Operating Income	0	0	0	0	-68,288	-134,247
Depreciation	0	0	0	0	68,288	130,737
Long-term Loans	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,046,312
Cash Outflow	289,324	1,401,204	2,606,558	3,908,524	3,690,357	3,255,797
Investment	289,324	1,395,996	2,576,222	3,831,817	3,544,676	3,046,312
Repayment of principal	0	0	0	0	0	0
Interest on Long-term Loans	0	5,208	30,336	76,708	145,680	209,485
Cash Balance	0	-5,208	-30,336	-76,707	-145,681	-212,995
Cash Ending	0	-5,208	-35,544	-112,251	-257,932	-470,926

Balance Sheet

Year	2000	2001	2002	2003	2004	2005
Current Assets	0	0	0	0	0	0
Cash & Deposit	0	0	0	0	0	0
Fixed Assets	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322
Total Assets	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322
Liabilities	289,324	1,690,528	4,297,086	8,205,610	11,895,967	15,155,273
Short-term Loans	0	5,208	35,544	112,251	257,932	470,926
Long-term Loans	289,324	1,685,320	4,261,542	8,093,359	11,638,035	14,684,347
Net Worth	0	-5,208	-35,544	-112,251	-326,220	-669,952
Total Liabilities & Net Worth	289,324	1,685,320	4,261,542	8,093,359	11,569,747	14,485,322

Financial Indicators	2000	2001	2002	2003	2004	2005
Rate of Return Fixed Assets						
Debt Service Coverage Ratio						
Operating Ratio						
Working Ratio						

Table 21.3.4Financial Statements
Incremental traffic

Income Statement (Unit Rs.1,000)

Year	2006	2007	2008	2009	2010	2011
Operating Revenue	0	2,114,692	3,156,256	3,156,256	3,156,256	3,156,256
Operating Expenses	234,425	807,067	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	0	118,500	118,500	118,500	118,500	118,500
Maintenance	11,984	11,984	252,782	252,782	252,782	252,782
Maintenance Dredging	0	164,377	164,377	164,377	164,377	164,377
Depreciation	222,442	512,207	544,672	544,672	544,672	544,672
Net Operating Income	-234,425	1,307,624	2,075,925	2,075,925	2,075,925	2,075,925
Interest on Long-term Loans	421,236	616,228	668,098	623,833	575,619	527,145
Net Surplus	-655,661	691,396	1,407,827	1,452,092	1,500,306	1,548,780
Accumulated Earnings	-1,325,613	-634,217	773,611	2,225,703	3,726,009	5,274,789

Cash Flow

Year	2006	2007	2008	2009	2010	2011
Cash Beginning	-470,926	-1,049,440	-131,686	1,478,598	3,133,146	4,821,442
Cash Inflow	3,517,700	3,542,749	2,692,928	2,620,597	2,620,597	2,620,597
Net Operating Income	-234,425	1,307,624	2,075,925	2,075,925	2,075,925	2,075,925
Depreciation	222,442	512,207	544,672	544,672	544,672	544,672
Long-term Loans	3,529,684	1,722,918	72,331	0	0	0
Cash Outflow	4,096,214	2,624,995	1,082,645	966,049	932,301	953,626
Investment	3,529,684	1,722,918	72,331	0	0	0
Repayment of principal	145,294	285,849	342,216	342,216	356,682	426,482
Interest on Long-term Loans	421,236	616,228	668,098	623,833	575,619	527,145
Cash Balance	-578,514	917,754	1,610,284	1,654,548	1,688,296	1,666,971
Cash Ending	-1,049,440	-131,686	1,478,598	3,133,146	4,821,442	6,488,413

Balance Sheet

Year	2006	2007	2008	2009	2010	2011
Current Assets	0	0	1,478,598	3,133,146	4,821,442	6,488,413
Cash & Deposit	0	0	1,478,598	3,133,146	4,821,442	6,488,413
Fixed Assets	17,792,564	19,003,276	18,530,935	17,986,263	17,441,591	16,896,918
Total Assets	17,792,564	19,003,276	20,009,532	21,119,409	22,263,033	23,385,331
Liabilities	19,118,177	19,637,492	19,235,922	18,893,706	18,537,024	18,110,543
Short-term Loans	1,049,440	131,686	0	0	0	0
Long-term Loans	18,068,737	19,505,806	19,235,922	18,893,706	18,537,024	18,110,543
Net Worth	-1,325,613	-634,217	773,611	2,225,703	3,726,009	5,274,789
Total Liabilities & Net Worth	17,792,564	19,003,276	20,009,532	21,119,409	22,263,033	23,385,331

Financial Indicators	2006	2007	2008	2009	2010	2011
Rate of Return Fixed Assets		6.9%	11.2%	11.5%	11.9%	12.3%
Debt Service Coverage Ratio		2.02	2.59	2.71	2.81	2.75
Operating Ratio		38.2%	34.2%	34.2%	34.2%	34.2%
Working Ratio		13.9%	17.0%	17.0%	17.0%	17.0%

Table 21.3.4Financial Statements
Incremental traffic

Income Statement (Unit Rs.1,000)

Year	2012	2013	2014	2015	2016	2017
Operating Revenue	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Interest on Long-term Loans	477,414	425,365	369,867	311,179	271,397	249,382
Net Surplus	1,598,511	1,650,560	1,706,058	1,764,747	1,804,528	1,826,543
Accumulated Earnings	6,873,300	8,523,861	10,229,919	11,994,666	13,799,193	15,625,736

Cash Flow

Year	2012	2013	2014	2015	2016	2017
Cash Beginning	6,488,413	8,076,304	9,189,231	10,297,328	11,384,444	12,550,429
Cash Inflow	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,032,707	1,507,670	1,512,500	1,533,481	1,454,613	1,250,677
Investment	0	335,422	218,516	218,516	218,516	119,188
Repayment of principal	555,293	746,884	924,117	1,003,786	964,699	882,106
Interest on Long-term Loans	477,414	425,365	369,867	311,179	271,397	249,382
Cash Balance	1,587,890	1,112,927	1,108,097	1,087,116	1,165,985	1,369,920
Cash Ending	8,076,304	9,189,231	10,297,328	11,384,444	12,550,429	13,920,349

Balance Sheet

Year	2012	2013	2014	2015	2016	2017
Current Assets	8,076,304	9,189,231	10,297,328	11,384,444	12,550,429	13,920,349
Cash & Deposit	8,076,304	9,189,231	10,297,328	11,384,444	12,550,429	13,920,349
Fixed Assets	16,352,246	16,142,996	15,816,840	15,490,684	15,164,529	14,739,045
Total Assets	24,428,550	25,332,227	26,114,168	26,875,129	27,714,958	28,659,394
Liabilities	17,555,250	16,808,366	15,884,249	14,880,463	13,915,764	13,033,658
Short-term Loans	0	0	0	0	0	0
Long-term Loans	17,555,250	16,808,366	15,884,249	14,880,463	13,915,764	13,033,658
Net Worth	6,873,300	8,523,861	10,229,919	11,994,666	13,799,193	15,625,736
Total Liabilities & Net Worth	24,428,550	25,332,227	26,114,168	26,875,129	27,714,958	28,659,394

Financial Indicators	2012	2013	2014	2015	2016	2017
Rate of Return Fixed Assets	12.7%	12.9%	13.1%	13.4%	13.7%	14.1%
Debt Service Coverage Ratio	2.54	2.24	2.03	1.99	2.12	2.32
Operating Ratio	34.2%	34.2%	34.2%	34.2%	34.2%	34.2%
Working Ratio	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%

Table 21.3.4Financial Statements
Incremental traffic

Income Statement (Unit Rs.1,000)

Year	2018	2019	2020	2021	2022	2023
Operating Revenue	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Interest on Long-term Loans	234,215	219,306	204,397	189,489	174,580	159,671
Net Surplus	1,841,710	1,856,619	1,871,528	1,886,437	1,901,345	1,916,254
Accumulated Earnings	17,467,446	19,324,065	21,195,593	23,082,029	24,983,375	26,899,629

Cash Flow

Year	2018	2019	2020	2021	2022	2023
Cash Beginning	13,920,349	14,915,958	15,926,477	16,951,904	17,992,240	19,304,318
Cash Inflow	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,624,988	1,610,079	1,595,170	1,580,261	1,308,519	1,320,832
Investment	565,033	565,033	565,033	565,033	308,200	335,422
Repayment of principal	825,740	825,740	825,740	825,740	825,740	825,740
Interest on Long-term Loans	234,215	219,306	204,397	189,489	174,580	159,671
Cash Balance	995,609	1,010,518	1,025,427	1,040,336	1,312,078	1,299,765
Cash Ending	14,915,958	15,926,477	16,951,904	17,992,240	19,304,318	20,604,083

Balance Sheet

Year	2018	2019	2020	2021	2022	2023
Current Assets	14,915,958	15,926,477	16,951,904	17,992,240	19,304,318	20,604,083
Cash & Deposit	14,915,958	15,926,477	16,951,904	17,992,240	19,304,318	20,604,083
Fixed Assets	14,759,406	14,779,767	14,800,128	14,820,489	14,584,016	14,374,766
Total Assets	29,675,364	30,706,243	31,752,031	32,812,728	33,888,334	34,978,849
Liabilities	12,207,918	11,382,179	10,556,439	9,730,699	8,904,960	8,079,220
Short-term Loans	0	0	0	0	0	0
Long-term Loans	12,207,918	11,382,179	10,556,439	9,730,699	8,904,960	8,079,220
Net Worth	17,467,446	19,324,065	21,195,593	23,082,029	24,983,375	26,899,629
Total Liabilities & Net Worth	29,675,364	30,706,243	31,752,031	32,812,728	33,888,334	34,978,849

Financial Indicators	2018	2019	2020	2021	2022	2023
Rate of Return Fixed Assets	14.1%	14.0%	14.0%	14.0%	14.2%	14.4%
Debt Service Coverage Ratio	2.47	2.51	2.54	2.58	2.62	2.66
Operating Ratio	34.2%	34.2%	34.2%	34.2%	34.2%	34.2%
Working Ratio	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%

Table 21.3.4Financial Statements
Incremental traffic

Income Statement (Unit Rs.1,000)

Year	2024	2025	2026	2027	2028	2029
Operating Revenue	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256	3,156,256
Operating Expenses	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331	1,080,331
Personnel & Administration	118,500	118,500	118,500	118,500	118,500	118,500
Maintenance	252,782	252,782	252,782	252,782	252,782	252,782
Maintenance Dredging	164,377	164,377	164,377	164,377	164,377	164,377
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Interest on Long-term Loans	144,762	129,853	114,944	100,035	85,126	70,218
Net Surplus	1,931,163	1,946,072	1,960,981	1,975,890	1,990,799	2,005,708
Accumulated Earnings	28,830,792	30,776,864	32,737,845	34,713,735	36,704,534	38,710,241

Cash Flow

Year	2024	2025	2026	2027	2028	2029
Cash Beginning	20,604,083	22,035,662	23,482,150	24,943,548	26,519,182	28,228,913
Cash Inflow	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597	2,620,597
Net Operating Income	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925	2,075,925
Depreciation	544,672	544,672	544,672	544,672	544,672	544,672
Long-term Loans	0	0	0	0	0	0
Cash Outflow	1,189,018	1,174,109	1,159,200	1,044,963	910,866	895,957
Investment	218,516	218,516	218,516	119,188	0	0
Repayment of principal	825,740	825,740	825,740	825,740	825,740	825,740
Interest on Long-term Loans	144,762	129,853	114,944	100,035	85,126	70,218
Cash Balance	1,431,579	1,446,488	1,461,397	1,575,634	1,709,731	1,724,640
Cash Ending	22,035,662	23,482,150	24,943,548	26,519,182	28,228,913	29,953,553

Balance Sheet

Year	2024	2025	2026	2027	2028	2029
Current Assets	22,035,662	23,482,150	24,943,548	26,519,182	28,228,913	29,953,553
Cash & Deposit	22,035,662	23,482,150	24,943,548	26,519,182	28,228,913	29,953,553
Fixed Assets	14,048,610	13,722,454	13,396,299	12,970,815	12,426,143	11,881,471
Total Assets	36,084,272	37,204,605	38,339,846	39,489,996	40,655,056	41,835,023
Liabilities	7,253,480	6,427,741	5,602,001	4,776,261	3,950,522	3,124,782
Short-term Loans	0	0	0	0	0	0
Long-term Loans	7,253,480	6,427,741	5,602,001	4,776,261	3,950,522	3,124,782
Net Worth	28,830,792	30,776,864	32,737,845	34,713,735	36,704,534	38,710,241
Total Liabilities & Net Worth	36,084,272	37,204,605	38,339,846	39,489,996	40,655,056	41,835,023

Financial Indicators	2024	2025	2026	2027	2028	2029
Rate of Return Fixed Assets	14.8%	15.1%	15.5%	16.0%	16.7%	17.5%
Debt Service Coverage Ratio	2.70	2.74	2.79	2.83	2.88	2.92
Operating Ratio	34.2%	34.2%	34.2%	34.2%	34.2%	34.2%
Working Ratio	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%

Chapter XXII Improvement Plan of Management and Operation System for the Short-term Plan

22.1 Future Port Management and Operation System for MBP

22.1.1 Organization of New Container Terminal

The terminal operator of the New container terminal needs to establish the organization having the following divisions to manage a full-fledged container terminal.

(1) Loading/unloading Division

- Planning and operating loading/discharging
- Receiving relevant information from shipping lines/agents
- Providing information on vessels' arrival for related parties

(2) Yard Control Division

- Arranging necessary cargo handling equipment, operators and workers
- Supervising the container handling operation in CY, controlling the flow of tractor trailers from outside the gates
- Controlling inventory of containers stored in the container terminal
- Compiling the data of storage fee and statistics

(3) Gate Operation Division

- Delivering/receiving containers at the terminal gates
- Checking the document to be exchanged with trailer drivers
- Checking container numbers and seal numbers
- Checking the exterior of containers and damage of containers

(4) Documentation Division

1) Export section

- Checking the booking of shipping lines/agents
- Checking the permission of Customs
- Compiling the data concerning detention charge

2) Import section

- Checking the data of cargo manifest

- Checking the schedule of the container delivery by transporters or shipping lines /agents
- Checking the permission of Customs
- Compiling the data concerning demurrage

(5) Maintenance Division

- Maintenance of cargo handling equipment
- Maintenance of terminal facilities (e.g. a substation at CY, lighting facilities and electrical system of the refrigerated containers)
- Plugging/unplugging refrigerated containers
- Monitoring temperature of refrigerated containers

22.1.2 Organization of New CFS (Container Depot)

The operator of the New CFS (container depot) needs to establish the organization having the following divisions to manage the CFS.

(1) Export Division

- Checking the bookings of shipping lines/agents
- Checking the permission of Customs
- Ordering the dispatch of empty containers
- Preparing the plan of stuffing cargoes
- Ordering the delivery of loaded containers to CY
- Compiling the data concerning operation

(2) Import Division

- Checking the cargo manifest
- Checking the permission of Customs
- Ordering the dispatch of loaded containers
- Ordering the dispatch of cargoes destuffed from containers
- Ordering the return of empty containers
- Compiling the data concerning operation

(3) Operation Division

- Stuffing/destuffing cargoes into/from containers(*)

* Employees of private companies are involved in the operation of cargo loading (unloading) to (from) consignees' (shippers') trucks.

(4) Gate Security Division

- Controlling inflow and outflow of the vehicles into/from CFS(container depot)
- Checking the documents (e.g. gate pass)

22.1.3 Flow of Containers through the New Container Terminal

(1) Export Containers

Terminal operator begins to receive export containers from a week before the arrival of the vessel. Shippers arrange tractor trailers and bring loaded containers to the Container terminal. At the gate of terminal, gate clerks check the exterior and seal of the containers. (In case of refrigerated containers, they also check the temperature of containers.) Then they weigh the containers on the scales. They input necessary data (container number, name of shipping company, name of vessel, port of discharge, size of container, weight, cargo description, customs clearance is done or not) into a terminal computers at gate house. Gate clerks instruct the stacking location of containers. At the same time, this information is transmitted to operators of RTGs via Yard Operator from Gate clerks. The driver of tractor trailer goes to the designated place of CY and waits for an RTG. An RTG moves to the place where the tractor stays. Then the RTG picks up the container from the trailer and stacked in the designated slot. After arrival of a vessel, RTGs pick up containers and load them onto yard trailers according to the working schedule prepared by the ship loading planner. Yard trailers carry the containers to the place below the designated quay side gantry crane. According to the working schedule, quay side gantry cranes pick up the containers from yard trailers and load the containers into the designated slot in hold or on deck of a vessel.

(2) Import Containers

The ship planner receives documents related to the import containers (bay plan of vessel, cargo manifest, hazardous cargo list, information on refrigerated containers and special cargoes) at least three days before the arrival of the vessel from the shipping line/agent. The ship planner considers above mentioned information very carefully and prepares the unloading

schedule to make operation time shortest. After the berthing of the vessel, operators of quay side gantry cranes unload containers from the vessel to yard trailers according to the unloading schedule. Yard trailers move containers from quay side to the designated place in CY. RTGs pick up the containers from yard trailers and put them on the designated locations. After finishing unloading containers, a shipping line/agent notices the arrival of the vessel to each consignee. At the shipping line/agent office, consignees get D/O in exchange of B/L. Then the consignee inform the documentation division of the container terminal when to pick up the container. Documentation division of the terminal checks D/O and permission of Customs clearance or bonded transportation. Demurrage or other charges are recovered at the release of the containers, if necessary. Then documentation division sends the delivery application to yard control division. Yard control division checks the yard plan with the delivery application by consignees and makes the list of containers for delivery. Drivers of container trailers arranged by consignees presents D/O to the gate clerks at the gate house. The gate clerks check D/O against the list of containers for delivery. If the container is on the list, the clerk let the driver go to the designated location for receiving the container. Yard operator instructs a operator of RTG to pick up the container for delivery. The operator of RTG checks the number of the container and RTG picks up the container from the stack of containers and loads it onto the trailer. The driver of trailer stops at the out lane of the gate where the gate clerk checks the exterior and seal of the container.

22.1.4 Operation in the New Container Terminal

(1) Ship planner

Before arrival of the vessel, it is necessary to prepare the working schedule to increase the operation efficiency and to make the berthing time of the vessel as short as possible. The roles of the ship planner are to prepare the working schedule and to supervise the overall operations. Each division of the terminal prepares its operation according to this working schedule. The efficient operation depends on the preparation of this working schedule.

About one week before the arrival of the vessel, the planner contacts the shipping line/agent and confirms the calling schedule of the vessel.

The planner gets concerned documents (bay plan of the vessel, list of unloading containers, cargo manifest, hazardous cargo list, booking summary) to check the following items.

-Volume of containers (20',40')

-Container number

-Detail of refrigerated containers

-Hazardous cargo

-Special containers

-Special cargoes

[Unloading]

The planner allocates the slots for unloaded containers based on the volumes and types and inputs data of the available spaces into the computer.

The planner prepares the working schedule for each quay side gantry crane considering the sequence of unloading containers and equalizing the work loads of two quay side gantry cranes engaged in the same vessel's operation.

The computer operator inputs the data of container numbers and weights referring to the bay plan of the vessel. Computer outputs the sequence list of discharge containers based on the yard planning system deciding the stacking spot of discharge containers.

[Loading]

The computer operator allocates yard space by vessel, port of discharge, weight and container size referring to the booking summary and inputs these information into a terminal computer.

After cut-off time, the computer outputs the yard plan indicating the stacking situation, the number of containers, container size and weight.

The planner checks the available spaces in the hold or on the deck of the vessel referring to the bay plan of the previous port. After cut-off time, planner makes the bay plan and decides the location of export containers in the vessel based on the port of discharge, container size and weight considering the operation time at the port discharge, draft, trim, careen and stability of the vessel. The personnel qualified as a captain or first officer or regarded as having the same ability should be engaged in the ship planning.

The planner makes the working schedule for each quay side gantry crane considering the sequence of loading containers and equalizing the work loads of two quay side gantry cranes engaged in the same vessel's operation.

The computer operator inputs the data of the bay plan of the vessel into the computer. The computer retrieves the container numbers of loading containers in order consistent with the bay plan of the vessel and then it outputs the sequence and location of loading containers.

The planner distributes copies of the working schedule to the concerned personnel, such as yard operator, quay side gantry crane operators, RTG operators and tractor drivers.

(2) Container yard operation

1) Quay side gantry crane operator

Containers are carried under the gantry crane by yard trailers according to the working schedule. The crane operator checks the container number and loads the container to the designated place in the hold or on the deck of the vessel.

2) Foreman

A foreman on board per crane checks the numbers of loading and unloading containers. If the number of containers would be less or more than that of the working schedule, he would have to report to the control center. Foremen supervise lashing/unlashing operation of containers, too.

3) Yard trailer

Three yard trailers work for a quay side gantry crane. Drivers receive the working schedule before operation. The drivers go to the designated place in CY according to the working schedule. A container is loaded onto the trailer and carried under the quay side gantry crane. Three drivers make up a team and they pick up the containers to be loaded in turn. Therefore it is very important for them to maintain the right order so as not to pick up the wrong container. They must not go under other quay side cranes. Drivers have to report to the control center if the wrong container is loaded.

4) RTG

At the loading/unloading operation, one RTG works for one quay side gantry crane. Other RTGs are engaged in the operation receiving/delivering containers with tractor trailers from the outside of the terminal. In case of loading, operators of RTG extract

the containers from piles in CY and load them onto the trailers according to the working schedule. In case of discharging, the operators unload containers from trailers and stack them to the designated place in CY.

5) Yard operator

The yard operator always stands by in the control center to monitor loading/unloading operation and yard operation. If some trouble with the cargo handling equipment occurs, the yard operator contacts the maintenance team for them to repair it. In such a case, yard operator must minimize the breakdown time of the equipment. Yard operator communicates with foremen and grasps the situation of operations. Yard planner suggests to the ship planner that the working schedule should be changed, if necessary.

6) Yard planner

a) To decide the stacking place of containers to be received/delivered at CY from one week before the arrival of the vessel

b) To prepare the yard plan, which includes the name of vessel, port of discharge, weight and container number

c) To prepare the sequence list of unloading containers considering the bay plan of the vessel. (Supporting the ship planner)

d) To prepare the sequence list of shifting containers considering the work schedule.

e) To prepare the list of containers for delivery checking with the yard plan and delivery application.

(3) Container gate operation

Container gates play important roles in receiving/delivering containers from/to shippers/consignees. Every container must pass through terminal gates, which are the final check points to find a mistake. If a gate clerk does not identify an error, both the shipper/consignee and a shipping line would have trouble. Delivering containers is one of the most important functions of a container terminal. Gate is the boundary separating the limit of responsibilities between shippers/consignees and a shipping line.

[Receiving]

1) To check the container number, seal number and condition.

2) To check the outside of containers (loaded) or both the inside and outside of containers (empty)

3) To weigh containers on the scales

4) To receive the gate slip indicating name of vessel, container number, size and type of container, port of discharge, name of shipper, kind of cargo and weight of cargo from a driver of trailer

5) To input the above mentioned information into a terminal computer

6) To instruct the driver of trailer the location to go

[Delivery]

1) To check the D/O presented by the trailer driver against the list of containers for delivery

2) To instruct the trailer driver the location of delivery

3) To check the exterior and seal of the containers

4) To let the trailer driver sign the receipt of the container

(4) Documentation

1) Import

- To check the working plan (discharging) with cargo manifest and CLP (Container Loaded Plan) a few days before the arrival of the vessel
- To prepare the discharge container list, which includes the following information

  Port of loading, FCL or consolidated, B/L number, size of container, consignee, customs broker
- To distribute it to the concerned divisions
- To prepare the list of special containers
- To issue the dispatch order after checking the D/O and permission of import/bonded transportation and to pass the application for delivery to the yard planner

2) Export

- To get the booking list from a shipping line/agent one week before the arrival of the vessel
- To inquire of the shippers and shipping line/agent the date to receive cargo and necessary documents
- To issue D/R after checking the export permission and CLP

(5) Maintenance and repair

Problems with quay side gantry cranes and RTGs stop the flow of containers and make the berthing time of a vessel longer. The following countermeasures are necessary.

1) Mechanics of cargo handling equipment must be on stand-by during the operation.

2) Periodic check-up and maintenance should be conducted.

3) Maintenance shop should keep enough stocks of spare parts for every type of cargo handling equipment.

22.2 Training Methods and Curriculum for Port Employees

22.2.1 Basic Concept of Training for Port Workers

Most of the port workers in the port of Mumbai have very low formal education. Inadequate education and the relatively higher average age of the port workers makes it difficult for them to be retrained. Management has not given training of the dock workers any priority for all these years. Most of the training given to them is related to safety. There is no training institute of the port for the workers (at least till recently). Management considers dock work as unskilled work. However even this unskilled work of cargo handling requires considerable ingenuity and skills acquired through informal on-the-job-experience. Most of the resistance to retraining to adjust one's skills and the resistance to the deployment can be mitigated if continuous attitudinal training of the dock workers is introduced.

In the textile industry, the Government of India and the employer have not been able to retrain their surplus labor and accordingly to redeploy them in various other departments within the same firm for the very reason mentioned above.

The management should make the port workers retrainable through attitudinal training. This is not a one day job.

22.2.2 Cargo Handling

(1) Container Handling

In the opening of the new container terminals under the closed terminal operation system at the port of Mumbai, it will be necessary to train employees to acquire operational know-how and skills to control containers within the terminals.

For the personnel at a control office, it is necessary to invite several foreign experts specializing in yard planning, stowage planning and documentation, to assist in on-the-job training.

For the operators of newly introduced machines such as quay side gantry cranes and RTGs, machine manufacturers generally dispatch operational instructors in the beginning of the operations. They will transfer operational skills mainly by on-the-job training using

machines newly procured at the actual container yard.

A modern container terminal must have its own maintenance shop for container-handling machines within the terminal. It is also expected that manufacturers of newly introduced machines dispatch maintenance engineers to give on-the-job training to ports' engineers/mechanics at the work shops in the beginning of the operations.

Prior to on-the-job training, it is advisable to have theoretical training on the newly introduced technology in the various fields. This would include lectures by the respective experts.

Once personnel of the new terminal obtains the above technology of container-handling operations from foreign experts, in turn, some of them could become instructors for new comers who will be recruited or transferred from other sections.

Training items of container-handling are listed as follows by job classification:

(1) Planning of container handling operation

[Theory]	[Practice]
- Port management	- Vessel's entry / departure
- Handling system	- Loading / unloading
- Shipping transport	- Delivery / receipt
- Container transport	- Stowage plan
- Structure of vessel	- Stacking plan
- Customs system	
- Trading system	
- CFS	
- Special container handling	

(2) Operation of container handling equipment

[Theory]	[Practice]
- Mechanical and electrical engineering	- Quay side gantry crane
- Specification of equipment	- RTG
- Structure and installation	- Top lift truck
- Function of equipment	- Forklift

- Fuel oil and lubricating oil
- Cargo handling system
- Basic dynamics
- Tractor/trailer

(3) Maintenance & repair

[Theory]	[Practice]
- Outline of maintenance & repair	- Quay side gantry crane
- Maintenance & repair guidance	- RTG
- Fuel oil and lubricating oil	- Top lift truck
- Management of spare parts	- Forklift
- Mechanical and electrical engineering	- Tractor / chassis
- Report	

(4) Container handling operation

[Theory]	[Practice]
- Container handling system	- Container handling operation
- Sling and tools	
- Weight and measurement	
- Names of container parts	
- Kinds and names of container	
- Kinds of handling equipment	
- Kinds of goods	
- Outline of vessels	

(2) Break Bulk Cargo Handling

Since various kinds, types and sizes of conventional break-bulk cargoes are co-stowed in the holds of a general cargo vessel, it is essential to train planners of cargo-handling operations to arrange required gangs, cargo-handling machines including ancillary tools and storage yards for her cargo prior to her arrival at a port. In the port of Mumbai, the planners could be trained by foreign experts through on-the-job training at the respective operation division offices.

It is advisable to dispatch the Indian planners to private stevedoring companies abroad

which are in operations at international leading ports under severe competition so they can observe first-hand efficient cargo-handling methods.

Together with the training of the planners of cargo-handling operations, it is necessary to train foremen who instruct gang workers to stow break-bulk cargoes adequately according to the instruction by vessel side, or conversely take out the cargoes from the holds. Stowing of loose cargoes requires a great deal of skill and experience, which should be emphasized during the training. Such training is done by foreign experts or senior foremen through on-the-job training.

It is also necessary to train operators of machines including quay-side cranes, and forklift trucks systematically. The training can be done by skilled operators through on-the-job training using actual machines at operational sites.

Training items in handling conventional break-bulk cargo are listed as follows by job classification:

1) Planning of general cargo handling operation

[Theory]	[Practice]
- Port management	- Vessel's entry/departure
- Handling system	- Loading/discharging
- Shipping transport	- Delivery/receipt
- Structure of a vessel	- Stowage plan
- Customs clearance	
- Trading system	
- Hazardous cargo and chemicals	

2) Operation of cargo handling equipment

[Theory]	[Practice]
- Mechanical and electrical engineering	- Jib crane (derrick)
- Specification of equipment	- Quay side tower crane
- Structure and installation	- Fork lift
- Function of equipment	
- Fuel oil and lubricating oil	

- Cargo handling system
- Basic dynamics
- Hazardous cargo and chemicals

3) Maintenance and repair

[Theory]
- Outline of maintenance and repair
- Maintenance and repair guidance
- Fuel oil and lubricating oil
- Management of spare parts
- Mechanical and electrical engineering
- Reports

[Practice]
- Jib crane (derrick)
- Quay side tower crane
- Fork lift

22.2.3 Training for Computer Operation

(1) Computer Operation in the new container terminal

For the employees who belong to not only cargo operation sections but administrative sections, it is necessary to participate in training courses about on-line operation of terminal computers. The company compiling programs and setting up net work systems should dispatch instructors to every section where terminal computers are installed. Participants of training need to operate computers by themselves according to the instruction of instructors and can ask experts questions concerning computer operations and get immediate answers. All the employees should join the training course, but if the number of participants or period of training courses would be limited, participants of the course would need to become instructors at their divisions for other employees.

Training items of computer operation are listed as follows:

1) How to input data
2) How to retrieve data
3) How to process data
4) How to transmit data
5) How to aggregate data and compile statistics

(Examples of data)

- Applications for vessels' entry/departure, berthing
- Cargo handling information

  Loading/unloading plan, Stacking plan, Stowage plan, In-yard movement, CFS container control
- Receiving/delivery information

  Gate-in or gate-out container, Container inventory control
- Port charge collecting information
- Vessels' information

  Vessels' calling schedule, Allocation of berths
- Statistics

(2) Off-line Operation of Terminal Computer

Employees engaged in administrative works have much opportunity to use computers at the off-line operation. Computers could change manual work at administration section more efficiently.

(Examples)

Personnel management, Salary of employees, Accounting, Documentation

A computer will become an indispensable tool for administrative work. Therefore all the staff members of administrative section have to be able to operate computers. It will be necessary for beginners to participate in a basic training course. On-the-job training is the most effective method to learn how to operate a personal computer.

Training items of computer operation are listed as follows:

1) Basic operation of OS
2) Operation of application software
   - Word processor
   - Spread sheet
   - Data base

22.2.4 Human Resource Development for Administration Staff

For human resource development for administration staff, it is recommendable to dispatch high level personnel to other advanced foreign ports under highly market-oriented system. At these ports all the operations including administrative work are very efficient adopting streamlined system using progressive computer systems. By visiting these ports, they could learn different methods of administrative work. After returning home, they could pass on this knowledge to other staff members of the administration section.

22.3 Other Improvement Plans

22.3.1 Simplified Procedure for Disposal of Uncleared Cargoes

Customs Act and Major Port Trust Act prescribe the procedures for disposal of uncleared cargoes. At present, it usually takes about one year for MBPT to conduct public auction of uncleared cargo from discharging. To shorten the period to finish the required procedures, amendment of the Acts is necessary, but this may be difficult. By introducing the computer system, it is possible to simplify and speed up, to some extent, the procedures for disposal of uncleared cargoes without the amendment of the Acts. At every stage, staff of MBPT prepare the different documents, which include the basic information on uncleared cargoes. It will not be necessary to enter same information on uncleared cargoes in documents repeatedly once necessary information is inputted into a terminal computer before discharging of cargoes. Based on the clearance information from Customs computer system, computer can extract the necessary information on uncleared cargoes and compile and output the list of them. It is easy to update the information even if some cargoes are cleared after start of the procedures. Computer can store the information on valuation and compile the data base of valuation of cargoes by category. Staff can refer to this data system when they decide the minimum bidding price for the public auction. This is another merit of the computer system.

At present valuation of the cargoes is conducted according to the market price. Prices on documents (for example, invoice) are not used. The staff members have to research the market price of every uncleared cargo and decide the minimum bidding price. Since the minimum bidding price is based on the market price (retail price), the price may not be attractive for potential bidders. It is recommended that the wholesale price should be used at the valuation of uncleared cargoes to attract potential bidders.

It is also necessary to train the staff members to make them knowledgeable in commodities.

22.3.2 Simplified Procedure for Bonded Transport

It is recommended that comprehensive permission of bonded transport system should be introduced in case of containerized cargo. If a shipping line or a transporter nominated by a shipping line/agent transports containers in bond continuously from the dock to the specific container depots(CFSs)/ICDs in the country and vice versa, authority should give them comprehensive permission within a certain period. Once getting this permission, the shipping line/agent or the transporter does not need to get the permission of bonded transport individually during the period. This permission can be renewed unless an accident takes place during the period. The shipping lines/agents submit the list of the containers in advance to Customs and MBPT. At the gate of the container terminal, CFS (container depot) or ICD, only container numbers and seals are checked.

Besides the comprehensive permission, it is advisable to use the computer system to simplify and shorten the time of processing for bonded transport of containers. Before arrival of a ship, shipping lines/agents or customs brokers apply bonded transport through the computer network and feed basic cargo information written on cargo manifest into the terminal computers and transmit to the host computers of Customs and MBPT. Customs and MBPT can identify the containers to be transported in bond from the dock to ICDs. Customs officers at the dock check the container number, seal number and whether seals of containers are intact or not. Then shipping line/agents or customs brokers get the permission of bonded transport from Customs after Customs confirms bond of the shipping line/agent or the customs broker. The information on the permission of bonded transport is transmitted to MBPT through the computer network. After MBPT confirms the permission of bonded transport and the payment of port charges, MBPT releases the containers. Information on containers transported in bond is transmitted to ICDs from the port through the computer network. Customs officers at ICD get the basic information on the container transported in bond by rail/road before the arrival of the train/tractor and check the container numbers and seal numbers and whether the seals of the containers are intact or not. If they find that a seal has been tampered with, they have all the cargoes in the container destuffed and inspect the cargo and container thoroughly.

Chapter XXIII Environmental Impact Assessment

23.1 General

23.1.1 Environmental Quality Standards in India

The environmental quality standards for emission on the discharge of environmental pollutants from the industry, operations, processes are prescribed in the various schedule of the Environment Protection Acts/Rules. The above standards are specified for the following purposes:

- Protecting and improving the quality of the environment
- Prevention and abatement of environmental pollution

The Central Government (India) has laid down the rules/regulations to regulate the environmental pollution in the following matters:

- The standards of quality of air, water and soil
- The maximum allowable limits of concentration of various pollutants
- The procedure and safeguards for handling hazardous substances
- The prohibition and restriction on the handling of hazardous substances
- The procedures and safeguards for the prevention of accidents and for providing remedial measures.
- The prohibition and restriction of the selection of location of industries and on process and operations.

The standards for few environmental parameter are specified here. The general standards for discharge of environmental pollutants, i.e. Effluents discharge to marine coastal area, are mentioned in Appendix A-8.1 and other standards of marine water quality are presented in Appendices A-8.1(a), A-8.1(b) and A-8.1(c).

The ambient primary and secondary standards for gaseous pollutants are mentioned in Appendix A-8.2. The ambient air quality standards in respect of noise are mentioned in Appendix A-8.3. All standards are being followed as per "The Environment Protection Acts/Rules, 1986" and subsequent Amendments by Ministry of Environment and Forest; and

standards prescribed by MPCB. The international standards for gaseous pollutants and noise impacts are mentioned in Appendix A-8.4.

23.1.2 Overview of Existing Environmental Situation in India

(1) Introduction

Most governments are now well aware of the possibility of undesirable side-effects from large scale development projects. Increasingly, Governments and international agencies are adopting regulations that legally require developers to undertake Environmental Impact Assessment Study. The developers are recognising that environmental problems not only lead to risks and costly liabilities, but also cause concern about the developers effectiveness across the full range of its responsibility. So the EIA has been integrated with the project cycle.

Sustainable development is the cornerstone of the policies and procedure encouraging development activity in India. The Govt. of India is emphasising conservation, protection and preservation of the environment to maintain the Indian ethos, culture and traditions. The Indian Constitutions enjoins the "Status to take measures to protect and improve the environment and to safeguard the forests, lakes, rivers and wild life of the country."

(2) EIA Capability

The Ministry of Environment and Forest (MOE&F) of India is assigned the Environmental Impact Assessment study for development of projects prior to any investment decision. The study "Development of Mumbai Port" will be carried out by JICA and a memorandum of understanding was signed by Ministry of Surface Transport (MOST), Govt. of India and Japan International Co-operation Agency (JICA). The focus of the study will be the implementing of the EIA procedures in India and a pilot project for Development of Mumbai Port is being taken into consideration.

(3) EIA Procedures

EIAs are generally carried out as per Environmental Procedure and Guidelines, issued by MOE&F, Govt. of India, 1994. The Port and Harbour Project is one of the projects listed in

schedule in the EIA Notification, 1994. It is intended that the suitable procedure will be followed along the guidelines given in the following documents:

- Environmental Guidelines for ports and Harbour Project MOE&F, Govt. of India, 1989.
- World Bank Environmental Assessment Source Book, Volume II - Sectoral Guidelines, Environment Department.
- Environmental Guidelines for selected Infrastructure Projects, Asian Development Bank.

The Environmental Appraisal Committee will scrutinise the documents submitted by the Investors with help of multi-disciplinary staff complement functioning in the MOE&F. The proper Environmental policy, planning and institutional framework will be acting on this EIA process.

(4) Existing Environmental Quality in India

Environmental pollution is the one of the most serious problems in India with various kinds of pollution affecting the quality of life. Water pollution is by far the most serious in its implications for the health and well-being of Indian citizens. Threats to natural environment are pollution, overuse and destruction.

1) Water pollution

Water pollution is becoming acute in many regions of India due to direct discharge of wastewater to the water courses. Although at a national level there is no shortage of water in India, 14 major rivers, other medium and minor rivers, lakes, tanks, etc, provide for fresh water needs. These water courses satisfy the various domestic demands besides those of agriculture, industries, fisheries, navigational and power generation as well as needs for receptacles. The picture of water pollution in India is uniformly gloomy as even large perennial rivers like the Ganga are today heavily polluted.

Investigation by the Central and State Boards for the Prevention and Control of Water Pollution shows that the major sources of pollution of natural water courses including coastal waters are the discharge of community waters from human settlements. Most of the waste water from the community and industrial waste water are discharged off into water courses, rendering it unfit for drinking water sources.

2) Air pollution

Air pollution is usually associated with major industrial growth and urbanisation projects and commercial activities. The problems of air pollution are becoming severe in major cities in India like Calcutta, Delhi and Mumbai. A high background dust level during certain period/ season aggravates the problematic situation. The level of sulphur dioxide, oxides of nitrogen and particulate matter in certain major cities exceed the permissible limits specified by organisations like World Health Organisation (WHO).

3) Noise pollution

In major cities and big towns, the noise pollution is very much serious. The growing threat is immense to physiological and mental well being from community noises in the occupational environment. There are few laws to control noise but not sufficient, hence there is a clear need for comprehensive legislation to abate noise pollution and save the health from serious nuisance.

4) Land pollution

Pollution of land becomes serious recently largely from improper disposal of solid waste and irregular solid waste management technique. Open dumping is common process in India for solid waste treatment. This serves serious breeding ground for pests and disease carrying vector. In India, those most deeply affected by environmental degradation/deterioration are the poor. Displaced and dispossessed by deforestation and other natural resources exploitation, they are the first victims of poor sanitation, bad air, contaminated water and scarce wood for fuel and fodder. India's poor are the ones who suffer most from the deterioration and loss of the nation's precious things, i.e. water, air, soil and forest.

Hence, the environment is to be protected with the following activities :

- Land Conservation
- Soil Conservation
- Water Conservation and Water Budget
- Pollution Control
- EIA/EIS/EMP
- Ecological restoration of degraded areas/biological balance
- Forestry
- Wild life protection including rare/endangered species protection
- Remedial measure for global warming & ozone depletion.

5) Environmental problems and actions in India

The scenario of environment and forests continues to cause concern. Destruction and degradation of ecosystem are taking a heavy toll of soil and water resources. And there exists a pressure on natural resources from an increasing population which is 850 million at present and projected to reach 1000 million by 2000 A.D.

The environmental problem in India is classified into two broad categories:

a) Problems arising from conditions of poverty and underdevelopment, and

b) Problems arising as negative effects of the very process of development.

General

- Of the 266 million hectare of land considered productive, about 175 million hectare are degraded in varying degrees (acid, alkaline, saline, water logged, ravines etc.) About 90 million hectare are acutely degraded, chiefly on account of a loss of free cover and top soil, leading to floods and droughts.
- An estimated 6000 million tonnes of top soil with essential nutrients is flowing into the sea every year.
- Depletion in forest cover to about 10 per cent of the total geographical area, instead of the desired 33 per cent, India has only 2 per cent of the forest land of the world but supports 16 per cent of the world population.
- Shortage of fuel wood and fodder for rural needs, leading to pressure on or forests.
- Threats to faunal and floral species and biological diversity because of disturbance of their habitat.
- Adverse impacts of development activities such as mining, power generation, industrialisation and irrigation.
- Degradation of fragile ecosystems, such as mangroves, wetlands, beaches and hill areas for reasons such as over-exploitation, lack of tree cover, ill-advised agricultural practices, tourism and indiscriminate building activities.
- Pollution of water from domestic, commercial and industrial waste.
- Pollution of coastal areas and seas.
- Exploitation and destruction of marine ecosystem resources.
- Air pollution due to emission from industries.
- Increased production, transportation and use of hazardous chemicals.

- Degradation of the urban environment because of rapid expansion and inadequate basic services.
- Lack of sufficient environmental awareness.
- Global warming and depletion of the ozone layer.
- The Wildlife Protection Act, 1972.
- The Water (Prevention and Control of Pollution) Act, 1974, amended in 1978 and 1988.
- The Forest (Conservation) Act, 1980, amended in 1988.
- The Air (Prevention and Control of Pollution) Act, 1981, amended in 1988.
- The Environment (Protection) Act, 1986.

Institutions

The following major institutions have been established apart from the existing ones;

- The Department of Environment in 1980 and the integrated Ministry of Environment and Forests in 1985 at the Centre.
- Departments of Environment in almost all States and Union Territories. The Central Pollution Control Board and State Pollution Control Boards in most States.
- Indian Institute of Forest Management.
- Indian Council of Forestry Research and Education.
- National Land-Use and Wastelands Development Council in 1985.
- National Wastelands Development Board in 1985.
- Indian Board for Wildlife in 1952.

Land and Soil

- Surveys by the All India Soil and Land-use Survey Organisation.
- Treating catchment of river valley projects, integrated watershed management projects in catchment of flood prone rivers.
- Assistance to states to control shifting cultivation.
- Assistance for reclamation and development of ravine areas.
- Drought-prone areas programme.
- Desert development programme.

Biosphere Reserves

- Thirteen bio-geographical zones in the country have been identified for establishing bio-sphere reserves. Seven reserves have been notified so far. Management plans for these

reserves are under preparation. Central assistance has been provided to few States.

Islands

- Island Development Authority has been set up in 1986 and ecologically appropriate plans are under implementation.

Wetlands Mangroves Forests

- The National Wetlands Committee has identified 16 wetlands for conservation, management and research. Management plans are under preparation.
- A status report on mangrove areas has been prepared. The National Mangroves Committee has chosen 15 areas and has taken up the preparation of management plans.
- The first Forest Policy of India was announced in 1894 and revised in 1952. The new Forest Policy of 1988 approved by the government proclaims the principal aim of ensuring environmental stability and maintenance of ecological balance including atmospheric equilibrium.
- Afforestation has been taken up from the First Plan, but up to 1985 only 6 million hectares have been covered. The loss was assessed at 9.17 million hectares between 1972 and 1985 alone. The National Wastelands Development Board (NWDB) was established in 1985. In three years 5.04 million hectares of land has been covered with plantation. The Seventh Plan Achievement is over 9 million hectares.
- The Forest Conservation Act of 1980 has stringent provisions for checking the diversion of forest land for any other purpose. Between 1951 and 1980, the rate of diversion of forest land was about 150,000 hectares per annum. After 1980, it has been reduced to 6,500 hectares per annum.

Wildlife

- National Wildlife Action Plan was adopted in 1983. The Indian Board for Wildlife is the apex statutory body, with Prime Minister as Chairman. Sixty three national parks and 358 sanctuaries in the country covering an area of 133,000 sq. km. or about 4 per cent of the country's area. Sixteen tiger reserves in the country in which Project Tiger launched in 1974 has had great success. The Wildlife Institute of India at Dehradun was established in 1982.

Pollution Monitoring and Control

- Standards have been notified for many industries and under enforcement by the Central

and State Pollution Control Boards.

- Environment (Protection) Act, 1986, was enforced in many cases to take stringent action against continuously erring industries.
- Over 3,500 prosecutions were launched against erring industries throughout the country.
- Over 3,000 Water Quality Monitoring Stations and over 106 Air Quality Monitoring Stations and over 173 Coastal Monitoring Stations have been established throughout the country.
- Of 4,056 large and medium industries in the country, over 50 per cent have installed effluent treatment plants.
- Use-based zone and classification of the 14 major rivers in the country have been completed.

Control over hazardous substances

- The Environment (Protection) Act of 1986 provides for control of hazardous substances.
- Draft rules have been prepared for notification of hazardous chemicals and control of manufacture, storage and transportation, and disposal of such substances and wastes.
- A crisis management plan for chemical accidents has been prepared and a Central Crisis Group has been set up. Guidelines for similar action at State and district level have been issued. Fourteen States have so far prepared on site and off-site emergency plans and set up State level co-ordination committees.

Eco-Regeneration and Development

- Ganga Action Plan (GAP) was launched in 1985 at a total estimated cost of Rs. 292 crores to clean up the river and restore water quality. Two hundred sixty two schemes at a cost of Rs. 259 crores have been sanctioned for treatment of waste water and for prevention of pollution of the river. The Eighth Five Year Plan will convert the GAP into National River Action Plan.
- Yamuna Action Plan (YAP) was also launched.
- Eco-task forces of ex-servicemen were deployed in Uttar Pradesh, Rajasthan and Jammu & Kashmir for ecological restoration through afforestation and soil conservation.
- Eco-development camps were organised for youth through NGOs and public participation.
- National Parks and sanctuaries would be further strengthened.
- Krishna-Godavari (Karad) national River Action Plan also is in progress.

23.1.3 Institutional Situation of Environmental Impact Assessment in India

(1) Notification on Environmental Impact Assessment of Development Project

Ministry of Environment and Forests released "Notification on Environmental Impact Assessment of Development Project" on the 27th January, 1994. When focusing on Port Development Project (except minor port), expansion or modernization of any activity (if pollution load is to exceed the existing one) or a new project shall not be undertaken in any part of India unless it has been accorded environmental clearance by the Central Government in accordance with the procedure specified in the notification.

1) Outline of Environmental Clearance Procedure

a) Any person who desires to undertaken any new project or the expansion or modernization of "Port Development Project" shall submit an application to the Ministry of Environment and Forests.

b) The application shall be accompanied by a project report which shall include an Environmental Impact Assessment Report / Environment Management Plan prepared in accordance with the guidelines issued by the Ministry of Environment and Forests.

c) The reports submitted with the application shall be evaluated and assessed by the Impact Assessment Agency, and if deemed necessary it may consult a Committee of Experts.

d) The Impact Assessment Agency shall prepare a set of recommendations based on technical assessment of documents and data.

e) Summary of the reports, the recommendation and the conditions, subject to which environmental clearance is given, shall be made available to the concerned parties or environmental groups on request.

f) The assessment shall be completed within a period of ninety days from receipt of the requisite documents and data and completion of public hearing, when required, and decision conveyed within thirty days thereafter.

2) Exceptions

Exception of "environmental clearance" is defined due to "Explanatory Note Regarding the Impact Assessment Notification dated 27th January,1994".

If it is certified that no increase is likely to occur in the existing pollution load due to the proposed expansion or modernization, the project proponent will not be required to seek environmental clearance, but a copy of such certificate issued by the State Pollution Control Board (SPCB) will have to be submitted to the Impact Assessment Agency for information.

(2) Coastal Regulation Zone Notification

1) Definitions

Ministry of Environment and Forests released "Coastal Regulation Zone Notification" on the 19th February, 1991. Coastal Regulation Zone is defined as the coastal stretches of seas, bays, estuaries, creeks, rivers and breakwaters which are influenced by tidal action (in the land ward side) up to 500 m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and HTL. Coastal Regulation Zone (CRZ), which does not include any water area, is illustrated in Figure 23.1.1.

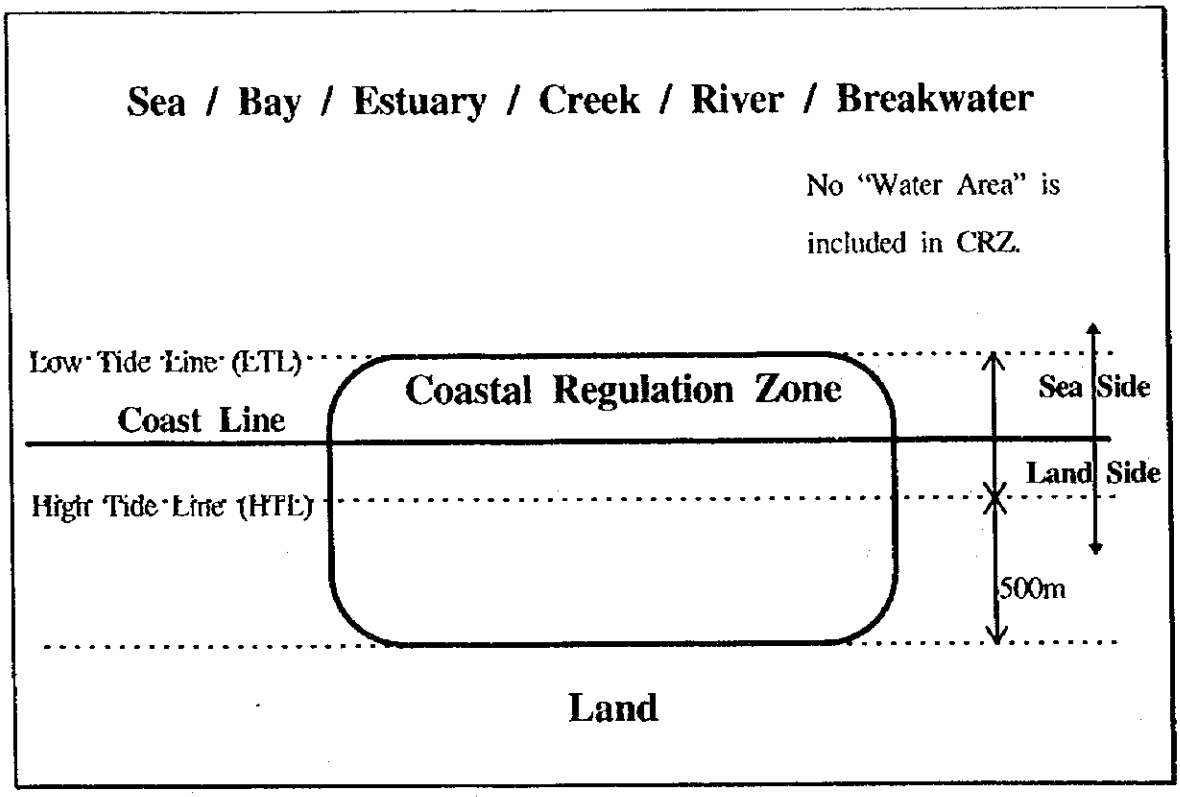

Figure 23.1.1 Definition of "Coastal Regulation Zone (CRZ)"

2) Prohibited Activities

As to "Port Development Project", "land reclamation" is prohibited within the Coastal Regulation Zone.

3) Permissible Activities

Concerning "Port Development Project", "operational construction" for ports and harbours requiring water frontages; jetties, wharves, quays, sleepways etc. will require environmental clearance by the Ministry of Environment and Forests. Clearance shall be given for any activities within the CRZ only if it requires water front and foreshore facilities.

(3) Draft Notification of Ocean Regulation Zone (ORZ)

Even though "land reclamation" is prohibited within a Coastal Regulation Zone by the said "Coastal Regulation Zone Notification", "land reclamation" on water area can be possible because CRZ itself does not include any water area. It is said that "Draft Ocean Regulation Zone (ORZ) Notification", which covers water area and similarly regulates activities within ORZ, is prepared by the Ministry of Environment and Forests. Definition of ORZ is illustrated in Figure 23.1.2. However, further information is not available at this moment.

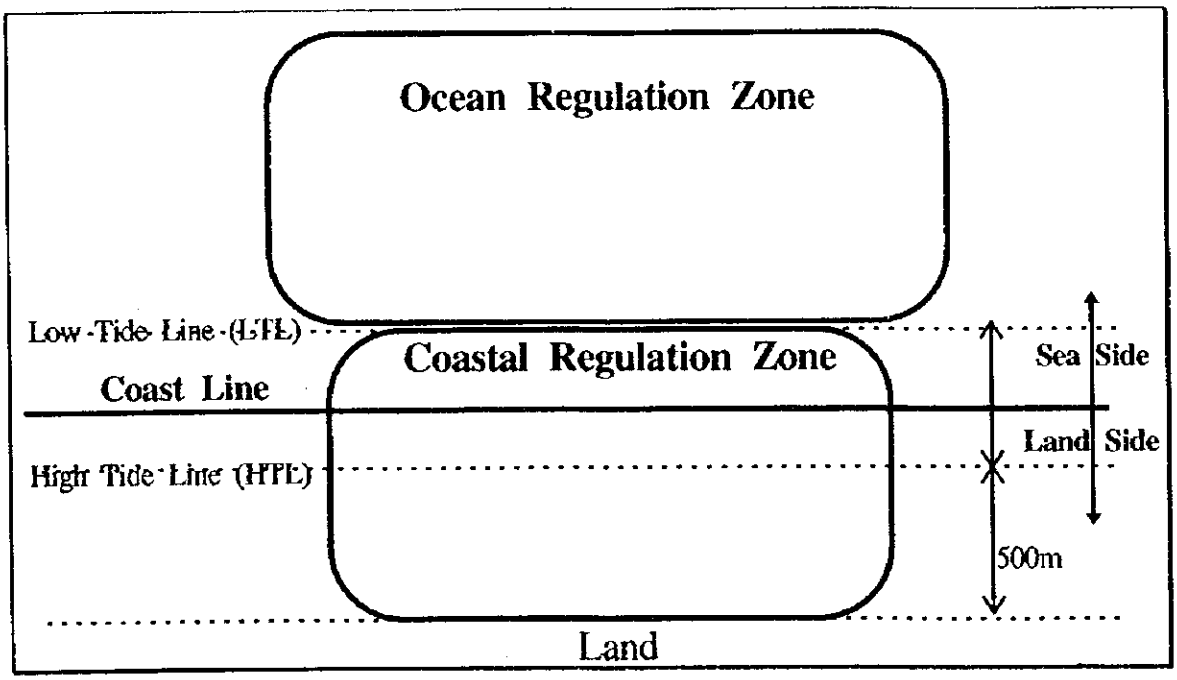

Figure 23.1.2 Definition of "Ocean Regulation Zone (ORZ)"

23.2 Description of the Short-term Development Plan

The Short-term Development Plan for the year 2007 is identified in Chapter 17. Summary of the proposed plan is presented in the following section.

Layout of the proposed short-term plan is shown in Figure 17.2.1, and project components are 1) three new off-shore jetty-type container berths connected to Victoria Dock Container Yard by access bridge, 2) 2,930 G. slots of container marshaling yard and 802 G. slots of empty container yard on Victoria Dock Container Yard, 3) dedicated road for container traffic between on-dock container yard and off-dock CFS and empty container yard and 4) Deepening both the basin of the proposed container berths, whose berthing area is deepened to -13.5m, and the Approach Channel to -11.0m.

Dimensions of the proposed project components are summarized in Table 23.2.1.

(1) Three New Container Berths

Three new off-shore jetty-type container berths are located approximately 800 meters off the Indira Dock Harbour Wall connected with Victoria Dock which is filled up as a container yard by access bridge using water-through structure such as pile-structure. In addition, the existing Ballard Pier Station (BPS) with container marshaling yard of 516 G. slots will be utilized as a container berth for the future.

The other side of the jetty facing Indira Dock Harbour Wall is planned to be used as a 500 m long berth for port service boats.

(2) Victoria Dock Container Yard

The container yard at Victoria Dock which is planned to be filled up accommodates 2,930 G. slots of laden containers and 802 G. slots of empty containers.

(3) Off-Dock Container Depots of CDW and TPS

Off-dock empty container yards of 2,299 G. slots are planned in off-dock area, 972 G. slots in CDW and 1,140 G. slots in TPS.

Table 23.2.1 Dimensions of Proposed Major Container Handling Facilities

Features	Unit	Alternative-6	
1. Existing Container Berths		Infrastructure	Equipment
1. Number of Berths		1	---
2. Berth Depth	(m)	-9.8	---
3. Berth Length	(m)	244	---
4. Berth Location		BPS	---
5. Quay-side Gantry Crane	(unit)	---	2
6. Transfer Crane	(unit)	---	3
2. Proposed Container Berths			
1. Number of Berths		3	---
2. Berth Depth	(m)	-13.5	---
3. Berth Length	(m)	300	---
4. Berth Location		800m off ID-HW	---
5. Quay-side Gantry Crane	(unit)	---	6
6. Transfer Crane	(unit)	---	19
3. Container Marshaling Yard		3,446	
1. Existing Yard	(G. Slots)	516	
2. Proposed Yard	(G. Slots)	2,930	
1. Yard Tractor-Chassis Unit	(unit)	---	97
2. Road Tractor-Chassis Unit	(unit)	---	55
3. ID-1	(G. Slots)	0	---
4. ID-2 to 5	(G. Slots)	0	---
5. ID-HW	(G. Slots)	0	---
6. VD-CY	(G. Slots)	2,930	---
7. CDW	(G. Slots)	0	---
8. TPS	(G. Slots)	0	---
9. CRS	(G. Slots)	0	---
4. Empty Container Yard	(G. Slots)	3,341	
1. Existing Yard	(G. Slots)	-	
2. Proposed Yard	(G. Slots)	3,154	
1. ID-1	(G. Slots)	240	---
2. VD-CY	(G. Slots)	802	---
3. CDW	(G. Slots)	972	---
4. TPS	(G. Slots)	1,140	---
5. CRS	(G. Slots)	0	---
3. Shortage of Yard	(G. Slots)	187	
5. Container Freight Station (CFS)	(sq. m)	67,687	
1. Existing CFS	(sq. m)	19,200	---
2. Proposed CFS	(sq. m)	19,200	---
1. CDW	(sq. m)	19,200	---
6. Dedicated Road for Containers			
1. No. of Lanes	(lanes)	4	---
2. Ground Length	(m)	1,000	---
3. Elevated Length	(m)	700	---

Remarks) BPS: Ballard Pier Station, ID-1: Indira Dock No. 1, ID-2 to 5: Indira Docks Nos. 2 to 5, ID-HW: Indira Dock Harbour Wall, VD-CY: Victoria Dock Container Yard, CDW: Cotton Depot West, TPS: Timber Pond South, CRS: Central Railway Stores

(4) Dedicated Road for Container Traffic

Dedicated road for container traffic would be essential to smoothly flow container traffic between on-dock container yard and off-dock CFS and empty container yard. The dedicated road starts from the gate of Victoria Dock Container Yard and extends to and connects with the Link Road. The fly-over structure is adopted for the dedicated road to cross over Malet Road so as to smoothly evacuate container out of the dock area. Heavy traffic congestion currently seen at the junction of Dock Expressway and Malet Road is expected to be reduced drastically by fly-over road.

General-purpose road along the container-dedicated road is prepared within the port area to flow port-related traffic including general cargo trucks. This could also reduce traffic congestion on P D'Mello Road where heavy congestion by both port-related traffic and city traffic is always seen currently.

(5) Deepening both the Basin and the Approach Channel to -11.0m

Both the basin of the proposed container berths, whose berthing pocket area is deepened to -13.5m, and the Approach Channel are planned to be deepened up to -11.0m.